SYSTEM LEVEL INTERVENTIONS, PREVENTION STRATEGIES, MITIGATION POLICIES AND SOCIAL RESPONSES DURING COVID-19 THAT IMPROVE MENTAL HEALTH OUTCOMES: EVIDENCE FROM LOWER- AND MIDDLE-INCOME COUNTRIES (LMICS)

EDITED BY: Manasi Kumar, Chiara Servili, Keng-yen Huang, Joanna Lai and Stefan Swartling Peterson

PUBLISHED IN: Frontiers in Psychiatry and Frontiers in Public Health

frontiers Research Topics

frontiers

ISSN 1664-8714
ISBN 978-2-88976-244-6
DOI 10.3389/978-2-88976-244-6

About Frontiers

Frontiers is more than just an open-access publisher of scholarly articles: it is a pioneering approach to the world of academia, radically improving the way scholarly research is managed. The grand vision of Frontiers is a world where all people have an equal opportunity to seek, share and generate knowledge. Frontiers provides immediate and permanent online open access to all its publications, but this alone is not enough to realize our grand goals.

Frontiers Journal Series

The Frontiers Journal Series is a multi-tier and interdisciplinary set of open-access, online journals, promising a paradigm shift from the current review, selection and dissemination processes in academic publishing. All Frontiers journals are driven by researchers for researchers; therefore, they constitute a service to the scholarly community. At the same time, the Frontiers Journal Series operates on a revolutionary invention, the tiered publishing system, initially addressing specific communities of scholars, and gradually climbing up to broader public understanding, thus serving the interests of the lay society, too.

Dedication to Quality

Each Frontiers article is a landmark of the highest quality, thanks to genuinely collaborative interactions between authors and review editors, who include some of the world's best academicians. Research must be certified by peers before entering a stream of knowledge that may eventually reach the public - and shape society; therefore, Frontiers only applies the most rigorous and unbiased reviews.
Frontiers revolutionizes research publishing by freely delivering the most outstanding research, evaluated with no bias from both the academic and social point of view. By applying the most advanced information technologies, Frontiers is catapulting scholarly publishing into a new generation.

What are Frontiers Research Topics?

Frontiers Research Topics are very popular trademarks of the Frontiers Journals Series: they are collections of at least ten articles, all centered on a particular subject. With their unique mix of varied contributions from Original Research to Review Articles, Frontiers Research Topics unify the most influential researchers, the latest key findings and historical advances in a hot research area! Find out more on how to host your own Frontiers Research Topic or contribute to one as an author by contacting the Frontiers Editorial Office: frontiersin.org/about/contact

SYSTEM LEVEL INTERVENTIONS, PREVENTION STRATEGIES, MITIGATION POLICIES AND SOCIAL RESPONSES DURING COVID-19 THAT IMPROVE MENTAL HEALTH OUTCOMES: EVIDENCE FROM LOWER- AND MIDDLE-INCOME COUNTRIES (LMICS)

Topic Editors:
Manasi Kumar, University of Nairobi, Kenya
Chiara Servili, World Health Organization (Switzerland), Switzerland
Keng-Yen Huang, New York University, United States
Joanna Lai, UNICEF United Nations International Children's Emergency Fund, United States
Stefan Swartling Peterson, Karolinska Institutet (KI), Sweden

Citation: Kumar, M., Servili, C., Huang, K.-Y., Lai, J., Peterson, S. S., eds. (2022). System level Interventions, Prevention Strategies, Mitigation Policies and Social Responses During COVID-19 That Improve Mental Health Outcomes: Evidence From Lower- and Middle-Income Countries (LMICs). Lausanne: Frontiers Media SA. doi: 10.3389/978-2-88976-244-6

Table of Contents

frontiers in Psychiatry

ORIGINAL RESEARCH
published: 02 September 2020
doi: 10.3389/fpsyt.2020.00824

Evaluating the Psychological Impacts Related to COVID-19 of Vietnamese People Under the First Nationwide Partial Lockdown in Vietnam

Xuan Thi Thanh Le[1†], Anh Kim Dang[1†], Jayson Toweh[2], Quang Nhat Nguyen[3,4], Huong Thi Le[1], Toan Thi Thanh Do[1], Hanh Bich Thi Phan[1], Thao Thanh Nguyen[1], Quan Thi Pham[1], Nhung Kim Thi Ta[1], Quynh Thi Nguyen[1], Anh Ngoc Nguyen[1], Quan Van Duong[1], Men Thi Hoang[3,5], Hai Quang Pham[3,5], Linh Gia Vu[6], Bach Xuan Tran[1,7], Carl A. Latkin[7], Cyrus S. H. Ho[8] and Roger C. M. Ho[9,10]*

[1] Institute for Preventive Medicine and Public Health, Hanoi Medical University, Hanoi, Vietnam, [2] Office of Inspector General Department, U.S. Environmental Protection Agency, Atlanta, GA, United States, [3] Institute for Global Health Innovations, Duy Tan University, Da Nang, Vietnam, [4] UFR Biosciences Department, Université Claude Bernard Lyon 1, Villeurbanne, France, [5] Faculty of Medicine, Duy Tan University, Da Nang, Vietnam, [6] Center of Excellence in Evidence-based Medicine, Nguyen Tat Thanh University, Ho Chi Minh City, Vietnam, [7] Bloomberg School of Public Health, John Hopkins University, Baltimore, MD, United States, [8] Department of Psychological Medicine, National University Hospital, Singapore, Singapore, [9] Department of Psychological Medicine, Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore, [10] Institute for Health Innovation and Technology (iHealthtech), National University of Singapore, Singapore, Singapore

This is the first time in Vietnam that people have undergone "social distancing" to minimize the spreading of infectious disease, COVID-19. These deliberate preemptive strategies may have profound impacts on the mental health of the population. Therefore, this study aimed to identify the psychological impacts of COVID-19 on Vietnamese people and associated factors. We conducted a cross-sectional study during a one-week social distancing and isolation from April 7 to 14, 2020, in Vietnam. A snowball sampling technique was carried out to recruit participants. Impact of Event Scale-Revised (IES-R) was utilized to assess the psychological impacts of the COVID-19. Of all participants, 233 (16.4%) reported low level of PTSS; 76 (5.3%) rated as moderate, and 77 (5.4%) reported extreme psychological conditions. Being female, above 44 years old, or having a higher number of children in the family were positively associated with a higher level of psychological distress. Being self-employed/unemployed/retired was associated with a higher score of intrusion and hyperarousal subscale. Individuals who have a history of touching objects with the possibility of spreading coronavirus (utensils) were related to a higher level of avoidance. There were relatively high rates of participants suffering from PTSS during the first national lockdown related to COVID-19. Comprehensive strategies for the screen of psychological problems and to support high-risk groups are critical, especially females, middle-aged adults and the elderly, affected laborers, and health care professionals.

Keywords: national partial lockdown, social isolation, psychological impacts, COVID-19, Vietnam

OPEN ACCESS

Edited by:
Manasi Kumar,
University of Nairobi, Kenya

Reviewed by:
Cyrus Mugo Wachira,
Kenyatta National Hospital, Kenya
Rita Roncone,
University of L'Aquila, Italy
Fatima Gohar,
UNICEF ESAR, Kenya

***Correspondence:**
Men Thi Hoang
hoangthimen@duytan.edu.vn

[†]These authors have contributed equally to this work

Specialty section:
This article was submitted to Public Mental Health, a section of the journal Frontiers in Psychiatry

Received: *23 May 2020*
Accepted: *30 July 2020*
Published: *02 September 2020*

Citation:
Le XTT, Dang AK, Toweh J, Nguyen QN, Le HT, Do TTT, Phan HBT, Nguyen TT, Pham QT, Ta NKT, Nguyen QT, Nguyen AN, Van Duong Q, Hoang MT, Pham HQ, Vu LG, Tran BX, Latkin CA, Ho CSH and Ho RCM (2020) Evaluating the Psychological Impacts Related to COVID-19 of Vietnamese People Under the First Nationwide Partial Lockdown in Vietnam. Front. Psychiatry 11:824. doi: 10.3389/fpsyt.2020.00824

INTRODUCTION

The 2019 coronavirus disease (COVID-19) pandemic is a global health threat. The number of cases continues to escalate exponentially beyond China, spreading to over 210 countries and territories (1). Clusters of unknown pneumonia cases were first detected in late December 2019, with epidemiological exposure linked to a seafood market in Wuhan, China (2). This pandemic has sown the seeds of an unprecedented global looming crisis, especially in developing countries, where health systems are fragile (3) and lack the capacity to impose restrictions or offer social assistance net for the unemployed (4).

Because of COVID-19, Vietnam, a developing country, was on higher alert due to its land border with China and overseas travel between two countries related to business and tourism. The government of Vietnam imposed "social distancing and social isolation" at the beginning of April 2020 to mitigate the spread of COVID-19, with prompt contact tracing and quarantine (5). Social distancing, or "physical distancing," means that one person keeps a safe space (about 2 arms' length) from other people who are not from their household in both indoor and outdoor spaces. For the first time in Vietnam, people have undergone "social distancing" to minimize infectious disease transmission. Although, these deliberate preemptive strategies bring positive effects on slowing down of positive tests, abiding by social distancing may ramp up profound impacts on the mental health of the population (6). At the individual level, mass home-confinement directives (quarantine or self-isolation) are associated with numerous adverse emotional outcomes such as depression, boredom, irritability, and stigma related to quarantine (7). Emotional distress stressors include infringement of personal freedoms due to unfamiliar public health measures, unemployment resulting in financial losses, the fear of COVID-19 infection, and severe shortages of personal protective equipment (7–9). As the government places stringent social restrictions, the people also have to confront a pervasive impairment of society. The loss of meaningful connections, lack of education due to school closures among children, and difficulty in ensuring safe medical care of the elderly can increase the risk of psychiatric illness attributed to COVID-19 (10–12).

The COVID-19 pandemic has triggered direct and indirect psychological effects on people over the world. A previous study revealed that the imposition of lockdown in China put more than 50 million people under quarantine to prevent the infection, leading to a "desperate plea" for support (13). More than half of the participants rated the pandemic's psychological impact as moderate or severe, and about one-third of them reported moderate to severe anxiety symptoms (13). Research studies from Iran and Japan also highlighted the seriousness of the COVID-19, misinformation, social isolation resulting in mental health problems, and a high level of panic behavior, such as stockpiling of resources in the population (14, 15). The severe acute respiratory syndrome (SARS) epidemic in 2003 was positively related to a high level of anxiety among recovered patients and the risk of suffering from post-traumatic stress disorder among those who survived life-threatening condition (16, 17). In the H1N1 influenza outbreak, the general public also revealed fears about the probability of contracting the virus (11). Lessons learned from previous epidemics show that assessment and interventions play a critical role in mitigating the psychological issues (18).

In countries with a large number of COVID-19 cases and deaths, many people are aware that lockdown is essential to reduce the risk of COVID-19 infection and its consequences. In Vietnam, however, the number of cases has only reached 271 [20]. There have been 252,950 deaths globally, though Vietnam has zero deaths, which may cause a false sense of safety among the country's citizens (19). As a result, restrictive measures to achieve public health goals could trigger adverse reactions due to differences in acceptability, especially those who perceived lack of threat (20). According to social distancing and isolation, all citizens were recommended to stay at home. They could only go out for essential services, such as food, medicine, emergencies, working at establishments that cannot work from home, and other emergency cases. The citizens were required to keep an interpersonal distance (2 m) and limit public gatherings to no more than two people. In addition, the epidemic is also occurring against the backdrop of growing mental health issues in particularly vulnerable groups in Vietnam (21). Previous studies suggested that people with different social-economic backgrounds and history/risk of exposure to the COVID-19 experienced a different severity level of mental health problems (13, 22, 23). Therefore, this study aimed to identify the psychological impacts of COVID-19 on Vietnamese people under the first nationwide lockdown. The results may help us develop strategies to mitigate psychological effects and enhance the ability to respond to future epidemics and pandemics.

MATERIALS AND METHODS

Study Setting and Participants

Study Design

We conducted a cross-sectional study during a one-week social distancing and isolation from April 7 to 14, 2020, in Vietnam.

Research Population and Inclusion Criteria

Participants of this study were the Vietnamese people and chosen based on the following eligibility criteria:

- Living in Vietnam since the first COVID-19 case in Vietnam was detected at the end of January 2020
- Agreeing to participate in the study by approving the online informed consent
- Can access the online questionnaire on the web-based platform
- Not experiencing an acute medical condition/physical impairments or be emergency

Sample Size and Sampling Method

A snowball sampling technique was carried out to recruit participants. Snowball sampling refers to a chain-referral

sampling and a nonprobability sampling technique, which involved participants offering referrals to recruit other subjects required for the study (24). In the beginning, a primary data source will be selected and then nominate other potential data sources that can take part in the survey. This technique is extensively utilized when the study population is unknown, and it is tough to select participants meeting the eligibility criteria (24). Thus, in our study, snowball sampling was the most appropriate technique to recruit participants as we were not able to retrieve official lists of members' demographic information. Previous studies also used snowball sampling as a useful tool to assess the mental health problems of the different populations during the COVID-19 pandemic (25, 26).

The primary groups in this study were students, lecturers, and staff from Hanoi Medical University. The link of the survey was sent to participants of core groups *via* social networks and emails. They accessed the link *via* their laptops/tablets/smartphones and sent the research invitation to different groups by social networks and emails after finishing the survey. We encouraged participants to roll out the study to as many as possible. The study participants consisted of different socio-economic characteristics of gender, age, educational level, and occupation, including health care workers, professional educators, white-collar workers, and students from 63 provinces and cities of Vietnam. There were 1,423 participants involved in the research.

Measure and Instruments

At the beginning of the survey, the introduction of research and informed consent were presented. After agreeing to involve in the study, participants answered a range of questions, including:

Socio-Economic Characteristics

The socio-economic characteristics included gender, age, educational level, marital status, occupation, religion, living region, number of children in the family.

History of Exposure to COVID-19 Infection

Participants self-reported their risk of exposure to COVID-19, which consisted of having COVID-19 confirmation testing or being isolated within 14 days, and the history of exposure to COVID-19-infected people.

Psychological Impacts

We utilized an easily administered self-report questionnaire, Impact of Event Scale-Revised (IES-R), to assess the psychological impacts of the COVID-19. In this study, this tool evaluated post-traumatic stress symptoms (PTSS) or acute stress and its severity level as immediate responses of participants within a short period of time after exposure to a specific traumatic event, not PTSD diagnostic (27). The questionnaire covered 22 questions and divided into three main post-traumatic symptoms (intrusion, avoidance, and hyperarousal). Each question was rated from 0 (Not at all) to 4 (Extremely). The score of Intrusion subscale ranged from 0 to 32 (eight items: 1, 2, 3, 6, 9, 14, 16, 20), Avoidance subscale ranged from 0 to 32 (eight items: 5, 7, 8, 11, 12, 13, 17, 22) and Hyperarousal subscale ranged from 0 to 24 (six items: 4, 10, 15, 18, 19, 21). The outcome of each subscale was analyzed as continuous measures. The total score was calculated as continuous measure which ranged from 0 to 88; higher scores indicated more PTSS. IES-R was also classified as normal (0–23), low level of PTSS (PTSD Clinical concern; 24–32), moderate level (a probable diagnosis of PTSD; 33–36), and extreme level (>37). The IES-R has been validated elsewhere in the Vietnam veterans with Cronbach's alpha = 0.96, which assesses the reliability/internal consistency (28).

Data Analysis

We used STATA 15.0 (StataCorp LP, College Station, TX) to analyze the data. Descriptive statistics presented included frequencies, percentages, means, and standard deviations.

We applied multivariable regression models to identify factors associated with the psychological impacts of participants during COVID-19. The outcomes of regression models were the total score of IES-R and three subscales (Intrusion, Avoidance, and Hyperarousal), which were measured as continuous variables. The independent variables included in the regression models were socio-economic characteristics and history of exposure to COVID-19 infection. Details of independent variables were shown in **Table 1**.

To determine the reduced regression models, we used stepwise forward selection strategies. At first, we put all variables into the models. This technique alternated between forward and backward, which brought in and removed variables meeting the criteria for entry or removal until a stable set of variables was obtained. The p-value for the log-likelihood ratio test of the stepwise method was 0.2. A p-value of less than 0.05 was considered as statistically significant.

Ethical Consideration

The Review Committee of the Institute for Preventive Medicine and Public Health, Hanoi Medical University, approved the study. Participants voluntarily took part in the survey, and the

TABLE 1 | Details of independent variables of regression models.

Variables	Types of variable	Compared group
Age	Ordinal	Under 25
Gender	Categorical	Male
Educational level	Ordinal	High school and below
Marital status	Categorical	Single
Occupation	Categorical	Health workers
Religion	Categorical	No
Living region	Categorical	Northern
Number of children in the family	Continuous	
Having COVID-19 confirmation testing	Binary	No
Being isolated within 14 days due to COVID-19	Binary	No
History of exposure to COVID-19-infected people	Categorical	No

anonymities were secured. Participants could refuse or withdraw from the study at any time.

RESULTS

Table 2 presents the socio-economic characteristics of the participants. Approximately two-thirds of the participants were female (n = 945 (66.4%)). The majority of the sample lived in the Northern region of Vietnam ((n = 1108 (77.9%)). More than half of participants reported undergraduate educational level (n = 801 (56.3%)), and 63.4% (n = 902) currently lived with their spouse/partner. Health care workers or professional educators made up 38% (n = 541) of participants. The mean age was 35.0 years old (SD = 11.0).

The history of exposure to COVID-19 is described in **Table 3**. We found that 2.4% (n = 8) and 7.0% (n = 24) of participants had COVID-19 confirmation tests and were isolated within the last two weeks. Overall, 10.8% (n = 43) of participants reported having a history of exposure to COVID-19, in which 4.7% (n = 16) had close contact with individuals suspected of COVID-19.

TABLE 2 | Socio-economics characteristics of participants.

Characteristics	n	%
Gender		
Male	475	33.4
Female	945	66.4
Others	3	0.2
Region		
Northern	1,108	77.9
Central	165	11.6
Southern	139	9.8
Foreign	11	0.8
Age group (years)		
Under 25	337	23.7
25–34	380	26.7
35–44	378	26.6
Above 44	326	22.9
Religion		
Yes	244	17.2
No	1,179	82.9
Marital status		
Single	482	33.9
Living with a spouse/partner	902	63.4
Others	39	2.7
Education level		
High school and below	291	20.5
Undergraduate	801	56.3
Postgraduate	331	23.3
Occupation		
Health workers	256	18.0
Professional educators	285	20.0
White-collar workers	318	22.4
Students	302	21.2
Others	262	18.4
Occupation status		
Functionary	543	38.2
Unlimited term full-time contract	279	19.6
Limited-term full-time contract	142	10.0
Self-employed/Unemployed/Retired	364	25.6
Others	95	6.7
	Mean	**SD**
Number of children	1.2	1.0
Number of children aged above 15	0.4	0.7
Age	35.0	11.0

TABLE 3 | History of exposure of COVID-19 of participants*.

Characteristics	n	%
Having COVID-19 confirmation test in the last 14 days		
Yes	8	2.4
No	333	97.7
Being isolated in the last 14 days		
Yes	24	7.0
No	317	93.0
History of exposure to people with COVID-19		
Close contact with people withCOVID-19	3	0.9
Indirect contact with people with COVID-19	15	4.4
Close contact with people suspected of having coved-19	16	4.7
Touching objects with the possibility of spreading SARS-CoV-2 (utensils)	9	2.6
Never having contact (directly or indirectly) with people with COVID-19	304	89.2

**Only 341 cases were reported.*

TABLE 4 | Psychological impacts (IES-R score) related to COVID-19 of participants.

Characteristics	n	%
IES-R score interpretation		
Normal	1,037	72.9
Low PTSS (PTSD clinical concern)	233	16.4
Moderate PTSS (Probable PTSD diagnosis)	76	5.3
Extreme	77	5.4
	Mean	**SD**
Intrusion (Score range: 0–32)	8.9	5.6
Any reminder brought back feelings about it	2.3	1.0
I had trouble staying asleep	0.9	1.0
Other things kept making me think about it	1.3	1.0
I thought about it when I did not mean to	0.8	0.9
Pictures about it popped into my mind	1.6	1.1
I found myself acting or feeling like I was back at stressful life events	0.7	0.9
I had waves of strong feelings about it	1.1	1.0
I had dreams about it	0.2	0.5
Avoidance (Score range: 0–32)	4.4	4.3
I avoided letting myself get upset when I thought about it	1.0	1.0
I felt as if it had not happened or wasn't real	0.4	0.9
I stayed away from reminders of it	0.4	0.7
I tried not to think about it	0.6	0.9
I was aware that I still had a lot of feelings about it, but I did not deal with them	0.5	0.8
My feelings about it were kind of numb	0.4	0.7
I tried to remove it from my memory	0.5	0.8
I tried not to talk about it	0.5	0.8
Hyperarousal (Score range: 0–24)	4.3	3.8
I felt irritable and angry	0.6	0.9
I was jumpy and easily startled	0.6	0.9
I had trouble falling asleep	0.5	0.8
I had trouble concentrating	0.6	0.8
Reminders of it caused me to have physical reactions	0.2	0.6
I felt watchful and on-guard	1.7	1.2
IE S-R score (Score range: 0–88)	17.5	11.5

Cronbach's alpha of domains Intrusion, Avoidance, Hyperarousal, and IES-R scale were 0.87; 0.80; 0.80; and 0.91, respectively.

The psychological impacts of the COVID-19 pandemic measured by IES-R are shown in **Table 4**. The mean score of the IES-R scale was 17.5 (SD = 11.5) (score ranged 0–88). Of all participants, 233 (16.4%) reported low level of PTSS; 76 (5.3%) rated as probably having moderate PTSS; 77 (5.4%) reported extreme conditions. The mean score of the intrusion subscale was the highest [8.9 (SD = 5.6) and score ranged from 0 to 32], followed by avoidance [4.4 (SD = 4.3) and score ranged from 0 to 32] and hyperarousal [4.3 (SD=3.8) and score ranged from 0 to 24).

Table 5 depicts the factors associated with the psychological impacts caused by the COVID-19 pandemic among participants. Participants who were female compared to male (OR = 1.24; 95% CI = 1.01–1.61) or those who were above 44 years old compared to under 25 years old (OR = 3.70; 95%CI=1.89–7.25) had higher odds of having a greater score of IES-R. In addition, one higher number of children in the family was associated with 1.68 higher odds (95%CI = 1.31–2.16) to have a higher level of psychological impacts as measured by the IES-R scale. Having an educational level as postgraduate compared to high school or being self-employed/unemployed/retired compared to functionary was positively related to a higher score of intrusion and hyperarousal subscale. Participants who were white-collar workers compared to health care workers or having a history of touching objects with the possibility of spreading SARS-CoV-2 (utensils) compared to not having, also had a higher score on the subscale of avoidance.

DISCUSSION

Findings from our study suggest critical evidence of initial negative psychological responses to the first time of large-scale social isolation among the general public. More than one-fourth of participants experienced mild to severe PTSS. The intrusion was rated with the highest score, which presented that people may have intrusive thoughts or nightmares about the problems. Being female, above 44 years old, or having a higher number of children in the family was associated with increased odds to a higher level of psychological impact. Additionally, being self-employed/unemployed/retired compared to functionary led to a higher odds of a clinically significant score of intrusion and hyperarousal subscale. Individuals who had a history of touching objects, with the possibility of spreading coronavirus (utensils), had greater odds of a higher level of avoidance.

This study shows relatively high rates of participants suffering from PTSS during the national lockdown related to COVID-19. This result is higher than the findings of studies that assessed post-traumatic stress (PTS) symptoms of hospital employees in China (29) and psychological impacts of the Taiwan population during the post-SARS epidemic in 2003 (29, 30). Another study carried out in the hardest-hit Hubei province, China, found substantially lower rates of PTSS using the PTSD Checklist for DSM-5 (PCL-5) (31). However, our findings showed a lower

TABLE 5 | Factors associated with the psychological impacts of participants.

	IES-R score level		Score					
			Intrusion		Avoidance		Hyperarousal	
	OR	95% CI	Coef.	95% CI	Coef.	95% CI	Coef.	95% CI
Gender (Female vs. Male)	1.24**	1.01; 1.61					0.40	−0.10; 0.90
Region (Central vs Northern)	2.51**	1.18; 5.36					1.32*	−0.16; 2.79
Age group (vs Under 25)								
25–34	1.08	0.55; 2.12	−2.47***	−4.20; −0.74	0.08	−1.06; 1.23	−0.53	−1.40; 0.33
35–44	1.93*	0.98; 3.81	−2.18**	−4.24; −0.13	1.57**	0.22; 2.92	−0.22	−1.27; 0.83
Above 44	3.70***	1.89; 7.25	−1.12	−3.20; 0.95	2.37***	1.00; 3.74	0.88	−0.19; 1.96
Marital status (*vs* Single)								
Living with a spouse/partner			1.29*	−0.00; 2.58	−0.65	−1.63; 0.33	1.47***	0.63; 2.30
Education level (*vs* High school and below)								
Undergraduate			1.96	−0.53; 4.46			2.30***	0.78; 3.82
Postgraduate			5.87***	2.35; 9.39			2.73***	0.94; 4.52
Occupation (*vs* Health workers)								
Professional educators			−1.97*	−4.27; 0.33			−1.97*	−4.27; 0.33
White-collar workers					1.95***	0.49; 3.41		
Others					2.25***	0.61; 3.89		
Occupation status (*vs.* functionary)								
Limited-term full-time contract	2.16*	0.98; 4.74						
Self-employed/Unemployed/Retired			2.64**	0.03; 5.24			1.97***	0.47; 3.46
Others			−3.39**	−6.20; −0.57	−1.85	−4.23; 0.52	−2.00**	−3.77; −0.24
History of exposure to people with COVID-19 (Yes *vs* No)								
Close contact with people with COVID-19	4.74	0.59; 7.91						
Touching objects with the possibility of spreading SARS-CoV-2 (utensils)					4.17**	0.26; 8.07	2.11	−0.79; 5.02
Number of children	1.68***	1.31; 2.16	1.14**	0.22; 2.06			0.82***	0.31; 1.33

*$p < 0.01$, **$p < 0.05$, *$p < 0.1$.

rate of PTSS compared to China's general public (13), general workforce (32), psychiatric patients (33), and healthcare workers (34) during the COVID-19 pandemic based on the IES-R tool. Two studies on 52,730 Chinese respondents (35) and 18,147 Italian individuals (36) revealed a higher percentage of the psychological problems, notwithstanding differences in assessment tools. The number of COVID-19 cases and fatalities continues to increase in Europe compared to Vietnam, which may trigger more devastating consequences to health and the economy. The differences regarding measure instruments and sample size should also be considered. The impact of COVID-19 is intense and has the potential to be far greater than that of the Severe Acute Respiratory Syndrome (SARS) in 2003. The COVID-19 pandemic has dominated headlines around the world. In many counties, social distancing will not be lifted shortly, which may have more severe psychological impacts among the public.

Our study result is consistent with previous research in China, which showed that female participants had a higher risk of mental health outcomes (31, 35). The result suggests more prevalent acute psychological disorders after traumatic events characterized by more intrusive memories in females than males (37). The altered sensitivity to emotional stimuli among women can be attributable to differences in immune function and hormone levels, which may increase intrusive flashbacks and psychological disorders in females (38). Also, having a higher number of children in the family was positively related to more severe PTS, which can be explicated by economic harms and loss of parental productivity due to increased time of taking care of children at home during social isolation, especially in low-income families (39, 40). Moreover, during school closure, the higher number of children is associated with the increased time that women have to spend in unpaid care work. Studies show that women may face a double burden—having shifts at work and taking care of family members at home (41, 42). Therefore, the pandemic has shed light on the gender inequalities in the already existing global care crisis.

Individuals above 44 years old were more likely to experience a higher IES-R score than those under 25 years old. Middle-aged adults are also high-risk groups of COVID-19 due to the start of decreasing function, chronic underlying diseases that may weaken the immune systems (43). Also, self-employed/unemployed/retired participants had a higher score of intrusion and hyperarousal. The economic consequences of the COVID-19 pandemic characterized by reductions in working hours and wages push millions of people into unemployment, underemployment, and working poverty (8). Many companies have been forced to scale down their production or temporarily suspend operations amid the COVID-19 crisis (44). The reduced operations have led to job loss among self-employed workers in developing countries (44). Unforeseen financial pressures and decreased access to food are risk factors for psychological disorders and severe socio-economic distress (45, 46).

Having a history of touching objects with the possibility of spreading SARS-CoV-2 (utensils) related to a higher level of avoidance, which is consistent with a previous study (13). As using shared plates and bowls during their mealtimes is a ritual of Vietnamese people, those who share utensils are more likely to have a fear of contracting COVID-19. Experiences from the SARS epidemic in 2003 suggested that enhancing perceptions of people towards precautionary measures can lead to positive psychological responses by providing them with a sense of control in prevention (47).

Several implications can be drawn from the study. First, it is critical to set up comprehensive strategic planning to screen psychological problems and epidemiological monitoring, especially among the high-risk groups for early interventions. Second, programs are needed that focus on building women's resilience to alleviate the care burden and better redistribute unpaid care work between women and men. Third, it highlights the need for more significant support for middle-aged adults and the elderly, affected laborers with psychological interventions to address distress and social concerns during these difficult circumstances. Fourth, regarding health care professionals, psychological support could include counseling services and assistance hotline teams to promote support systems among colleagues.

This study has several strengths, including large sample size and conducting in the first national lockdown, which becomes a piece of evidence. Additionally, we used international instruments that can increase the ability to compare our findings with previous studies. However, there were some limitations. A snowball sampling technique may limit the representativeness of the Vietnamese population, as in this study, the percentage of female participants and those who were from the northern region were high. Therefore, high sample size and recruiting participants from various settings/provinces were applied to increase the generalizability of results. Relying on the web-based platform, re-sharing the link could introduce selection bias with high uniformity. The cross-sectional study may limit the causal interpretation, and a longitudinal study on the psychological impact on Vietnamese is required (48).

In conclusion, there were relatively high rates of participants suffering from PTSS during the first national lockdown related to COVID-19. Being female, above 44 years old, having a higher number of children in the family, or being self-employed/unemployed/retired were associated with greater odds of having increased psychological distress. Comprehensive strategic planning to screen for psychological problems and appropriate interventions is critical, especially among the high-risk groups.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by The Review Committee of the Institute for Preventive Medicine and Public Health, Hanoi Medical

University. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

All authors contributed to the article and approved the submitted version. Data analysis: HQP and LV. Methodology: AD, HBTP, TN, QP, NT, QD and QTN. Supervision: HL, TD, AN, BT, CL, CH and RH, Writing-original draft: AD and XL. Writing -review and editing: AD, JT, QNN, MH.

FUNDING

Research is supported by Vingroup Innovation Foundation (VINIF) in project code VINIF.2020.Covid-19.DA03.

ACKNOWLEDGMENTS

Research is supported by Vingroup Innovation Foundation (VINIF) in project code VINIF.2020.Covid-19.DA03.

REFERENCES

1. World Health Organization. *Coronavirus disease 2019 (COVID-19) Situation Report – 88*. World Health Organization (2020).
2. Nishiura H, Jung SM, Linton NM, Kinoshita R, Yang Y, Hayashi K, et al. The Extent of Transmission of Novel Coronavirus in Wuhan, China, 2020. *J Clin Med* (2020) 9(2):330–4. doi: 10.3390/jcm9020330
3. Mills A. Health care systems in low- and middle-income countries. *N Engl J Med* (2014) 370(6):552–7. doi: 10.1056/NEJMra1110897
4. Orach CG. Health equity: challenges in low income countries. *Afr Health Sci* (2009) 9 Suppl 2:S49–51.
5. Parmet WE, Sinha MS. Covid-19 - The Law and Limits of Quarantine. *N Engl J Med* (2020) 382(15):e28. doi: 10.1056/NEJMp2004211
6. Pfefferbaum B, North CS. Mental Health and the Covid-19 Pandemic. *N Engl J Med* (2020), 383(6):510–2. doi: 10.1056/NEJMp2008017
7. Rubin GJ, Wessely S. The psychological effects of quarantining a city. *BMJ* (2020) 368:m313. doi: 10.1136/bmj.m313
8. Brooks SK, Webster RK, Smith LE, Woodland L, Wessely S, Greenberg N, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *Lancet* (2020) 395(10227):912–20. doi: 10.1016/S0140-6736(20)30460-8
9. Diouf A, Badiane A, Manga NM, Idohou-Dossou N, Sow PS, Wade S. Daily consumption of ready-to-use peanut-based therapeutic food increased fat free mass, improved anemic status but has no impact on the zinc status of people living with HIV/AIDS: a randomized controlled trial. *BMC Public Health* (2016) 16:1. doi: 10.1186/s12889-015-2639-8
10. Holmes EA, O'Connor RC, Perry VH, Tracey I, Wessely S, Arseneault L, et al. Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science. *Lancet Psychiat*. (2020) 7(6):547–60 doi: 10.1016/S2215-0366(20)30168-1
11. Rubin GJ, Potts HW, Michie S. The impact of communications about swine flu (influenza A H1N1v) on public responses to the outbreak: results from 36 national telephone surveys in the UK. *Health Technol Assess* (2010) 14 (34):183–266. doi: 10.3310/hta14340-03
12. Armitage R, Nellums LB. COVID-19 and the consequences of isolating the elderly. *Lancet Public Health*. (2020) 5(5):e256. doi: 10.1016/S2468-2667(20) 30061-X
13. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate Psychological Responses and Associated Factors during the Initial Stage of the 2019 Coronavirus Disease (COVID-19) Epidemic among the General Population in China. *Int J Environ Res Public Health* (2020) 17(5):1729–53. doi: 10.3390/ijerph17051729
14. Shigemura J, Ursano RJ, Morganstein JC, Kurosawa M, Benedek DM. Public responses to the novel 2019 coronavirus (2019-nCoV) in Japan: Mental health consequences and target populations. *Psychiatry Clin Neurosci* (2020) 74 (4):281–2. doi: 10.1111/pcn.12988
15. Zandifar A, Badrfam R. Iranian mental health during the COVID-19 epidemic. *Asian J Psychiatr* (2020) 51:101990. doi: 10.1016/j.ajp.2020.101990
16. Tsang HW, Scudds RJ, Chan EY. Psychosocial impact of SARS. *Emerg Infect Dis* (2004) 10(7):1326–7. doi: 10.3201/eid1007.040090
17. Nickell LA, Crighton EJ, Tracy CS, Al-Enazy H, Bolaji Y, Hanjrah S, et al. Psychosocial effects of SARS on hospital staff: survey of a large tertiary care institution. *CMAJ* (2004) 170(5):793–8. doi: 10.1503/cmaj.1031077
18. Sim K, Huak Chan Y, Chong PN, Chua HC, Wen Soon S. Psychosocial and coping responses within the community health care setting towards a national outbreak of an infectious disease. *J Psychosom Res* (2010) 68(2):195–202. doi: 10.1016/j.jpsychores.2009.04.004
19. Ministry of Health of Vietnam. *Statistics on COVID-19 disease situation Vietnam*. The Vietnamese Ministry of Health (2020), [cited 2020 April 29, 2020]. Available from: https://ncov.moh.gov.vn/
20. Bensimon CM, Upshur RE. Evidence and effectiveness in decisionmaking for quarantine. *Am J Public Health* (2007) 97 Suppl 1:S44–8. doi: 10.2105/AJPH.2005.077305
21. Nguyen T, Tran T, Tran H, Tran T, Fisher J. Challenges in Integrating Mental Health into Primary Care in Vietnam. In: Okpaku S, editor. *Innovations in Global Mental Health*. Cham: Springer International Publishing (2019). p. 1–21.
22. Ozamiz-Etxebarria N, Idoiaga Mondragon N, Dosil Santamaría M, Picaza Gorrotxategi M. Psychological Symptoms During the Two Stages of Lockdown in Response to the COVID-19 Outbreak: An Investigation in a Sample of Citizens in Northern Spain. *Front Psychol* (2020) 11:1491. doi: 10.3389/fpsyg.2020.01491
23. Roy D, Tripathy S, Kar SK, Sharma N, Verma SK, Kaushal V. Study of knowledge, attitude, anxiety & perceived mental healthcare need in Indian population during COVID-19 pandemic. *Asian J Psychiatr* (2020) 51:102083. doi: 10.1016/j.ajp.2020.102083
24. Lewis-Beck MS, Bryman A, Liao TF. eds. *The SAGE encyclopedia of social science research methods*. Vols. 1–3 Thousand Oaks, CA: SAGE Publications, Inc. (2004). doi: 10.4135/9781412950589
25. Fekih-Romdhane F, Ghrissi F, Abbassi B, Cherif W, Cheour M. Prevalence and predictors of PTSD during the COVID-19 pandemic: Findings from a Tunisian community sample. *Psychiatry Res* (2020) 290:113131. doi: 10.1016/j.psychres.2020.113131
26. Liang L, Ren H, Cao R, Hu Y, Qin Z, Li C, et al. The Effect of COVID-19 on Youth Mental Health. *Psychiatr Q* (2020) 91(3):841–52. doi: 10.1007/s11126-020-09744-3
27. Weiss D, Marmar C, Wilson J, Keane T. Assessing psychological trauma and PTSD. *Impact Events Scale—Revised* (1997) 19:399–411. doi: 10.1037/t12199-000
28. Creamer M, Bell R, Failla S. Psychometric properties of the Impact of Event Scale - Revised. *Behav Res Ther* (2003) 41(12):1489–96. doi: 10.1016/j.brat.2003.07.010
29. Wu P, Fang Y, Guan Z, Fan B, Kong J, Yao Z, et al. The psychological impact of the SARS epidemic on hospital employees in China: exposure, risk perception, and altruistic acceptance of risk. *Can J Psychiatry* (2009) 54 (5):302–11. doi: 10.1177/070674370905400504
30. Ko CH, Yen CF, Yen JY, Yang MJ. Psychosocial impact among the public of the severe acute respiratory syndrome epidemic in Taiwan. *Psychiatry Clin Neurosci* (2006) 60(4):397–403. doi: 10.1111/j.1440-1819.2006.01522.x
31. Liu N, Zhang F, Wei C, Jia Y, Shang Z, Sun L, et al. Prevalence and predictors of PTSS during COVID-19 outbreak in China hardest-hit areas: Gender differences matter. *Psychiatry Res* (2020) 287:112921. doi: 10.1016/j.psychres.2020.112921
32. Tan W, Hao F, McIntyre RS, Jiang L, Jiang X, Zhang L, et al. Is returning to work during the COVID-19 pandemic stressful? A study on immediate mental health status and psychoneuroimmunity prevention measures of Chinese workforce. *Brain Behav Immun* (2020) 87:84–92. doi: 10.1016/j.bbi.2020.04.055
33. Hao F, Tan W, Jiang L, Zhang L, Zhao X, Zou Y, et al. Do psychiatric patients experience more psychiatric symptoms during COVID-19 pandemic and

lockdown? A case-control study with service and research implications for immunopsychiatry. *Brain Behav Immun* (2020) 87:100–6. doi: 10.1016/j.bbi.2020.04.069

34. Chew NWS, Lee GKH, Tan BYQ, Jing M, Goh Y, Ngiam NJH, et al. A multinational, multicentre study on the psychological outcomes and associated physical symptoms amongst healthcare workers during COVID-19 outbreak. *Brain Behav Immun* (2020) 88:559–65. doi: 10.1016/j.bbi.2020.04.049
35. Qiu J, Shen B, Zhao M, Wang Z, Xie B, Xu Y. A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: implications and policy recommendations. *Gen Psychiatr* (2020) 33(2): e100213. doi: 10.1136/gpsych-2020-100213
36. Rossi R, Socci V, Talevi D, Mensi S, Niolu C, Pacitti F, et al. COVID-19 pandemic and lockdown measures impact on mental health among the general population in Italy. An N=18147 web-based survey. *medRxiv* (2020). 2020.04.09.20057802. doi: 10.1101/2020.04.09.20057802.
37. McLean CP, Anderson ER. Brave men and timid women? A review of the gender differences in fear and anxiety. *Clin Psychol Rev* (2009) 29(6):496–505. doi: 10.1016/j.cpr.2009.05.003
38. Soni M, Curran VH, Kamboj SK. Identification of a narrow post-ovulatory window of vulnerability to distressing involuntary memories in healthy women. *Neurobiol Learn Mem* (2013) 104:32–8. doi: 10.1016/j.nlm.2013.04.003
39. Rashid H, Ridda I, King C, Begun M, Tekin H, Wood JG, et al. Evidence compendium and advice on social distancing and other related measures for response to an influenza pandemic. *Paediatr Respir Rev* (2015) 16(2):119–26. doi: 10.1016/j.prrv.2014.01.003
40. Viner RM, Russell SJ, Croker H, Packer J, Ward J, Stansfield C, et al. School closure and management practices during coronavirus outbreaks including COVID-19: a rapid systematic review. *Lancet Child Adolesc Health* (2020) 4 (5):397–404. doi: 10.1016/S2352-4642(20)30095-X
41. Bin Nafisah S, Alamery AH, Al Nafesa A, Aleid B, Brazanji NA. School closure during novel influenza: A systematic review. *J Infect Public Health* (2018) 11 (5):657–61. doi: 10.1016/j.jiph.2018.01.003
42. The L. The gendered dimensions of COVID-19. *Lancet* (2020) 395 (10231):1168. doi: 10.1016/S0140-6736(20)30823-0
43. Meng H, Xu Y, Dai J, Zhang Y, Liu B, Yang H. The Psychological effect of COVID-19 on the Elderly in China. *Psychiatry Res* (2020) 289:112983. doi: 10.1016/j.psychres.2020.112983
44. International Labour Organization. *Almost 25 million jobs could be lost worldwide due to COVID-19*. International Labour Organization. (2020). [cited 2020 April 1, 2020]. Available from: https://www.ilo.org/global/about-the-ilo/newsroom/news/WCMS_738742/lang–en/index.htm
45. Pellecchia U, Crestani R, Decroo T, Van den Bergh R, Al-Kourdi Y. Social Consequences of Ebola Containment Measures in Liberia. *PloS One* (2015) 10 (12):e0143036. doi: 10.1371/journal.pone.0143036
46. Mihashi M, Otsubo Y, Yinjuan X, Nagatomi K, Hoshiko M, Ishitake T. Predictive factors of psychological disorder development during recovery following SARS outbreak. *Health Psychol* (2009) 28(1):91–100. doi: 10.1037/a0013674
47. Leung GM, Lam TH, Ho LM, Ho SY, Chan BH, Wong IO, et al. The impact of community psychological responses on outbreak control for severe acute respiratory syndrome in Hong Kong. *J Epidemiol Community Health* (2003) 57(11):857–63. doi: 10.1136/jech.57.11.857
48. Wang C, Pan R, Wan X, Tan Y, Xu L, McIntyre RS, et al. A longitudinal study on the mental health of general population during the COVID-19 epidemic in China. *Brain Behav Immun* (2020) 87:40–8. doi: 10.1016/j.bbi.2020.04.028

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychiatry

OPINION
published: 09 September 2020
doi: 10.3389/fpsyt.2020.582007

Digital Health Solutions for Mental Health Disorders During COVID-19

Alton Ming Kai Chew[1,2], *Ryan Ong*[1,3], *Hsien-Hsien Lei*[4], *Mallika Rajendram*[1], *Grisan K V*[5], *Swapna K. Verma*[5,6], *Daniel Shuen Sheng Fung*[1,5,6], *Joseph Jern-yi Leong*[5] *and Dinesh Visva Gunasekeran*[1,7]*

[1] National University of Singapore (NUS), Singapore, Singapore, [2] UCL Medical School, University College London (UCL), London, United Kingdom, [3] School of Medicine and Medicine Science, University College Dublin (UCD), Dublin, Ireland, [4] NUS Saw Swee Hock School of Public Health (NUS-SSHSPH), Singapore, Singapore, [5] Institute of Mental Health (IMH), Singapore, Singapore, [6] Duke-NUS Medical School, Singapore, Singapore, [7] Raffles Medical Group, Singapore, Singapore

Keywords: coronavirus disease 2019 (COVID-19), global mental health, psychiatry, digital health, pandemic

OPEN ACCESS

Edited by:
Manasi Kumar,
University of Nairobi, Kenya

Reviewed by:
Paul Macharia,
Consultant, Nairobi, Kenya
Cyrus Mugo Wachira,
Kenyatta National Hospital, Kenya

***Correspondence:**
Dinesh Visva Gunasekeran
dineshvg@hotmail.sg;
mdcdvg@nus.edu.sg

Specialty section:
This article was submitted to Public Mental Health, a section of the journal Frontiers in Psychiatry

Received: *10 July 2020*
Accepted: *14 August 2020*
Published: *09 September 2020*

Citation:
Chew AMK, Ong R, Lei H-H, Rajendram M, KV G, Verma SK, Fung DSS, Leong JJ-y and Gunasekeran DV (2020) Digital Health Solutions for Mental Health Disorders During COVID-19. Front. Psychiatry 11:582007. doi: 10.3389/fpsyt.2020.582007

INTRODUCTION

The Coronavirus disease 2019 (COVID-19) pandemic has had an immense impact infecting 10 million individuals and claiming 500,000 lives globally as of 1 July 2020 (1). The rapid spread was largely enabled by the onset of the outbreak in Wuhan city just prior to the Lunar New Year season, a peak period in travel to and from China (2). Fortunately, many regions have controlled initial outbreaks and shared their experiences. These have been recently summarized by the World Health Organization (WHO), highlighting the importance of developing targeted responses and enhancing communication to address the pandemic's impact (3, 4).

Notably, emotionally driven sharing of misinformation has featured prominently in this crisis, fueling both confusion and irrational anxiety among the public (5, 6). Termed an "infodemic", this has far-reaching consequences on population health with a direct impact on overloaded health systems and an indirect impact on mental health, resulting in paranoia and behavioral responses like stock-piling due to disproportionate fear (7). The impact of misinformation in the media on public emotion and fear has been illustrated with the Middle-East Respiratory Syndrome (MERS), whereby it led to a surge in fear and sustained economic consequences (8).

Mental Health and COVID-19

The psychosocial impact of large-scale disasters and previous outbreaks have been described, including increased incidence of mental health disorders (9). Similarly, COVID-19 has had a two-fold detrimental impact on the mental health of populations subject to the psychosocial consequences of the pandemic, including the incidence of new onset mental health disorders as well as deterioration in the condition of patients with existing mental health disorders (4, 10). This impact is on the rise given the protracted lock downs, social isolation, and concomitant occupational stressors in the context of the weakened global economy (10–12). These factors highlight the urgent need to scale-up and decentralize mental health services to attain a multiplier effect in the provision and accessibility of these services to combat the pandemic-driven surge in mental health disorders (9, 11).

Fortunately, several reports have demonstrated the effectiveness of digital health solutions for various applications, including addressing gaps in mental health services (12). These solutions

include cloud-based big data systems, artificial intelligence (AI)–based chatbots, online health communities (OHCs), and telehealth platforms. Several have already been extensively applied for the pandemic's direct impact on health, such as big data systems and telehealth for remote consultations (13, 14). This review summarizes relevant applications of digital health that can help address the indirect impact of the pandemic on population mental health.

Cloud-Based Big Data Systems

Cloud-based big data systems have been successfully applied in previous infectious disease outbreaks by aggregating data from numerous possible sources including weather surveillance systems (15), queries in online search engines (16), and even connected devices among the Internet of Things (IoT) such as mobile phones and drones (17, 18). Applications of these systems range from early detection of outbreaks to facilitating global digital epidemiology collaborations that address unresolved clinical uncertainties, such as ocular findings for early detection of latent tuberculosis (19, 20). Successful applications include monitoring dengue outbreaks using data on mobility from mobile phones (15) or queries in search engines such as Baidu in China (21).

Evidence is emerging for the value of these platforms beyond retrospective or real-time surveillance applications, to prospective projections of disease trends and clinical need. In the context of the ongoing pandemic, several potential applications of these tools have emerged, such as predicting outbreaks of COVID-19 based on historic travel data and public health capacity (22). Also, Cornelia Betsch and the COVID-19 Snapshot MOnitoring (COSMO) group evaluated methods for surveillance of behavioral responses to the pandemic (5). These applications enable evidence-based approaches to localize public health responses and monitor their effectiveness, in accordance with WHO recommendations (23).

Related applications for mental health include the prediction of disorders such as depression, stress and anxiety, using publicly available data from websites like Twitter (24). These applications are gaining traction in academic consciousness as digital data becomes more ubiquitous, as exemplified by the development of recommendations for evidence-based research using tools like Google search to predict mental disorders (24, 25). There are also validated individual-level applications of big data, such as the use of ecological momentary assessment (EMA) from passive behavioral monitoring of mobile data, that have been used to detect and monitor severity for a spectrum of mood and behavioral disorders (26). This ushers in the possibility of precision digital mental health with tailored recommendations to the individual, as recently described for panic disorder (27).

These methods can be leveraged for useful applications during lockdowns, such as early detection of mental health disease onset or progression. However, unresolved barriers to implementation include ethical and privacy issues of population-level monitoring such as with big data systems for contact tracing, that would similarly apply to systems for mental health surveillance (28). Measures to facilitate implementation include the use of high quality input data and clinical validation using formal diagnostic criteria, robust methodology, and actionable outcomes (29). Nonetheless, these systems can contribute to responses to the pandemic and address the needs of the vulnerable groups during the recurrent lockdowns in response to local outbreaks, such as potential victims of domestic violence (9).

AI Chatbots

AI chatbots utilize pre-programmed content and decision-trees for automated conversations using techniques such as natural language processing (NLP). These are more interactive than static digital repositories leading to higher engagement for patients (30). Preliminary reports of AI chatbots that have been developed for mental health include solutions providing counseling for well individuals to improve psychological well-being (31). Others include AI chatbots such as Wysa for digital mental well-being with demonstrated effectiveness in patients with depression (32), and Woebot for cognitive behavioral therapy (CBT) in young adults with depression/anxiety symptoms (33).

These tools have potential applications in the current pandemic and beyond for preventive care and mental health promotion. They also function as contingency solutions to expand surge capacity in the event of overwhelming clinical need (30). However, their applications needs to be supervised given limited clinical validation with robust experimental design (34). Other challenges clinical AI have also been described in various specialities, including practical, technical, and sociocultural barriers to implementation (35, 36). Particularly given the conversational nature of chatbots and linguistic variations in different populations, acculturation is needed to facilitate the implementation of chatbots in new populations, as demonstrated with AI chatbots for health professional training to address colloquialisms such as "Singlish" in Singapore (37). This is crucial to ensure emotional support or triage advice are perceived accurately by patients, and piloting messages will help ascertain effectiveness (38).

Validated community mental health assessment tools could be incorporated in future conversational AI chatbots to prompt regular self-reporting by patients of wellness and social inclusion for active population monitoring. These include the various iterations of the Social and Communities Opportunities Profile (SCOPE) scale validated in the United Kingdom and Hong Kong, as well as the mini-SCOPE in Singapore (39). Applying AI chatbots in this manner using a "sorting conveyor" operational model could be transformative, whereby the AI solutions built with predefined criteria can re-direct individuals requiring more comprehensive psychological support to appropriate services within a stepped-care mental health service (9).

Online Health Communities

Open digital patient engagement platforms that allow any visitor to a website or application to view interactions between patients and/or healthcare providers are called online health communities (OHCs). OHCs could be the silver bullet to the "infodemic",

which is largely attributed to the unfettered spread of viral misinformation in unverified sources or platforms like social media, crowding out official communication (12, 40). In the earlier example of the impact of misinformation on fear during MERS, Choi et al. found that it created a positive feedback loop leading to a spiral of growing misinformation and paranoia, with the publication of more inaccurate information by the media in a bid to capitalize on public interest (8).

Big data systems such as the aforementioned COSMO for behavioral surveillance provide measures of these phenomena to develop targeted public health communication messages—an essential first step to combat this problem (38). However, due to the speed of misinformation propagated online, there is increasingly a need to implement a digital effector arm for our monitoring systems (3), one that amplifies reputable sources to directly combat misinformation in a transparent, scalable manner by addressing myths and promoting reputable sources of information (41). In Singapore, such a solution was developed by AskDr through needs-finding surveys and ideation with frontline providers (**Figure 1**). It combines network effects of social media with behavioral gamification to give registered medical professionals digital tools to crowd-source a coherent counter-narrative to misinformation (42).

Public health agencies should similarly develop or adopt such tools for the "last mile" of public health communication. In the context of the ongoing pandemic, key applications include promoting reliable information and directly breaking the "spiral of misinformation". Direct potential applications of OHCs for patients at-risk of mental health disorders include lowering the barrier to access care and support for stigmatized illnesses such as anxiety and depression, by allowing patients to seek initial medical advice anonymously (43). Apart from the provision of basic demographic information such as gender and age that are required to contextualize medical advice; otherwise, anonymous engagement also helps to address limitations such as privacy issues similar to those with big data systems (28).

Other applications of OHCs that can enhance public health responses to the pandemic include provision of triage advice to optimize right-siting of patients and reduce unnecessary healthcare presentations where appropriate. This "tele-support" can be used long-term for fundamental illness-related concerns that may not require formal consultation, such as questions about potential interactions of chronic medications with over-the-counter (OTC) medications or other health products (44). Finally, they provide an avenue for asynchronous patient engagement between outpatient appointments while protecting the privacy of healthcare providers, creating opportunities for patient support and early identification of at-risk individuals needing to be re-directed to formal mental health services online or in-person (9).

Telehealth Platforms for Remote Consultation

Digital telehealth services have numerous embodiments including video-conferencing, store-and-forward technology, remote tele-monitoring with connected devices, and mobile health applications, all of which are increasingly applied in large-scale disasters (45). These can be used for either Asynchronous or Synchronous consultations with private discussions between patients and healthcare providers (46). Existing descriptions of tele-mental health services indicate the importance of human support and interaction regardless of the embodiment of telehealth used (6, 12). Although its application in COVID-19 for mental health services has been greatly enabled by legislative changes (6), the barriers to telehealth adoption that have kept it from becoming mainstream to date still remain (47). Ensuring successful, sustained adoption requires active alignment with clinical needs when deploying services (6).

Nonetheless, tele-mental health services are critical to maintain the continuity of care for patients with mental health disorders by providing avenues for remote review and prescription re-fills (9). Other avenues with long-term value to health systems include co-ordinated avenues for health professionals to engage patients with mental health disorders more frequently, facilitate early detection of those at-risk of self-harm, and enable preventive interventions such as motivational interviewing that reduce hospitalizations (11, 48, 49). Apart from the traditional two-way teleconsultation between doctor and patient, multi-way conferencing or tele-collaboration by allied professionals remotely supported by clinicians has been described (50) and is mainstreamed in countries like Singapore to project tertiary care to nursing homes and intermediate and long-term care (ILTC) facilities.

DISCUSSION

COVID-19 is the first "viral" pandemic that threatens to overwhelm mental health services in coming months as a result of fear perpetuated by misinformation alongside social isolation during lockdowns (4, 11) These unprecedented challenges highlight the need to develop creative solutions to address the impending surge in mental health disorders (4, 10). The four technologies discussed in this review are potential avenues to expand the capacity and penetration of existing mental health services to address this indirect health impact of the pandemic. Hybrid strategies combing various solutions in an overarching "pyramid" operational model may be required to rapidly scale-up stepped mental health services.

This was illustrated in the SAVED study operationalizing telehealth for complexed emergency services (51). Digital operationalization of mental health services can be similarly achieved using combinations of digital tools in comprehensive services such as Illness Management and Recovery (IMR) Programs (52). IMRs are structured mental health services incorporating multi-modal mental health interventions to promote self-management and optimize treatment. Pioneered in America, they were externally validated and demonstrated to reduce re-admissions and the post-illness recovery period of Asian patients after discharge from in-patient psychiatric services (52).

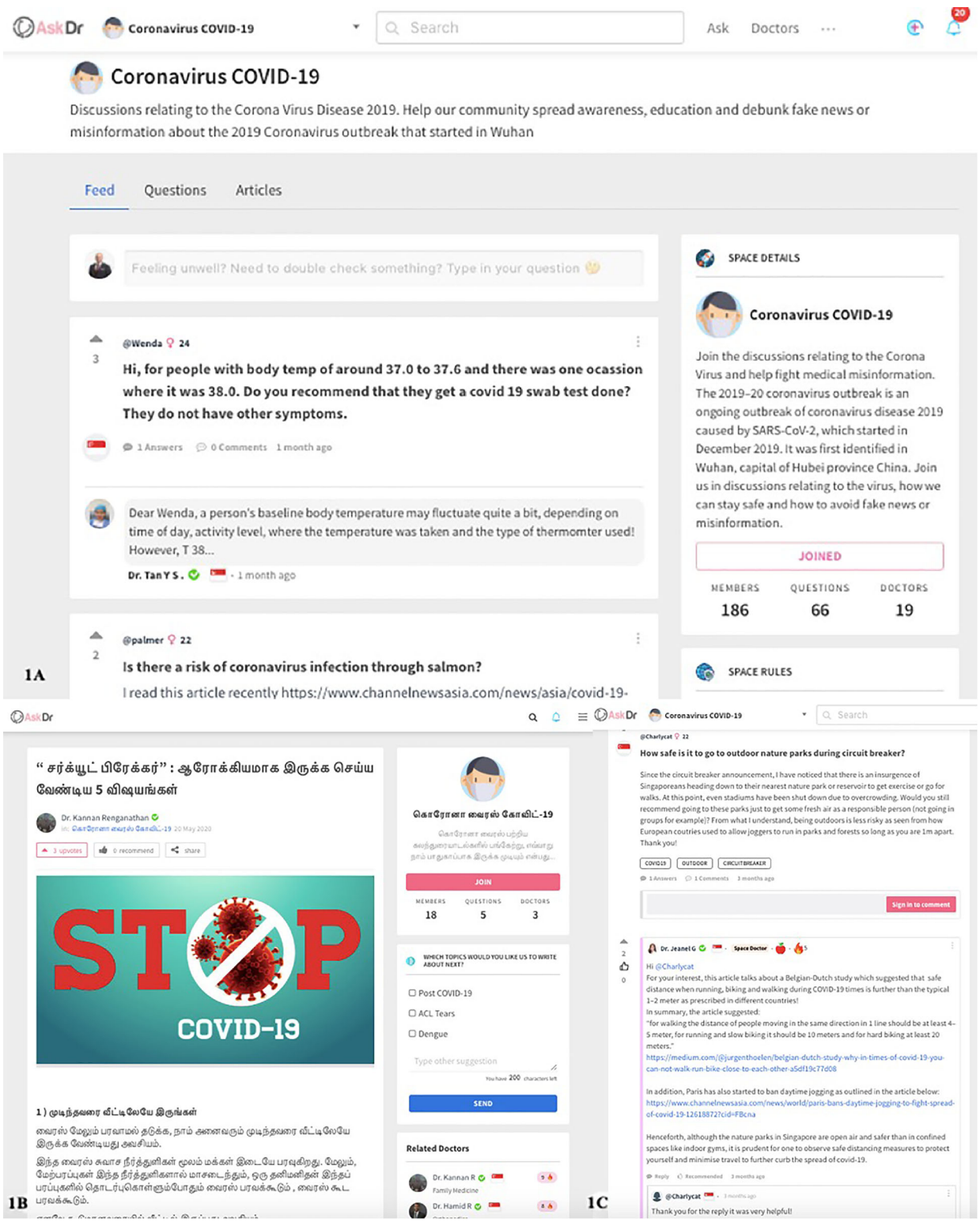


FIGURE 1 | The ideation of a free, crowd-sourced digital tool, and **(A)** online health community (OHC) moderated by verified providers incorporating **(B)** multilingual patient education content and **(C)** personalized health promotion based on demographic information to address the needs of patients with varied backgrounds. This enables sustainable public health promotion for patients and gamified digital tools for providers to address medical misinformation, project their expertise online, and engage members of public with relevant interests.

The pyramid base catering to the needs of the general population could include screening tools such as big data systems and/or OHCs to actively identify and/or engage at-risk individuals without pre-existing mental health disorders, as well as provide tele-support services to reduce risk of progression in patients with mental health disorders (49). As countries re-open, at-risk individuals can be directed to AI-based chatbots providing automated support as well as triage in a "sorting conveyor" operational model to further escalate care as appropriate to in-person or telehealth mental health services based on patient risk profile (3, 16). These requires modifications to traditional practice as described for telehealth cognitive processing therapy (CPT) services to treat post-traumatic stress disorder (PTSD), a condition likely to increase in coming months even among healthcare professionals due to the prolonged stress of frontline services or rationalizing care in some regions (4, 53).

The Way Forward: Intentional Deployment of Digital Mental Health

Ultimately, the effective deployment of digital mental health services is greatly dependant on successful assimilation within existing health systems. Patient willingness to use, provider acceptance, and even the quality of digital and hardware infrastructure are fundamental considerations that need to be addressed. This has been recently illustrated based on the challenges of implementing AI solutions for Ophthalmology despite maturity of the technology (35, 36). Deployment of digital health thereby needs to be driven by the needs of the target patient population, clinical acceptance, and validated effective applications (38). These considerations dictate the likely effective form of deployment for these digital tools.

Designing effective digital mental health care requires taking into account the wide range of patient needs determined by the severity of mental health disorder(s), social determinants of health (SDH), access to technology, and cultural acceptance, among others (35, 38). There is no "one size fits all" solution, and research in telehealth has demonstrated that individualized design considerations are critical to maximize acceptance, ensure effectiveness, and sustain adoption with recurrent use (38). Meeting the needs of patients in a timely and cost-effective manner ensures sustained adoption beyond the COVID-19 crisis. For provider adoption, stakeholder engagement methods have been advocated to map out clinical processes, participants, and individual responsibilities to actively plan deployment for telehealth (6) and are just as important for other forms of digital health (47).

Firstly, this requires detailed mapping of the needs, roles, and incentives of stakeholders such as healthcare workers, logistic procurement teams, and chief medical informatics officers. They are prioritized into primary and secondary stakeholders based on their capacity to make or influence decisions about adoption of digital tools. Subsequently, a deployment strategy is developed to maximize stakeholder alignment while minimizing disruption to existing processes or new responsibilities that may overburden stakeholders. This also yields crucial insights for communication strategies to engage individual stakeholder groups effectively.

Participatory approaches like these with design-thinking have been used to operationalize tele-health in complexed emergency services (51), as well as develop solutions with targeted applications such as AI chatbots for automated adolescent mental health coaching (54). In tandem, it is important to address the needs of vulnerable populations that may fail to seek care, such as potential domestic violence or child abuse victims (9). They may require tailored solutions such as targeted deployment of mobile mental health services provided by allied mental health professionals that could be remotely advised by psychiatrists using "hub-and-spoke" telehealth to project services into these pockets of society.

CONCLUSIONS

In conclusion, the massive health impact of the first "viral" pandemic has been fueled by global travel, social isolation, rampant misinformation in social media, and other intricacies of modern life. However, digital mental health tools are the silver lining we are fortunate to have, as they can empower responses to the COVID-19 outbreak at a scale that was never before possible in human history. Responding effectively to the mounting impact of this pandemic on population mental health may ultimately require us to leverage these digital health solutions to expand the capacity of mental health services and supplement face-to-face care with an intentional approach for successful deployment (6, 47).

AUTHOR'S NOTE

Authors AC and RO are medical students on clinical research attachment with author DG. Author H-HL is an adjunct Associate Professor at the Saw Swee Hock School of Public Health (SSHSPH), NUS, and concurrently Chief Executive Officer, The American Chamber of Commerce in Singapore. Author RM is a Tutor in Academic English at the Center for English Language Communication (CELC), NUS. Author GK is a Senior Operational Manager at the Institute of Mental Health (IMH), Singapore. Authors SV, DF, and JJ-YL are Senior Consultant Psychiatrists at IMH, Singapore. Author SV is also a Professor at Duke-NUS, Singapore. The author DF is also the Chairman Medical Board at IMH, Singapore, as well as President of the International Association of Child and Adolescent Psychiatry. DF is concurrently adjunct Associate Professor at all three medical schools in Singapore, NUS, Duke-NUS, and LKC. DG is a Senior Lecturer and Faculty Advisor (Medical Innovation) at the National University of Singapore (NUS), and Physician Leader (Telemedicine) at Raffles Medical Group.

AUTHOR CONTRIBUTIONS

Authors AC, RO, and DG conceptualized the manuscript, researched its contents, wrote the manuscript, and edited all revisions. Authors H-HL, RM, GK, SV, DF, and JJ-YL intellectually contributed to the development and writing of the manuscript, added text, and edited all revisions.

REFERENCES

1. World Health Organisation (WHO). *Coronavirus disease (COVID-2019) situation reports* . Available at: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/ (Accessed 1 Mar 2020).
2. Peeri NC, Shrestha N, Rahman MS, Zaki R, Tan Z, Bibi S, et al. The SARS, MERS and novel coronavirus (COVID-19) epidemics, the newest and biggest global health threats: what lessons have we learned? *Int J Epidemiol* (2020) 49(3):717– 26. doi: 10.1093/ije/dyaa033
3. Heymann DL, Shindo N. Hazards WSaTAGfI. COVID-19: what is next for public health? *Lancet* (2020) 395(10224):542–5. doi: 10.1016/S0140-6736(20)30374-3
4. Torjesen I. Covid-19: Mental health services must be boosted to deal with "tsunami" of cases after lockdown. *BMJ* (2020) 369:m1994. doi: 10.1136/bmj.m1994
5. Betsch C, Wieler LH, Habersaat K, COSMO group. Monitoring behavioural insights related to COVID-19.*Lancet* (2020) 395(10232):1255–6. doi: 10.1016/S0140-6736(20)30729-7
6. Torous J, Wykes T. Opportunities From the Coronavirus Disease 2019 Pandemic for Transforming Psychiatric Care With Telehealth. *JAMA Psychiatry* (2020). doi: 10.1001/jamapsychiatry.2020.1640
7. Leung GM, Leung K. Crowdsourcing data to mitigate epidemics. *Lancet Digital Health* (2020) 2(4):e156–7. doi: 10.1016/S2589-7500(20)30055-8
8. Choi S, Lee J, Kang MG, Min H, Chang YS, Yoon S. Large-scale machine learning of media outlets for understanding public reactions to nation-wide viral infection outbreaks. *Methods* (2017) 129:50–9. doi: 10.1016/j.ymeth.2017.07.027
9. Galea S, Merchant RM, Lurie N. The Mental Health Consequences of COVID-19 and Physical Distancing: The Need for Prevention and Early Intervention. *JAMA Intern Med* (2020). doi: 10.1001/jamainternmed.2020.1562
10. Gupta R, Dhamija RK. Covid-19: social distancing or social isolation? *BMJ* (2020) 369:m2399. doi: 10.1136/bmj.m2399
11. Killgore WDS, Cloonan SA, Taylor EC, Dailey NS. Loneliness: A signature mental health concern in the era of COVID-19. *Psychiatry Res* (2020) 290:113117. doi: 10.1016/j.psychres.2020.113117
12. Figueroa CA, Aguilera A. The Need for a Mental Health Technology Revolution in the COVID-19 Pandemic. *Front Psychiatry* (2020) 11:523. doi: 10.3389/fpsyt.2020.00523
13. Mann DM, Chen J, Chunara R, Testa PA, Nov O. COVID-19 transforms health care through telemedicine: Evidence fromthe field. *J Am Med Inform Assoc* (2020) 27(7):1132–5. doi: 10.1093/jamia/ocaa072
14. Lai S, Bogoch I, Ruktanonchai N, Watts A, Lu X, Yang W, et al. Preprint: Assessing spread risk of Wuhan novel coronavirus within and beyond China, January-April 2020: a travel network-based modelling study. *medRxiv* [Preprint]. doi: 10.1101/2020.02.04.20020479
15. Wesolowski A, Qureshi T, Boni MF, Sundsøy PR, Johansson MA, Rasheed SB, et al. Impact of human mobility on the emergence of dengue epidemics in Pakistan. *Proc Natl Acad Sci U S A* (2015) 112(38):11887–92. doi: 10.1073/pnas.1504964112
16. Jun S, Yoo H, Choi S. Ten years of research change using Google Trends: from the perspective of big data utilizations and applications. *Technol Forecast Soc Change* (2018) 130:69–87. doi: 10.1016/j.techfore.2017.11.009
17. Wesolowski A, Eagle N, Tatem AJ, Smith DL, Noor AM, Snow RW, et al. Quantifying the impact of human mobility on malaria. *Science* (2012) 338 (6104):267–70. doi: 10.1126/science.1223467
18. Flahault A, et al. *Precision global health for real-time action. Lancet Digital Health*. Available at: https://www.thelancet.com/journals/landig/article/PIIS2589-7500(19)30240-7/fulltext-articleInformation (Accessed 10 Mar 2020). 1 Feb 2020.
19. Gunasekeran DV, Agrawal R, Testi I, Agarwal A, Mahajan I, Nguyen QD, et al. Lessons in Digital Epidemiology from COTS-1: Coordinating Multicentre Research across 10 Countries Using Operational and Technology Innovation to Overcome Funding Deficiencies. *Ocul Immunol Inflamm* 2020:1–7. doi: 10.1080/09273948.2020.1744669
20. Agrawal R, Gunasekeran DV, Grant R, Agarwal A, Kon OM, Nguyen QD, et al. Clinical Features and Outcomes of Patients With Tubercular Uveitis Treated With Antitubercular Therapy in the Collaborative Ocular Tuberculosis Study (COTS)-1. *JAMA Ophthalmol* (2017) 135(12):1318–27. doi: 10.1001/jamaophthalmol.2017.4485
21. Liu K, Wang T, Yang Z, Huang X, Milinovich GJ, Lu Y, et al. Using Baidu Search Index to Predict Dengue Outbreak in China. *Sci Rep* (2016) 6:38040. doi: 10.1038/srep38040
22. Bogoch II, Watts A, Thomas-Bachli A, Huber C, Kraemer MUG, Khan K. Pneumonia of Unknown Etiology in Wuhan, China: Potential for International Spread Via Commercial Air Travel. *J Travel Med* (2020) 27 (2):taaa008. doi: 10.1093/jtm/taaa008
23. World Health Organisation (WHO). *COVID-2019 Operational planning guidelines for Countries*. Available at: https://www.who.int/docs/default-source/coronaviruse/covid-19-sprp-unct-guidelines.pdf (Accessed 7 Mar 2020).
24. Chancellor S, De Choudhury M. Methods in predictive techniques for mental health status on social media: a critical review. *NPJ Digit Med* (2020) 3:43. doi: 10.1038/s41746-020-0233-7
25. Mavragani A, Ochoa G. Google Trends in Infodemiology and Infoveillance: Methodology Framework. *JMIR Public Health Surveill* (2019) 5(2):e13439. doi: 10.2196/13439
26. Russell MA, Gajos JM. Annual Research Review: Ecological momentary assessment studies in child psychology and psychiatry. *J Child Psychol Psychiatry* (2020) 61(3):376–94. doi: 10.1111/jcpp.13204
27. Robinaugh DJ, Brown ML, Losiewicz OM, Jones PJ, Marques L, Baker AW. Towards a precision psychiatry approach to anxiety disorders with ecological momentary assessment: the example of panic disorder. *Gen Psychiatr* (2020) 33(1):e100161. doi: 10.1136/gpsych-2019-100161
28. Sustained suppression. *Nat BioMed Eng* (2020) 4(5):479–80. doi: 10.1038/s41551-020-0567-0
29. Guntuku SC, Yaden DB, Kern ML, Ungar LH, Eichstaedt JC. Detecting depression and mental illness on social media: an integrative review. *Curr Opin Behav Sci* (2017) 18:43–9. doi: 10.1016/j.cobeha.2017.07.005
30. Garrido S, Millington C, Cheers D, Boydell K, Schubert E, Meade T, et al. What Works and What Doesn't Work? A Systematic Review of Digital Mental Health Interventions for Depression and Anxiety in Young People. *Front Psychiatry* (2019) 10:759. doi: 10.3389/fpsyt.2019.00759
31. Ly KH, Ly AM, Andersson G. A fully automated conversational agent for promoting mental well-being: A pilot RCT using mixed methods. *Internet Interv* (2017) 10:39–46. doi: 10.1016/j.invent.2017.10.002
32. Inkster B, Sarda S, Subramanian V. An Empathy-Driven, Conversational Artificial Intelligence Agent (Wysa) for Digital Mental Well-Being: Real-World Data Evaluation Mixed-Methods Study. *JMIR Mhealth Uhealth* (2018) 6(11):e12106. doi: 10.2196/12106
33. Fitzpatrick KK, Darcy A, Vierhile M. Delivering Cognitive Behavior Therapy to Young Adults With Symptoms of Depression and Anxiety Using a Fully Automated Conversational Agent (Woebot): A Randomized Controlled Trial. *JMIR Ment Health* (2017) 4(2):e19. doi: 10.2196/mental.7785
34. Gaffney H, Mansell W, Tai S. Conversational Agents in the Treatment of Mental Health Problems: Mixed-Method Systematic Review. *JMIR Ment Health* (2019) 6(10):e14166. doi: 10.2196/14166
35. Gunasekeran DV, Wong TY. Artificial Intelligence in Ophthalmology in 2020: A Technology on the Cusp for Translation and Implementation. *Asia Pac J Ophthalmol (Phila)* (2020) 9(2):61–6. doi: 10.1097/01.APO.0000656984.56467.2c
36. Gunasekeran DV, Ting DSW, Tan GSW, Wong TY. Artificial intelligence for diabetic retinopathy screening,prediction and management. *Curr Opin Ophthalmol* (2020) 31(5):357–65. doi: 10.1097/ICU.0000000000000693
37. Shorey S, Ang E, Yap J, Ng ED, Lau ST. Chui CK. A Virtual Counseling Application Using Artificial Intelligence for Communication Skills Training in Nursing Education: Development Study. *J Med Internet Res* (2019) 21(10): e14658. doi: 10.2196/14658
38. Gunasekeran DV. Technology and chronic disease management. *Lancet Diabetes Endocrinol* (2018) 6(2):91. doi: 10.1016/S2213-8587(17)30441-2
39. Tan CHS, Chiu YLM, Leong JJ, Tan LYE. Social inclusion among mental health service users: A reliability test of the Mini-SCOPE Scale. *J Clin Nurs* (2019) 28(9-10):1847–55. doi: 10.1111/jocn.14798
40. World Health Organisation (WHO). *Coronavirus disease (COVID-2019) situation report – 86 (15 April 2020)*. Available at: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200415-sitrep-86-covid-19.pdf?sfvrsn=c615ea20_6 (Accessed 17 April 2020).
41. van der Meer TGLA, Jin Y. Seeking Formula for Misinformation Treatment in Public Health Crises: The Effects of Corrective Information Type and

Source. *Health Commun* (2020) 35(5):560–75. doi: 10.1080/10410236.2019.1573295
42. AskDr. *Coronavirus COVID-19 Singapore*. Available at: https://www.askdr.co/spaces/coronavirus-covid-19 (Accessed 2 March 2020).
43. Berger M, Wagner TH, Baker LC. Internet use and stigmatized illness. *Soc Sci Med* (2005) 61(8):1821–7. doi: 10.1016/j.socscimed.2005.03.025
44. Ravoire S, Lang M, Perrin E. 6 poGXRTN. Advantages and limitations of online communities of patients for research on health products. *Therapie* (2017) 72(1):135–43. doi: 10.1016/j.therap.2016.11.058
45. Lurie N, Carr BG. The Role of Telehealth in the Medical Response to Disasters. *JAMA Intern Med* (2018) 178(6):745–6. doi: 10.1001/jamainternmed.2018.1314
46. Ting DS, Gunasekeran DV, Wickham L, Wong TY. Next generation telemedicine platforms to screen and triage. *Br J Ophthalmol* (2019) 104 (3):299–300. doi: 10.1136/bjophthalmol-2019-315066
47. Smith AC, Thomas E, Snoswell CL, Haydon H, Mehrotra A, Clemensen J, et al. Telehealth for global emergencies: Implications for coronavirus disease 2019 (COVID-19). *J Telemed Telecare* (2020) 26(5):309–13. doi: 10.1177/1357633X20916567
48. Tan SC, Lee MW, Lim GT, Leong JJ, Lee C. Motivational Interviewing Approach Used by a Community Mental Health Team. *J Psychosoc Nurs Ment Health Serv* (2015) 53(12):28–37. doi: 10.3928/02793695-20151020-03
49. Goodman-Casanova JM, Dura-Perez E, Guzman-Parra J, Cuesta-Vargas A, Mayoral-Cleries F. Telehealth Home Support During COVID-19 Confinement for Community-Dwelling Older Adults With Mild Cognitive Impairment or Mild Dementia: Survey Study. *J Med Internet Res* (2020) 22(5): e19434. doi: 10.2196/19434
50. Mendez I, Jong M, Keays-White D, Turner G. The use of remote presence for health care delivery in a northern Inuit community: a feasibility study. *Int J Circumpolar Health* (2013) 72. doi: 10.3402/ijch.v72i0.21112
51. Gunasekeran DV, Liu Z, Tan WJ, Koh J, Cheong CP, Tan LH, et al. Safety and Efficacy of Follow-up for Patients With Abdominal Pain Using Video Consultation (SAVED study): Randomized Controlled Trial Evaluating Digital Telereview. *J Med Internet Res* (2020) 22(6):e17417. doi: 10.2196/preprints.22018
52. Tan CHS, Ishak RB, Lim TXG, Marimuthusamy P, Kaurss K, Leong JJ. Illness management and recovery program for mental health problems: reducing symptoms and increasing social functioning. *J Clin Nurs* (2017) 26(21-22):3471–85. doi: 10.1111/jocn.13712
53. Moring JC, Dondanville KA, Fina BA, Hassija C., Chard K., Monson C, et al. Cognitive Processing Therapy for Posttraumatic Stress Disorder via Telehealth: Practical Considerations During the COVID-19 Pandemic. *J Trauma Stress* (2020) 13. doi: 10.1002/jts.22544
54. Gabrielli S, Rizzi S, Carbone S. Donisi V. A Chatbot-Based Coaching Intervention for Adolescents to Promote Life Skills: Pilot Study. *JMIR Hum Factors* (2020) 7(1):e16762. doi: 10.2196/16762

Conflict of Interest: DG reports equity investment in Doctorbell (acquired by MaNaDr, Mobile Health), AskDr, VISRE, and Shyfts, and appointment as Physician Leader (Telemedicine) at Raffles Medical Group. He reports advisory to university-affiliated technology developers and start-up companies developing patient engagement systems in Southeast Asia. He declares receipt of travel funding from the Commonwealth Fellowship in Innovation award, Mobile Health Education grant, and National Youth Fund award, for clinical research training and collaborations at Oxford University, United Kingdom and Stanford University, United States of America.

The remaining authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychiatry

OPINION
published: 11 September 2020
doi: 10.3389/fpsyt.2020.564452

Telemedicine in the COVID-19 Pandemic: Motivations for Integrated, Interconnected, and Community-Based Health Delivery in Resource-Scarce Settings?

Bach Xuan Tran[1,2], Men Thi Hoang[3,4], Long Hoang Vo[1], Huong Thi Le[1], Trang Ha Nguyen[3,4], Giang Thu Vu[5], Carl A. Latkin[2], Cyrus S. H. Ho[6] and Roger C. M. Ho[7,8]*

[1] Institute for Preventive Medicine and Public Health, Hanoi Medical University, Hanoi, Vietnam, [2] Bloomberg School of Public Health, Johns Hopkins University, Baltimore, MD, United States, [3] Institute for Global Health Innovations, Duy Tan University, Da Nang, Vietnam, [4] Faculty of Medicine, Duy Tan University, Da Nang, Vietnam, [5] Center of Excellence in Evidence-based Medicine, Nguyen Tat Thanh University, Ho Chi Minh City, Vietnam, [6] Department of Psychological Medicine, National University Hospital, Singapore, Singapore, [7] Department of Psychological Medicine, Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore, [8] Institute for Health Innovation and Technology (iHealthtech), National University of Singapore, Singapore, Singapore

OPEN ACCESS

Edited by:
Manasi Kumar,
University of Nairobi, Kenya

Reviewed by:
Irene Njuguna,
Kenyatta National Hospital, Kenya

****Correspondence:***
Bach Xuan Tran
bach.ipmph2@gmail.com

Specialty section:
This article was submitted to Public Mental Health, a section of the journal Frontiers in Psychiatry

Received: *21 May 2020*
Accepted: *18 August 2020*
Published: *11 September 2020*

Citation:
Tran BX, Hoang MT, Vo LH, Le HT, Nguyen TH, Vu GT, Latkin CA, Ho CSH and Ho RCM (2020) Telemedicine in the COVID-19 Pandemic: Motivations for Integrated, Interconnected, and Community-Based Health Delivery in Resource-Scarce Settings? Front. Psychiatry 11:564452. doi: 10.3389/fpsyt.2020.564452

Keywords: COVID-19, telemedicine, health delivery, digital technologies, low-middle income countries

The coronavirus disease (COVID-19) has crippled health systems within a matter of months and created tremendous pressure on the physical and psychological aspects of millions of people's lives across the world (1, 2). In such exceptionally challenging times, over 200 countries and territories have been suffering from an acute shortage of medical personnel and medical equipment (1, 2). In global efforts to prevent the spread of the virus (SARS-CoV-2), practicing social distancing and isolation is considered as an effective containment measure that has been applied around the world. Healthcare providers, therefore, are required to serve patients both physically and virtually to accommodate this historic moment.

In Vietnam, thanks to prompt and vigorous actions of the government against COVID-19, including practicing aggressive social distancing, no fatality case has been recorded, and among 324 confirmed cases, 82.1% of them have recovered and been discharged from hospital (3). However, the situation with this pandemic is still unpredictable, and people having suspected COVID-19 symptoms or outpatients in need of healthcare are facing a dilemma about whether to visit the hospital in person. Under aggressive social distancing, people were asked to avoid directly going to hospitals; instead, they should contact health advisers at the hospitals *via* telephone for early direction and services referrals. The fear of exposure to COVID-19 in addition to shortage in testing capacity and required self-isolation makes patients with suspected symptoms, undiagnosed, or untreated medical conditions experienced more physical and psychological distress.

Although Vietnam's health system has four levels of administration, in the past years, patients prefer to have their first visit to central or provincial hospitals. This preference is partly due to the perception of higher services quality and health workers' capacity and partially because of improved

local transportation and socioeconomic status (4). Besides, when the patients have a poor prognosis of recovery, local doctors are more likely to transfer them immediately to a higher level of health services. As a result, provincial and central hospitals have always been overloaded with increased risk of hospital infection in addition to long waiting times and high non-medical costs incurring to the patients.

Accelerating telemedicine may support health services delivery systems, effective and efficient telemedicine-based health diagnosis, treatments and rehabilitation have not been widely implemented in Vietnam (5–11). Telemedicine is defined as the use of medical information *via* electronic communication, including the telephone network, computer networks, the internet, and the radio broadcasting system to deliver healthcare services at a distance (12, 13). Although its first introduction in Vietnam was in 1998 (13), telemedicine has not yet fully integrated into the Vietnamese health system due to the lack of contextualized strategies, financial and human resources, legal and infrastructure, and the culture of absorbing new technologies in health (5). The unprecedented turbulence caused by COVID-19 has acted as a catalyst to transform the healthcare service delivery in Vietnam. Diagnosis and treatment processes have been tailored to ensure social distancing; the use of telemedicine, therefore, has been strongly encouraged. Joint efforts by the Ministry of Health in coordination with the Ministry of Information and Communications has created several synchronous telemedicine projects launched on 16 April 2020. The Central Lung Hospital utilized videotelephony to examine patients *via* a smartphone application. Notably, Hanoi Medical University Hospital introduced a "digital hospital" project which aimed to shape an alternative approach for both doctor-to-patient communications and doctor-to-doctor continuing professional coaching. Preliminary results of two-month pilot revealed the promising role of telemedicine to enhance quality of healthcare service in the digital era. (14). To more effective development, it is recently prominent that the Project "Remote health examination and treatment" has been approved by Ministry of Health for the 5-year period, 2020–2025 (15). In addition, setting up community hubs for pre-checking patients and linking them to senior doctors at central hospitals have been practiced in various settings.

Although telemedicine is essential to reach the patients during social distancing, several barriers have been challenging its applications in resource-scare settings. As a country with 54 ethnic groups, 66% living in the rural, 68% using smartphone out of 89% those having mobile phones (16), localized telemedicine services have not yet established prior to the COVID-19 pandemic, thus, resulted in limited coverage of this innovation (17, 18). For multiple years, the focus of telemedicine was on technical aspects and IT infrastructure rather than interprofessional and interpersonal components in health care delivery and medical education in the "virtual" space. In addition, insufficient legislature and legal frameworks, as well as regulations on medical procedures and protocols at the national level, are confining both hospitals and health professionals to use telemedicine systems. In the light of Vietnam's time of social distancing, despite a very strong political will on the implementation of telemedicine (19), there has not been standardized guidance for provincial and grassroots health services delivery, leading confusion in the transition to the telemedicine-related services. From the providers' perspective, perceived barriers included the fears of medical errors, poor patient compliance, inadequate doctor-to-patient communication when using teleconsultation services, inability to monitor treatment progression. While, as for the patients, concerns regarding unclear or inadequate privacy, confidentiality, and security regarding their records, the limited IT infrastructure in the rural areas, both health and technology literacy, and missing many benefits of direct patients-doctors interactions reduce the willingness of patients to be involved in telemedical care services.

The increasing demand for telemedicine in various resource-scarce settings requires a systematic approach, not merely the switch from face-to-face to electronic- and virtual communications. In practice, this requires restructuring the organization and mechanism for healthcare delivery toward a more integrated, interconnected, and community-based approach. Central hospitals should take the advantages of setting up satellite clinics with professional medical education, technology transfer, and quality assurance. The implementation of telemedicine thus needs to be in parallel with the layers of services management, enhancing capacity and readiness across four levels of the health system concurrently, instead of being centralized. The inter-connected system will allow sharing patient records, referring, transferring, and monitoring patients in the virtual environment.

Although telemedicine can contribute to addressing the COVID-19 pandemic, it is also critical to mobilizing local resources by involving community and family in medical care, and hygiene practice is essential during the COVID-19 pandemic. Community and family are those "gate-keepers" in the frontline who direct healthcare-seeking behaviors, prevent potential infection spread, strengthening linkages between health service providers and intersectoral taskforces, and support continuing care for at-risk groups, e.g., older adults and patients with chronic conditions.

The "social distancing" model of healthcare in the current COVID-19 pandemic provides an experience valuably not only for Vietnam but also the countries having similar resource-scarce conditions. COVID-19 can be seen as a timely motivation to accelerate telemedicine-based adoption and promote a more efficient health system.

AUTHOR CONTRIBUTIONS

Conceptualization: BT, MH, LV, and HL. Methodology: BT, MH, TN, and GV. Writing—original draft: BT, MH, LV, and GV. Writing—review and editing: BT, MH, LV, HL, TN, GV, CL, CH, and RH.

FUNDING

Research is supported by Vingroup Innovation Foundation (VINIF) in project code VINIF.2020.COVID-19.DA03. The

authors declare that this study received funding from Vingroup Innovation Foundation (VINIF). The funder was not involved in the study design, collection, analysis, interpretation of data, the writing of this article, or the decision to submit it for publication.

ACKNOWLEDGMENTS

Research is supported by Vingroup Innovation Foundation (VINIF) in project code VINIF. 2020.COVID-19.DA03.

REFERENCES

1. Wang C, Pan R, Wan X, Tan Y, Xu L, McIntyre RS, et al. A Longitudinal Study on the Mental Health of General Population during the COVID-19 Epidemic in China. *Brain Behav Immun* (2020) 87:40–8. doi: 10.1016/j.bbi.2020.04.028
2. Anderson M, McKee M, Mossialos E. Covid-19 exposes weaknesses in European response to outbreaks. *BMJ* (2020) 368:m1075. doi: 10.1136/bmj.m1075
3. Ministry of Health. *General Information on COVID-19* The Ministry of Health of Vietnam (2020). Available at: https://ncov.moh.gov.vn/ [cited 2020 May 19].
4. Lam T. *Hơn 50% số bệnh nhân vượt tuyến không cần thiết*. (2018). Available at: https://nhandan.com.vn/suckhoe/item/37614202-hon-50-so-benh-nhan-vuot-tuyen-khong-can-thiet.html [cited 2020 May 02].
5. Tran VN. *Adoption of telemedicine in Vietnam: case study Newtel*. (2015).
6. Grady J. CE: Telehealth A Case Study in Disruptive Innovation. *AJN Am J Nurs* (2014) 114(4):38–45. doi: 10.1097/01.NAJ.0000445682.52553.89
7. Lee HY, Kim JY, Na KY, Park HY, Han J, Pak Y, et al. The role of telehealth counselling with mobile self-monitoring on blood pressure reduction among overseas Koreans with high blood pressure in Vietnam. *J Telemed Telecare* (2019) 25(4):241–8. doi: 10.1177/1357633X18780559
8. Hersh D, Hersch F, Mikuletic L, Neilson S. A Web-based approach to low-cost telemedicine. *J Telemed Telecare* (2003) 9(2_suppl):24–6. doi: 10.1258/135763303322596174
9. O'Neil J, McBride B, Eni R, Nguyen T. *Improving maternal and prenatal care for ethnic minorities in Thai Nguyen, Vietnam through an integrated eHealth and user-provider interaction model (mMom: 2013-2016)*. (2016).
10. Nguyen Q, Naguib R, Tawfik H, Phuong N. Strategic challenges facing user- and patient-centred e-health in Vietnam. *Int J Healthcare Technol Manage* (2012) 13(5-6):378–94. doi: 10.1504/IJHTM.2012.052551
11. Lam JA, Dang LT, Phan NT, Trinh HT, Vu NC, Nguyen CK. Mobile health initiatives in Vietnam: scoping study. *JMIR mHealth uHealth* (2018) 6(4): e106. doi: 10.2196/mhealth.8639
12. World Health Organization. *Telemedicine: opportunities and developments in Member States: report on the second global survey on eHealth 2009*. World Health Organization (2010). Available at: https://www.who.int/goe/publications/goe_telemedicine_2010.pdf [cited 2020 April 28].
13. Tram B. *Y tế từ xa có còn xa?* Forbes Vietnam (2019). Available at: https://forbesvietnam.com.vn/tin-cap-nhat/y-te-tu-xa-co-con-xa-5879.html.
14. Thuy H. *Telemedicine for health 4.0: Online newspaper of the government*. (2020). Available at: http://baochinhphu.vn/Suc-khoe/Kham-chua-benh-tu-xa-Xu-the-tat-yeu-cua-nen-y-te-40/398883.vgp.
15. Ministry of Health. *Plan on Telemedicine*. The Ministry of Health of Vietnam (2020). Available at: https://moh.gov.vn/tin-noi-bat/-/asset_publisher/3Yst7YhbkA5j/content/hoi-thao-trien-khai-e-an-kham-chua-benh-tu-xa-giai-oan-2020-2025.
16. UNFPA Vietnam. *Results Of The Population And Housing Census 2019*. (2019).
17. VOV. *Telemedicine infrastructure*. (2020). Available at: https://vovgiaothong.vn/hien-thuc-hoa-nen-tang-kham-benh-tu-xa.
18. Mobile Marketing Association. *The State of Mobile in Rural Vietnam 2018/2019*. (2019).
19. Minitry of Health. *Telemedicine launching workshop*. (2020). Available at: https://ncov.moh.gov.vn/web/guest/-/khai-truong-nen-tang-ho-tro-tu-van-kham-chua-benh-tu-xa.

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychiatry

ORIGINAL RESEARCH
published: 17 September 2020
doi: 10.3389/fpsyt.2020.580268

Identifying the Associated Risk Factors of Sleep Disturbance During the COVID-19 Lockdown in Bangladesh: A Web-Based Survey

Tasnim Ara[1]*, *Md. Mahabubur Rahman*[1], *Md. Abir Hossain*[2] and *Amir Ahmed*[3]

[1] Institute of Statistical Research and Training, University of Dhaka, Dhaka, Bangladesh, [2] Department of Chemical and Food Engineering, Dhaka University of Engineering and Technology, Gazipur, Bangladesh, [3] Department of Nutrition and Food Engineering, Daffodil International University, Dhaka, Bangladesh

OPEN ACCESS

Edited by:
Joanna Lai,
UNICEF United Nations International Children's Emergency Fund, United States

Reviewed by:
Ralf Moreno Garcia,
UNICEF United Nations International Children's Emergency Fund, United States
Tanvi Jain,
UNICEF United Nations International Children's Emergency Fund, United States

***Correspondence:**
Tasnim Ara
tara@isrt.ac.bd

Specialty section:
This article was submitted to Public Mental Health, a section of the journal Frontiers in Psychiatry

Received: 05 July 2020
Accepted: 25 August 2020
Published: 17 September 2020

Citation:
Ara T, Rahman MM, Hossain MA and Ahmed A (2020) Identifying the Associated Risk Factors of Sleep Disturbance During the COVID-19 Lockdown in Bangladesh: A Web-Based Survey. Front. Psychiatry 11:580268. doi: 10.3389/fpsyt.2020.580268

Background: Bangladesh, a developing country with a lower-middle-income and one of the world's most densely populated areas, has been severely affected by COVID-19. This global epidemic is not only affecting the physical health of the patients but also causing severe psychological effects among those who have not yet been infected. Sleep disturbance is one of the key symptoms of major depression and one of the proven risk factors for suicide. The objective of this study is to identify the risk factors associated with sleep disturbance which has developed as a general impact of COVID-19 and new normal life during the lockdown (a measure to control the spread of COVID-19) in Bangladesh.

Methods: Demographic characteristics, COVID-19, and lockdown related information have been collected from 1,128 individuals by conducting a web-based survey. Respondent's perspective regarding sleep disturbance during COVID-19 lockdown is considered as the outcome of interest which is dichotomous. Descriptive statistics methods have been applied to explore the distribution of respondent's demographic characteristics. Pearson's chi-square tests have been performed to relate the sleep disturbance status of the respondents to their demographic, personal, and COVID-19 related information. Furthermore, a multivariable logistic regression model has been adopted to identify the significant association of sleep disturbance with the demographic, COVID-19, and lockdown related information of respondents during the COVID-19 lockdown in Bangladesh.

Findings: The prevalence of sleep disturbance during the COVID-19 lockdown is found to be higher among participants aged 31–40 years. Gender disparity has also been observed in favor of male participants, whereas no significant regional heterogeneity has been found. Working from home or doing online classes during the lockdown has been found as a potential predictive factor of sleep disturbance. Losing a job has been considered as an adverse economic effect of COVID-19, which also induces sleep disturbance. Perception regarding the risk of getting infected and anxiety triggered the

chance of developing sleep disturbance. The sleeping schedule is also found as a risk factor for sleep disturbance.

Conclusion: Evidence-based policies are required to combat psychological challenges that have arisen due to COVID-19, primarily targeting the groups who are largely suffering from sleep disturbance.

Keywords: COVID-19, lock down, home confinement, sleep disturbance, anxiety, AOR, AUC

INTRODUCTION

The emergence of a cluster of acute respiratory illnesses that occurred by exposure to SARS-COV-2 is officially identified as COVID-19, which was first observed in December 2019 in Wuhan, Hubei Province of China (1–3). The WHO declared the COVID-19 outbreak as a "pandemic" on March 11, 2020 as the virus spreads increasingly worldwide (4). As of June 24, 2020, 213 countries and territories around the world are affected by the SARS-COV-2, and a total of 9,360,758 COVID-19 cases in the world have been confirmed, and 479,896 deaths have occurred worldwide from the disease (5). Almost all countries are adopting preventive measures such as remote office activities, international travel bans, mandatory lockdowns, and physical distancing. Bangladesh, a developing country with a lower-middle-income and one of the world's most densely populated areas, is also trying to stop the spread of the disease with its limited resources. The country confirmed the first COVID-19 case on March 7 (6). There are 119,198 total confirmed cases and 1,545 total deaths in Bangladesh as of June 24, 2020 (7). The government of Bangladesh declared the enforcement of lockdown on March 26 to prevent the spreading of this infectious virus (6).

There is a considerable relation between mental health and poverty (8). Low and middle-income countries have a higher burden of mental disorders than economically developed countries (9, 10). Mental health resources include policy and infrastructure within countries, mental health services, community resources, human resources, and funding. In low-and middle-income countries, mental health services are highly insufficient, and the available resources for mental health are still scarce, inequitably distributed, and inefficiently utilized (11, 12). Compared to Australia and Canada (two high capacity countries in terms of mental health response), Bangladesh is more than 100-fold behind in terms of the number of psychiatrists per 100,000 population (13). The rate of occupational therapists per 100,000 population is 0 in Bangladesh, whereas this rate is respectively 7.65 and 3.7 in Australia and Canada (13). In Australia and Canada, people with mental disorders pay at least 20% of the cost of mental health care, whereas in Bangladesh patients pay entirely out of their own pocket to receive the service (13). The only nationally representative survey conducted between 2003 and 2005 illustrated the high burden of mental disorders in Bangladesh (14). Notedly, mental health services are virtually non-existent at the primary care level throughout the country (15, 16). There is a considerable lack of an adequate number of psychiatrists, and they are mostly located in big cities which makes the burden heavier (17). In such a situation, mental health issues during the COVID-19 pandemic might be severe in Bangladesh.

The mass home confinement since the COVID-19 outbreak in December 2019 has developed a stressful situation for many across the globe. COVID-19 not only affects the physical health of the population but also has a serious impact on mental health (18, 19). In addition, symptoms of anxiety and depression and self-reported stress are common psychological effects of the COVID-19 pandemic (20). Previous studies have also shown that the prevalence of novel infectious diseases, such as severe acute respiratory syndrome (SARS) can increase anxiety, depression, and stress levels in the general population (21). Being forced to stay at home, work from home, do home-schooling for children, severely reduced social interaction, work many more hours in stressful situations, and health risks can have a severe impact on daily activities and nighttime sleep (19). Even if people under lockdown have less possibility to develop an infection they often suffer from negative psychological effects, which may disrupt the sleep quality (22).

Sleep plays a fundamental role in emotion regulation (23–26). Many cross-sectional epidemiological studies have indicated that sleep disturbance is closely associated with new-onset of poor mental health status and lasting poor mental health status (27–31). Disturbed sleep is also considered as a causal factor in the occurrence of many mental health disorders (32). Several studies have shown that proper quality sleep not only reduces the risk of non-communicable diseases (NCDs) (33–38) but also helps to improve immunity to viral infection (39, 40). Thus, through good quality sleep, a better immune system can be developed which in turn may have an impact on the susceptibility of COVID-19 infection. Psychological wellbeing and sleep are affected by several socio-economic factors such as economic burden, family support, and social support (41). Recently, several studies have investigated the influence of social factors and factors related to COVID-19 on sleep quality in China and European countries (18, 19, 42). This paper attempts to assess the risk factors associated with sleep disturbance in the context of COVID-19 and new normal life during the lockdown in Bangladesh.

MATERIALS AND METHODS

Study Design and Participants

A web-based self-reported cross-sectional survey has been conducted to collect the data. This web-based survey was intended to reach as many individuals as possible. Thus, rather

than using the official psychological tools to respond to questions about sleep disorder or anxiety, to keep the questionnaire easy and understandable to the respondents and to make the interview duration shorter, we constructed a self-reporting questionnaire. This is the most widely used tool in community surveys for physical and mental health evaluation (43–45). Features that might be related to sleep quality evaluated by previous studies were included in the questionnaire (46–48). Moreover, some hypothesized risk factors of sleep disturbance in the context of COVID-19 and new normal life during the lockdown were also included in the questionnaire. The survey questionnaire with the consent form was shared on the internet through different social networking and messaging site (Facebook, Whatsapp, Viber, IMO, *etc.*) and e-mail, SMS. All Bangladeshi people using these tools may see this survey and may answer the questionnaire by clicking the relevant link. This web-based questionnaire was completely voluntary and non-commercial.

Data Collection

Participants answered the questionnaires anonymously on the Internet from May 12, 2020, to May 18, 2020. All subjects reported their demographic data, COVID-19 related information, and questions related to sleep quality. To ensure the quality of this survey, questions were provided in both Bengali and English language and encouraged participants to answer carefully through questionnaire explanations. A total of 1,150 individuals have participated in the survey and among them, 1,128 individuals have completed the questionnaire. Incomplete responses have been excluded from the analysis.

Variables Assessed and Measured

Demographic and Other Personal Information

Demographic variables include administrative division, place of residence ("urban", "rural"), religion, age, gender, marital status, educational level, employment status, and income level. In addition, family-size and body mass index (BMI) of the participants have also been included.

Information Regarding COVID-19 and New Normal Life During the Lockdown

Individuals were asked about different pieces of information regarding COVID-19 and their new normal life during the lockdown. This information includes whether they are following the social distancing rule; whether they or their family members, relatives, friends, or neighbors got infected by COVID-19; whether they are working from home/doing online classes; whether they have to go to the workplace during the lockdown; whether any of the family members including respondent have lost their job; exercise status, whether food consumption dominates the new normal life during the lockdown, daily internet usage, perception regarding the risk of getting infected by COVID-19, anxiety, sleeping schedule, *etc.*

Outcome Measurements

Sleep disturbance was considered as a binary outcome of interest. Individuals were asked whether they are facing any kind of problems or disturbances in their sleep during the lockdown period or not.

Statistical Analysis

Descriptive statistical methods have been applied to assess the distribution of the demographic characteristics of the Bangladeshi population. Then, Pearson's chi-square tests (49) were used to find associations between independent variables and sleep disturbance, with those variables showing an association of 0.05 selected to be the part of the model. A multivariable logistic regression (50, 51) has been carried out to find associations between the independent variables, the dependent variable, and adjust for confounders. The adjusted odds ratio (AOR) and 95% confidence interval (95% CI) have been obtained from the logistic regression model. In the logistic regression model, coefficients with p-values (2-sided tests) less than or equal to 0.05 have been considered as statistically significant (5% level of significance). As a measure of model performance, the area under the curve (AUC) of the receiving operating characteristic (ROC) has been calculated along with its standard error by using its equivalence to the Wilcoxon statistic (52, 53). All data were analyzed using R (Version 3.6.2, RStudio version: 1.1.383) and STATA version 14.0 (Stata SE 14, Stata Corp, College Station, TX, USA).

RESULTS

The socio-demographic information of the respondents is presented in **Table 1**. The analysis was based on a sample of 1,128 respondents (male 55.1% and female 44.9%). The majority of the respondents (75.71%) were from the second age group (21–30 years). There was found to be a higher response (48.5%) from the Dhaka division. The responses were the highest (68.6%) from urban areas. More than half of the participants (52.4%) were students, and 71.28% have passed the Bachelor or equivalent level. The marital status of 67% of respondents is "Single". Around 12% of the respondents have income less than ten thousand TK.

Prevalence of Sleep Disturbance

The prevalence of sleep disturbance by the demographic and personal information of the respondents is presented in **Table 2**. From this web-based survey, it has been observed that 33.24% of the participants claimed to have sleep disturbance during the COVID-19 lockdown. After performing Pearson's chi-square test of association, it has been observed that place of residence, age, gender, and marital status have a statistically significant association with sleep disturbance. **Table 2** displays that sleep disturbance during this pandemic situation is more common among respondents of urban areas (36.05%) compared to rural areas (27.12%). The highest prevalence of sleep disturbance has been found among respondents aged 31–40 years. Among females, a higher prevalence of sleep disturbance (38.54%) has been observed compared to males (28.94%). The sleep disturbance significantly varies with the marital status of the

TABLE 1 | Distribution of the demographic characteristics.

	Frequency (n)	Percentage (%)
Division		
Dhaka	547	48.49
Chittagong	118	10.46
Rajshahi	125	11.08
Khulna	84	7.45
Barisal	26	2.30
Rangpur	126	11.17
Sylhet	21	1.86
Mymensingh	81	7.18
Place of residence		
Urban	774	68.62
Rural	354	31.38
Religion		
Muslim	1,007	89.27
Non-muslim	121	10.73
Age (years)		
11-20	184	16.31
21-30	854	75.71
31-40	41	3.63
41-50	20	1.77
>50	29	2.57
Gender		
Male	622	55.14
Female	506	44.86
Marital status		
Single	756	67.02
In a relationship	176	15.60
Married	190	16.84
Widowed/Divorced	6	0.53
Educational level		
Higher secondary or below	111	9.84
Bachelor or equivalent	804	71.28
Masters or above	213	18.88
Employment status		
Student	592	52.48
Employed	281	24.91
Unemployed	255	22.61
Income level		
< 10000 TK	135	11.97
10001-30000 TK	394	34.93
30001-50000 TK	301	26.68
> 50000 TK	298	26.42

TABLE 2 | Distribution of sleep disturbance by the respondent's demographic and personal characteristics.

	Sleep disturbance		*p*-value
	No, n (%)	Yes, n (%)	
Total	753 (66.76)	375 (33.24)	
Division			
Dhaka	351 (64.17)	196 (35.83)	0.247
Chittagong	76 (64.41)	42 (35.59)	
Rajshahi	86 (68.80)	39 (31.20)	
Khulna	54 (64.29)	30 (35.71)	
Barisal	18 (69.23)	8 (30.77)	
Rangpur	90 (71.43)	36 (28.57)	
Sylhet	18 (85.71)	3 (14.29)	
Mymensingh	60 (74.07)	21 (25.93)	
Place of residence			
Urban	495 (63.95)	279 (36.05)	0.003
Rural	258 (72.88)	96 (27.12)	
Religion			
Muslim	672 (66.73)	335 (33.27)	0.963
Non-muslim	81 (66.94)	40 (33.06)	
Age (years)			
11-20	132 (71.74)	52 (28.26)	0.034
21-30	568 (66.51)	286 (33.49)	
31-40	19 (46.34)	22 (53.66)	
41-50	15 (75.00)	5 (25.00)	
>50	19 (65.52)	10 (34.48)	
Gender			
Male	442 (71.06)	180 (28.94)	0.001
Female	311 (61.46)	195 (38.54)	
Relationship status			
Single	525 (69.44)	231 (30.56)	0.016
In a relationship	105 (59.66)	71 (40.34)	
Married	121 (63.68)	69 (36.32)	
Widowed/Divorced	2 (33.33)	4 (66.67)	
Educational level			
Higher secondary or below	79 (71.17)	32 (28.83)	0.509
Bachelor or equivalent	536 (66.67)	268 (33.33)	
Masters or above	138 (64.79)	75 (35.21)	
Employment status			
Student	402 (67.91)	190 (32.09)	0.644
Employed	182 (64.77)	99 (35.23)	
Unemployed	169 (66.27)	86 (33.73)	
Income level			
< 10000 TK	92 (68.15)	43 (31.85)	0.814
10001-30000 TK	268 (68.02)	126 (31.98)	
30001-50000 TK	200 (66.45)	101 (33.55)	
> 50000 TK	193 (64.77)	105 (35.23)	
BMI			
Underweight	66 (63.46)	38 (36.54)	0.792
Normal weight	476 (67.23)	232 (32.77)	
Overweight	170 (65.64)	89 (34.36)	
Obese	38 (70.37)	16 (29.63)	
Size of family			
Small	399 (67.40)	193 (32.60)	0.630
Large	354 (66.04)	182 (33.96)	

p-value ≤ 0.001 are treated as 0.001.

respondents. Among respondents who were in a relationship, about 40% are suffering from sleep disturbance, whereas the prevalence of sleep disturbance is the lowest (30.56%) among "single" respondents.

Table 3 explores how sleep quality is disrupted during the COVID-19 lockdown. A higher prevalence of sleep disturbance has been observed among respondents whose family member/relative/friend/neighbor or him/herself has got infected with COVID-19. Among respondents who were working from home or doing online courses (during the lockdown) through the internet, 36.67% have developed sleep disturbance. The prevalence of sleep disturbance varies considerably by internet usage. **Table 3** indicates that the prevalence of sleep disturbance is the highest among respondents whose daily internet use is more than 5 h. Losing the job of any of the family members (including respondents) increases the prevalence of sleep disturbance. Among respondents who thought to be at a high risk of getting infected by COVID-19, 38.46% had a sleep disturbance. It has been observed that about 27% of respondents have claimed to develop anxiety during the lockdown, while 41.8% of them have also claimed to develop sleep disturbance, which is higher than those who do not think

TABLE 3 | Distribution of sleep disturbance by respondent's characteristics regarding COVID-19 and new normal life during the lockdown.

	n (%)	Sleep disturbance		*p*-value
		No, n (%)	Yes, n (%)	
Following the social distancing rule				
No	18 (1.60)	12 (66.67)	6 (33.33)	0.383
Moderately	380 (33.69)	264 (69.47)	116 (30.53)	
Strictly	730 (64.72)	477 (65.34)	253 (34.66)	
Infected by COVID-19				
No	793 (70.30)	548 (69.10)	245 (30.90)	0.010
Yes	335 (29.70)	205 (61.19)	130 (38.81)	
Currently living with family				
No	84 (7.45)	56 (66.67)	28 (33.33)	0.986
Yes	1,044 (92.55)	697 (66.76)	347 (33.24)	
Working from home/ doing online classes				
No	629 (55.76)	437 (69.48)	192 (30.52)	0.029
Yes	499 (44.24)	316 (63.33)	183 (36.67)	
Going to the workplace				
No	618 (82.40)	412 (66.67)	206 (33.33)	0.867
Yes	132 (17.60)	87 (65.91)	45 (34.09)	
Losing job				
No	909 (80.59)	642 (70.63)	267 (29.37)	0.001
Yes	219 (19.41)	111 (50.68)	108 (49.32)	
Exercise status				
No	638 (56.56)	414 (64.89)	224 (35.11)	0.129
Yes	490 (43.44)	339 (69.18)	151 (30.82)	
Food consumption dominates the new normal life				
No	738 (65.43)	498 (67.48)	240 (32.52)	0.477
Yes	390 (34.57)	255 (65.38)	135 (34.62)	
Daily internet usage				
< 3 h	220 (19.50)	155 (70.45)	65 (29.55)	0.004
3-5 h	321 (28.46)	232 (72.27)	89 (27.73)	
> 5 h	587 (52.04)	366 (62.35)	221 (37.65)	
Infection risk				
No	647 (57.36)	457 (70.63)	190 (29.37)	0.001
Yes	481 (42.64)	296 (61.54)	185 (38.46)	
Anxiety				
No	824 (73.05)	576 (69.90)	248 (30.10)	0.001
Yes	304 (26.95)	177 (58.22)	127 (41.78)	
Sleeping schedule				
Night	785 (69.59)	558 (71.08)	227 (28.92)	0.001
Day	343 (30.41)	195 (56.85)	148 (43.15)	

p-value ≤ 0.001 are treated as 0.001.

themselves as anxious. The sleeping schedule during the COVID-19 lockdown is significantly associated with sleep disturbance. A higher prevalence of sleep disturbance (43.35%) has been observed among respondents who usually sleep more at daytime (6 am–6 pm) than at night (6 pm–6 am) during the lockdown.

Factors Associated With Sleep Disturbance

Finally, the estimated effects from the logistic regression model for the factors associated with sleep disturbance are presented in **Table 4**. It demonstrates that out of the four significant personal factors of Pearson's chi-square test, only age and gender remain significant after fitting the logistic regression model. Furthermore, working from home/doing online classes, losing a job, infection risk, anxiety, sleeping schedule remain as significant factors of sleep disturbance. A respondent of age 31 to 40 years has approximately four times higher odds of having a sleep disturbance than a respondent of age 11 to 20 years (AOR: 4.04, 95% CI: 1.77–9.22). Gender has a statistically significant impact on sleep disturbances in favor of males. Compared to male respondents, females are 56% more likely to develop sleep disturbance (AOR: 1.56, CI: 1.19–2.04). The odds of having sleep disturbance is 34% higher among the respondents who are working from home or taking online classes through the internet than those who are not doing so (AOR:1.34, CI: 1.02–1.75). Sleep disturbance is 2.41 times higher among respondents who or anyone from his/her family had lost their job than among the respondents who or anyone from his/her family did not lose their job during lock-down. It has been observed that a respondent who thinks to be at a high risk of getting infected by

TABLE 4 | Determinant analysis of sleep disturbance: Results from a multivariable logistic regression model.

	AOR	*p*-value	95% CI
Constant	0.11	0.001	0.06-0.19
Place of residence			
Urban	1.00		
Rural	0.97	0.841	0.71-1.32
Age (years)			
11-20	1.00		
21-30	1.41	0.074	0.97-2.05
31-40	4.04	0.001	1.77-9.22
41-50	0.96	0.945	0.29-3.18
>50	1.89	0.215	0.69-5.12
Gender			
Male	1.00		
Female	1.56	0.001	1.19-2.04
Marital status			
Single	1.00		
In a relationship	1.29	0.164	0.90-1.84
Married	1.08	0.723	0.69-1.70
Widowed/Divorced	2.64	0.281	0.45-15.38
Infected by COVID-19			
No	1.00		
Yes	1.11	0.483	0.83-1.49
Working from home/ doing online classes			
No	1.00		
Yes	1.34	0.035	1.02-1.75
Losing job			
No	1.00		
Yes	2.41	0.001	1.76-3.32
Daily internet usage			
< 3 h	1.00		
3-5 h	0.90	0.604	0.59-1.36
> 5 h	1.30	0.183	0.88-1.92
Infection risk			
No	1.00		
Yes	1.45	0.006	1.11-1.89
Anxiety			
No	1.00		
Yes	1.42	0.019	1.06-1.90
Sleeping schedule			
Night	1.00		
Day	1.86	0.001	1.40-2.49

AOR = Adjusted odds ratio and p-value ≤ 0.001 are treated as 0.001.

COVID-19 has 45% higher chance to develop sleep disturbance than a respondent who does not think to be at a high risk of getting infected (AOR: 1.45, 95% CI: 1.11–1.89). Expectedly, anxiety plays a vital role in sleep disturbance. Respondents who are getting anxious during lockdown have 42% greater odds of developing sleep disturbance than respondents who do not think themselves as anxious with an estimated AOR of 1.42 (95% CI: 1.06–1.90). The results suggest that a respondent who sleeps more at daytime (6 am–6 pm) is 86% more likely to develop a sleep disturbance compared to a respondent who sleeps more at night (6 pm–6 am) with an estimated AOR of 1.86 (95% CI: 1.40–2.49).

Lastly, the area under the curve (AUC) of the receiving operating characteristic (ROC) curve has been calculated as a measure of model performance, which explains the model's performance by evaluating sensitivity *versus* specificity. **Figure 1** displays that there is a 68.7% chance that the final fitted model will be able to distinguish between the positive and negative class of sleep disturbance. Further, statistically significant evidence (p-value <.001) has been found that the model performance measure AUC of the final fitted model is greater than 0.5.

DISCUSSION

According to Worldometers, a total of 533,441 COVID-19 cases were identified, and the death rate was 16.61% over the cumulative number of closed cases up to 26th March when the first shutdown starts in Bangladesh (5, 54). As of the end of March, infections remained low, but a steep rise had been observed in April 2020 (55). New cases in Bangladesh grew by 1,155% in the week ending on 11th April, which is the highest in Asia, ahead of Indonesia, with 186% (7, 56). This web-based survey shows a high prevalence (33.24%) of sleep disturbance and anxiety (26.95%) during the COVID-19 outbreak. Studies on the Italian population showed a 57.1% prevalence of sleep problems with 32.1% anxiety disorders (57). The Italian study partitioned their region into three geographical segments and revealed sleep disturbance by using official psychological tools. The majority of their respondents (74.3%) were female. They explore the influence of demographic factors and knowledge of people affected by COVID-19 in determining risk for sleep quality. On the other hand, our study assesses how COVID-19 and new normal life during the lockdown disrupts sleep quality. Furthermore, it is impossible to differentiate whether the results of the Italian study are due to the fear of the pandemic or the restrictive measures imposed by the government of Italy. However, the different demographic characteristics of the sample and different aspects of the Italian study made a statistical comparison quite impossible.

Our study indicates that younger participants of age less than 30 years were less likely to develop sleep disturbance compared to older people of age more than 30 years during this lockdown. Around 90% of the respondents aged 31–40 years were living in urban areas where population density is much higher compared to rural areas. As a result, a higher percentage of them (46.34%) thought to be at a high risk of getting infected by COVID-19. This risk of getting infected may disrupt their sleep quality.

Women's triple burden is depicted across three broad categories of productive, reproductive, and community work (58). Disease outbreak, disaster, or other crises predominantly increase women's workloads and decrease the ability to balance their time (59–62). Burdens associated with COVID-19 are

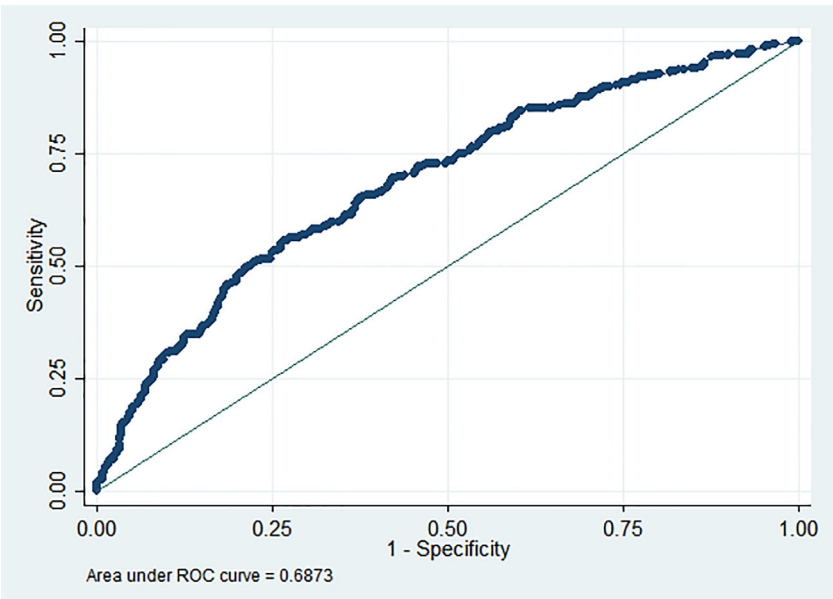


FIGURE 1 | Performance measure for predicting sleep disturbance using last fitted multivariable logistic regression model.

strenuous, perilous, and likewise gendered. Understanding the extent to which COVID-19 home confinement measures affect women and men differently is fundamental for understanding the broader impact of this disease. During the lockdown, families are at home more which has intensified women's existing triple burden (63) and fears of violent domestic abusers (64). A recent study has explored women's triple burden during COVID-19 in three Asian countries (65). Home confinement may have increased household (including caretaking of elderly family members) responsibilities, which may disproportionately affect women. In addition to other jobs, this potential increase in responsibilities during the pandemic may have exacerbated adverse mental health for women in particular. Several studies have reported a higher prevalence of sleep disturbance among women compared to males (19, 57, 66, 67). A recent study in the context of COVID-19 conducted on Bangladeshi people also found a higher prevalence of general anxiety disorder among females (68). Similar to other studies, it has been observed in our study that the odds of getting anxious during the lockdown is about 15% higher among female participants than among males. This high prevalence of anxiety and a greater burden in the household increase the stress of females, which may result in a higher prevalence of sleep disturbance.

It has been observed that sleep disturbance is more common among the participants who are working from home or taking online classes through the internet. One possible explanation behind observing a higher prevalence is that the majority of them (56.31%) are using the internet for more than 5 h a day. Previous studies have identified excessive usage of the internet as a potential source of sleep disorders (69–76). Besides this, around 48% of the respondents who were working from home or taking online classes through the internet were female, which also provides the rationale for observing a higher prevalence among them.

Readymade garments and other export-oriented sectors of Bangladesh had faced a huge shock due to orders cancellation of worth $3.0 billion (77). More than a million have already been fired or furloughed as global fashion companies have canceled or suspended their orders in Bangladesh due to the corona virus crisis (78). The tourism industry of Bangladesh will face a loss of about Tk 40 billion (USD 470 million) this year, whereas this sector directly provided a livelihood for 1.1 million people (79). Around 32 lakh transport workers had become temporarily unemployed (80). It seems that this pandemic now turns into a severe economic crisis as a huge percentage of people have already lost their jobs. Among the participants, 20% stated that their family members or they themselves lost jobs during this lockdown. The finding of this study implies that there is a greater prevalence of sleep disturbance among participants who or anyone from their family members lost jobs during this pandemic as losing jobs create massive insecurity of meeting livelihoods.

The results of this survey have displayed that 42.7% of the participants think that they are at high risk of getting infected. The results of multivariable logistic regression have suggested that the odds of developing sleep disturbance is higher among participants who thought to be at high risk of getting infected. Due to the lockdown, people have been confined to their homes, which results in a severe reduction of their daily social interaction. This lack of social interaction and home confinement may contribute to developing anxiety. Expectedly, it has been observed from the study results that the presence of anxiousness triggers sleep disturbance. In several studies, anxiety had also been found as a potential risk factor of sleep disturbance (81–87). In this study, no statistically significant association (Pearson's chi-square value = 5.33, p-value = 0.255) has been found between respondent's anxiety and age.

Before the COVID-19 lockdown, the sleeping schedule was more dependent on a person's working shift. Several studies have found that sleep disorders are more common in night-shift workers compared with day workers (88–90). During lockdown, people have been confined to their homes, which moderately shifts the working hours and work responsibilities. Participants of this study were mainly students (52.48%) and in general, they can have erratic sleep schedules as they have no defined hours to do their work. The results of this study have suggested that sleeping schedule has a statistically significant impact on developing sleep disturbance in favor of participants who slept more at night (6 pm–6 am) than those who slept more at daytime (6 am–6 pm).

The findings of this study suggest that the factors highlighted above can be the potential risk factors of developing sleep disturbance, as previously reported for the Chinese population and accordingly with other studies on epidemic and quarantine conditions (91–94).

Limitations and Strengths of the Study

The findings of this study should be interpreted in the context of the study's design and limitations. The study used a web-based non-probabilistic convenience sampling method as it was impossible to take personal interviews due to COVID-19 confinement restrictions. It is always very much difficult to obtain a nationally representative sample through a web-based survey. Expectedly, we have observed more responses from urban areas and comparatively younger groups of Bangladeshi population (mainly students) as they are more active in digital platforms than the people of rural areas and elderly people of Bangladesh. Approximately half of the responses have been obtained from the Dhaka division, which results in failing to capture the regional psychological behavior of the respondents. Since the study is a cross-sectional one, it can only point toward associations. A more robust design such as cohort or case–control is recommended to corroborate causation and generalization. The results of this study could have been more robust if we could have included the information regarding the previous history of sleep disturbance (insomnia), depression, and other mental health conditions (bipolar disorder), the previous history of anxiety disorder, chronic diseases/chronic pain conditions, consumption of medications associated with insomnia.

The survey was basic, with clear categories outlined and no need for official psychological tools, making it easy for respondents to quickly go through the survey. The survey reached people through a variety of digital platforms, making it more accessible and meeting people where they already are (aside from the fact that this was not available in person).

Notwithstanding all the limitations, this study explores a relevant topic, mental health and associated conditions like sleeping disorders, which have been identified as one of the secondary effects of the pandemic. To the best of our knowledge, this will be the first study in Bangladesh that assesses the association between sleep disturbance and variables associated with the lockdown prompted by COVID-19.

CONCLUDING REMARKS

Fortunately, many strong national measures have been taken by the Bangladesh government to avoid further spread of the COVID-19 outbreak. However, the public's psychological problems during the COVID-19 outbreak are still overlooked. This study attempts to fill this research gap by analyzing the prevalence of sleep disturbance as sleep disturbance is one of the key symptoms of major depression and one of the proven risk factors for suicide (95–97). The findings of this study suggest that sleep disturbance during the lockdown is dependent on both demographic characteristics and the COVID-19 related information of the respondents. In conclusion, this study found that variables associated with the lockdown prompted by COVID-19 such as working from home or doing online classes through the internet, job loss, anxiety, fear of infection with COVID-19, and (day) sleeping schedule were predictive factors for developing sleeping disorders in the Bangladeshi population. We anticipate that this framework will help the policymakers to initiate government programs to diagnose and treat mental health disorders due to the secondary impact of the pandemic. We suggest arranging cognitive–behavioral therapy (CBT) which is the most widely-used therapy for sleep disorders and may be conducted individually in a group of people with similar sleeping problems, or even online (98–100). As well as changing the way one's thinking regarding sleep, CBT also works to change the habits that can prevent someone from sleeping well. A promotional campaign should be arranged to let people know about the digitally available stress and anxiety mitigation resources of WHO (101, 102). Further, researchers may use this study as a means to keep studying the impact of the pandemic in mental health and sleep quality and prompt further interest and investment from the health sector in mental health programs to tackle the impact of COVID-19.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was not required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

AUTHOR CONTRIBUTIONS

Conceived and designed the experiments: TA, MH. Performed the experiments: MH, TA, AA. Analyzed the data: TA, MR. Contributed reagents/materials/analysis tools: TA, MR. Wrote the paper: MR, TA, AA. All authors contributed to the article and approved the submitted version.

REFERENCES

1. World Health Organization. *WHO Timeline - COVID-19* (2020). Available at: https://www.who.int/news-room/detail/27-04-2020-who-timeline—covid-19 (Accessed April 27, 2020).
2. Paules CI, Marston HD, Fauci AS. Coronavirus infections—more than just the common cold. *JAMA* (2020) 323(8):707–8. doi: 10.1001/jama.2020.0757
3. Wang D, Hu B, Hu C, Zhu F, Liu X, Zhang J, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus–infected pneumonia in Wuhan, China. *JAMA* (2020) 323(11):1061–9. doi: 10.1001/jama.2020.1585
4. World Health Organization. *WHO Director-General's opening remarks at the media briefing on COVID-19*. Available at: https://www.who.int/dg/speeches/detail/who-director-general-s-opening-remarks-at-the-media-briefing-on-covid-19—11-march-2020 (Accessed March 11, 2020).
5. Worldometers. *Coronavirus update*. Available at: https://www.worldometers.info/coronavirus/ (Accessed June 24, 2020).
6. Anwar S, Nasrullah M, Hosen MJ. COVID-19 and Bangladesh: Challenges and how to address them. *Front Public Health* (2020) 8:154. doi: 10.3389/fpubh.2020.00154
7. Worldometers. *BangladeshCoronavirus*. Available at: https://www.worldometers.info/coronavirus/country/bangladesh/ (Accessed June 24, 2020).
8. Das J, Do QT, Friedman J, McKenzie D, Scott K. Mental health and poverty in developing countries: Revisiting the relationship. *Soc Sci Med* (2007) 65 (3):467–80. doi: 10.1016/j.socscimed.2007.02.037
9. Bass JK, Bornemann TH, Burkey M, Chehil S, Chen L, Copeland JR, et al. A United Nations General Assembly Special Session for mental, neurological, and substance use disorders: the time has come. *PLoS Med* (2012) 9(1): e1001159. doi: 10.1371/journal.pmed.1001159
10. Hock RS, Or F, Kolappa K, Burkey MD, Surkan PJ, Eaton WW. A new resolution for global mental health. *Lancet (London Engl)* (2012) 379 (9824):1367. doi: 10.1016/S0140-6736(12)60243-8
11. Saxena S, Thornicroft G, Knapp M, Whiteford H. Resources for mental health: scarcity, inequity, and inefficiency. *Lancet* (2007) 370(9590):878–89. doi: 10.1016/S0140-6736(07)61239-2
12. Lora A, Hanna F, Chisholm D. Mental health service availability and delivery at the global level: an analysis by countries' income level from WHO's Mental Health Atlas 2014. *Epidemiol Psychiatr Sci* (2017), 29(2) 1–2. doi: 10.1017/S2045796017000075
13. World Health Organization. *Mental Health Atlas-2017 country profiles*. Available at: https://www.who.int/mental_health/evidence/atlas/profiles-2017/en (Accessed 2017).
14. Firoz AH, Karim ME, Alam MF, Rahman AH, Zaman MM. Prevalence, medical care, awareness and attitude towards mental illness in Bangladesh. *Bangladesh J Psychiatry* (2006) 20(1):9–32.

15. Ahmed HU, Mullick MS, Alam MF, Nahar JS, Chowdhury NF, Hamid MA, et al. *Management of psychotic depression in Bangladesh*. (2011) *JSPN* SS46–SS50. Available at: http://www.jspn. or. jp/journal/symposium/.../pdf/ss046-050_bgsdng11.pdf.
16. Mohit MA, Maruf MM, Ahmed H, Alam MT. Depression and physical illnesses: an update. *Bangladesh Med J* (2011) 40(1):53–8. doi: 10.3329/bmj.v40i1.9966
17. Hossain MD, Ahmed HU, Chowdhury WA, Niessen LW, Alam DS. Mental disorders in Bangladesh: a systematic review. *BMC Psychiatry* (2014) 14 (1):216. doi: 10.1186/s12888-014-0216-9
18. Xiao H, Zhang Y, Kong D, Li S, Yang N. Social capital and sleep quality in individuals who self-isolated for 14 days during the coronavirus disease 2019 (COVID-19) outbreak in January 2020 in China. *Med Sci Monit: Int Med J Exp Clin Res* (2020) 26:e923921–1. doi: 10.12659/MSM.923921
19. Huang Y, Zhao N. Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: an online-based cross-sectional survey. *Psychiatry Res* (2020) 12:112954. doi: 10.1016/j.psychres.2020.112954
20. Rajkumar RP. COVID-19 and mental health: A review of the existing literature. *Asian J Psychiatry* (2020) 10:102066. doi: 10.1016/j.ajp.2020.102066
21. Wu KK, Chan SK, Ma T. Posttraumatic stress, anxiety, and depression in survivors of severe acute respiratory syndrome (SARS). *J Traumatic Stress* (2005) 18(1):39–42. doi: 10.1002/jts.20004
22. Shen L, van Schie J, Ditchburn G, Brook L, Bei B. Positive and negative emotions: Differential associations with sleep duration and quality in adolescents. *J Youth Adolesc* (2018) 47(12):2584–95. doi: 10.1007/s10964-018-0899-1
23. Kahn M, Sheppes G, Sadeh A. Sleep and emotions: bidirectional links and underlying mechanisms. *Int J Psychophysiol* (2013) 89(2):218–28. doi: 10.1016/j.ijpsycho.2013.05.010
24. Walker MP, van Der Helm E. Overnight therapy? The role of sleep in emotional brain processing. *Psychol Bull* (2009) 135(5):731. doi: 10.1037/a0016570
25. Baum KT, Desai A, Field J, Miller LE, Rausch J, Beebe DW. Sleep restriction worsens mood and emotion regulation in adolescents. *J Child Psychol Psychiatry* (2014) 55(2):180–90. doi: 10.1111/jcpp.12125
26. Tavernier R, Willoughby T. A longitudinal examination of the bidirectional association between sleep problems and social ties at university: The mediating role of emotion regulation. *J Youth Adolesc* (2015) 44(2):317–30. doi: 10.1007/s10964-014-0107-x
27. Kaneita Y, Yokoyama E, Harano S, Tamaki T, Suzuki H, Munezawa T, et al. Associations between sleep disturbance and mental health status: a longitudinal study of Japanese junior high school students. *Sleep Med* (2009) 10(7):780–6. doi: 10.1016/j.sleep.2008.06.014
28. Roberts RE, Shema SJ, Kaplan GA, Strawbridge WJ. Sleep complaints and depression in an aging cohort: a prospective perspective. *Am J Psychiatry* (2000) 157(1):81–8. doi: 10.1176/ajp.157.1.81
29. Chang PP, Ford DE, Mead LA, Cooper-Patrick L, Klag MJ. Insomnia in young men and subsequent depression: The Johns Hopkins Precursors Study. *Am J Epidemiol* (1997) 146(2):105–14. doi: 10.1093/oxfordjournals.aje.a009241
30. Breslau N, Roth T, Rosenthal L, Andreski P. Sleep disturbance and psychiatric disorders: a longitudinal epidemiological study of young adults. *Biol Psychiatry* (1996) 39(6):411–8. doi: 10.1016/0006-3223(95)00188-3
31. Ford DE, Kamerow DB. Epidemiologic study of sleep disturbances and psychiatric disorders: an opportunity for prevention? *JAMA* (1989) 262 (11):1479–84. doi: 10.1001/jama.262.11.1479
32. Harvey AG, Murray G, Chandler RA, Soehner A. Sleep disturbance as transdiagnostic: consideration of neurobiological mechanisms. *Clin Psychol Revi* (2011) 31(2):225–35. doi: 10.1016/j.cpr.2010.04.003
33. Lucassen EA, Rother KI, Cizza G. Interacting epidemics? Sleep curtailment, insulin resistance, and obesity. *Ann New Y Acad Sci* (2012) 1264(1):110. doi: 10.1111/j.1749-6632.2012.06655.x
34. Chien KL, Chen PC, Hsu HC, Su TC, Sung FC, Chen MF, et al. Habitual sleep duration and insomnia and the risk of cardiovascular events and all-cause death: report from a community-based cohort. *Sleep* (2010) 33(2):177–84. doi: 10.1093/sleep/33.2.177
35. Magee CA, Holliday EG, Attia J, Kritharides L, Banks E. Investigation of the relationship between sleep duration, all-cause mortality, and preexisting disease. *Sleep Med* (2013) 14(7):591–6. doi: 10.1016/j.sleep.2013.02.002
36. Li Y, Zhang X, Winkelman JW, Redline S, Hu FB, Stampfer M, et al. Association between insomnia symptoms and mortality: a prospective study of US men. *Circulation* (2014) 129(7):737–46. doi: 10.1161/CIRCULATIONAHA.113.004500
37. Yeo Y, Ma SH, Park SK, Chang SH, Shin HR, Kang D, et al. A prospective cohort study on the relationship of sleep duration with all-cause and disease-specific mortality in the Korean Multi-center Cancer Cohort study. *J Prevent Med Public Health* (2013) 46(5):271. doi: 10.3961/jpmph.2013.46.5.271
38. Buxton OM, Pavlova M, Reid EW, Wang W, Simonson DC, Adler GK. Sleep restriction for 1 week reduces insulin sensitivity in healthy men. *Diabetes* (2010) 59(9):2126–33. doi: 10.2337/db09-0699
39. Irwin M. Effects of sleep and sleep loss on immunity and cytokines. *Brain Behav Immun* (2002) 16(5):503–12. doi: 10.1016/S0889-1591(02)00003-X
40. Gamaldo CE, Shaikh AK, McArthur JC. The sleep-immunity relationship. *Neurol Clin* (2012) 30(4):1313–43. doi: 10.1016/j.ncl.2012.08.007
41. Mehnert A, Lehmann C, Graefen M, Huland H, Koch U. Depression, anxiety, post-traumatic stress disorder and health-related quality of life and its association with social support in ambulatory prostate cancer patients. *Eur J Cancer Care* (2010) 19(6):736–45. doi: 10.1111/j.1365-2354.2009.01117.x
42. Altena E, Baglioni C, Espie CA, Ellis J, Gavriloff D, Holzinger B, et al. Dealing with sleep problems during home confinement due to the COVID-19 outbreak: Practical recommendations from a task force of the European CBT-I Academy. *J Sleep Res* (2020) 4:e13052. doi: 10.1111/jsr.13052
43. Fischer A, Fischer M, Nicholls RA, Lau S, Poettgen J, Patas K, et al. Diagnostic accuracy for major depression in multiple sclerosis using self-report questionnaires. *Brain Behav* (2015) 5(9):e00365. doi: 10.1002/brb3.365
44. Ortega-Montiel J, Posadas-Romero C, Ocampo-Arcos W, Medina-Urrutia A, Cardoso-Saldaña G, Jorge-Galarza E, et al. Self-perceived stress is associated with adiposity and atherosclerosis. *GEA Study BMC Public Health* (2015) 15(1):780. doi: 10.1186/s12889-015-2112-8
45. White K, Scarinci IC. Comparison of self-rated health among Latina immigrants in a Southern US city and a national sample. *Am J Med Sci* (2015) 350(4):290–5. doi: 10.1097/MAJ.0000000000000554
46. Sher L. COVID-19, anxiety, sleep disturbances and suicide. *Sleep Med* (2020) 70:124. doi: 10.1016/j.sleep.2020.04.019
47. Lin LY, Wang J, Ou-yang XY, Miao Q, Chen R, Liang FX, et al. The immediate impact of the 2019 novel coronavirus (COVID-19) outbreak on subjective sleep status. *Sleep Med* (2020). doi: 10.1016/j.sleep.2020.05.018
48. Fu W, Wang C, Zou L, Guo Y, Lu Z, Yan S, et al. Psychological health, sleep quality, and coping styles to stress facing the COVID-19 in Wuhan, China. *Trans Psychiatry* (2020) 10(1):1–9. doi: 10.1038/s41398-020-00913-3
49. Pearson KX. On the criterion that a given system of deviations from the probable in the case of a correlated system of variables is such that it can be reasonably supposed to have arisen from random sampling. *London Edinburgh Dublin Philos Magazine J Sci* (1900) 50(302):157–75. doi: 10.1080/14786440009463897
50. Agresti A. "Building and applying logistic regression models". In: *Categorical Data Analysis. 2nd ed.* Wiley Inc: Hoboken (2007). p. 211–66.
51. Cramer JS. *The origins of logistic regression*. Tinbergen Institute Discussion Paper. Amsterdam and Rotterdam: Tinbergen Institute (2002). Available at: http://hdl.handle.net/10419/86100
52. Hanley JA, McNeil BJ. The meaning and use of the area under a receiver operating characteristic (ROC) curve. *Radiology* (1982) 143(1):29–36. doi: 10.1148/radiology.143.1.7063747
53. Fogarty J, Baker RS, Hudson SE. Case studies in the use of ROC curve analysis for sensor-based estimates in human computer interaction, in: *Proceedings of Graphics Interface*. Victoria, British Columbia: University of Waterloo (2005). p. 129–36.
54. Dhaka Tribune. *Coronavirus: Bangladesh declares public holiday from March 26 to April 4* (2020). Available at: https://www.dhakatribune.com/bangladesh/2020/03/23/govt-offices-to-remain-closed-Until-april-4 (Accessed March 23, 2020).
55. Dhaka Tribune. *20-fold rise in Covid-19 cases in Bangladesh since April 1* (2020). Available at: https://www.dhakatribune.com/health/coronavirus/2020/04/14/20-fold-rise-of-covid-19-cases-in-bangladesh-since-april-1 (Accessed April 14, 2020).

56. Institute of Epidemiology, Disease Control and Research (IEDCR). *Bangladesh Covid-19 Update* (2020). Available at: https://www.iedcr.gov.bd/index.php/component/content/article/website (Accessed April 11, 2020).
57. Casagrande M, Favieri F, Tambelli R, Forte G. The enemy who sealed the world: Effects quarantine due to the COVID-19 on sleep quality, anxiety, and psychological distress in the Italian population. *Sleep Med* (2020) 75:12–20. doi: 10.1016/j.sleep.2020.05.011
58. Moser C. *Gender planning and development: Theory, practice and training*. London: Routledge (2012). p.15–55. doi: 10.4324/9780203411940
59. Bradshaw S. Engendering development and disasters. *Disasters* (2015) 39 (s1):s54–75. doi: 10.1111/disa.12111
60. Bradshaw S, Fordham M. Double disaster: Disaster through a gender lens. In: *Hazards, risks and disasters in society*. Academic Press (2015). p. 233–51. doi: 10.1016/B978-0-12-396451-9.00014-7
61. Mondal SH. Women's vulnerabilities due to the impact of climate change: Case from Satkhira region of Bangladesh. *Global J Hum Soc Sci* (2014) 14 (5):46–52.
62. Stemple L, Karegeya P, Gruskin S. Human rights, gender, and infectious disease: from HIV/AIDS to Ebola. *Hum Rts Q* (2016) 38:993. doi: 10.1353/hrq.2016.0054
63. Graves L. *Women"s Domestic Burden just got Heavier with Coronavirus*. Kings Place.[Google Scholar]: London (2020).
64. Baird J. *Domestic Abuse Advocates Warn of an Increase in Violence amid Coronovirus Crisis*. ABC News.[Google Scholar]: New York (2020).
65. McLaren HJ, Wong KR, Nguyen KN, Mahamadachchi KN. Covid-19 and Women's Triple Burden: Vignettes from Sri Lanka, Malaysia, Vietnam and Australia. *Soc Sci* (2020) 9(5):87. doi: 10.3390/socsci9050087
66. Soares CN, Murray BJ. Sleep disorders in women: clinical evidence and treatment strategies. *Psychiatr Clinics North America* (2006) 29(4):1095. doi: 10.1016/j.psc.2006.09.002
67. Su TP, Lien TC, Yang CY, Su YL, Wang JH, Tsai SL, et al. Prevalence of psychiatric morbidity and psychological adaptation of the nurses in a structured SARS caring unit during outbreak: a prospective and periodic assessment study in Taiwan. *J Psychiatr Res* (2007) 41(1-2):119–30. doi: 10.1016/j.jpsychires.2005.12.006
68. Islam MS, Ferdous MZ, Potenza MN. Panic and generalized anxiety during the COVID-19 pandemic among Bangladeshi people: An online pilot survey early in the outbreak. *J Affect Disord* (2020) 276:30–37. doi: 10.1016/j.jad.2020.06.049
69. Bakken IJ, Wenzel HG, Götestam KG, Johansson A, Øren A. Internet addiction among Norwegian adults: a stratified probability sample study. *Scand J Psychol* (2009) 50(2):121–7. doi: 10.1111/j.1467-9450.2008.00685.x
70. Shimizu T. Sleep habits and its relation to depression. *Nihon rinsho Japanese J Clin Med* (2012) 70(7):1206–10.
71. Younes F, Halawi G, Jabbour H, El Osta N, Karam L, Hajj A, et al. Internet addiction and relationships with insomnia, anxiety, depression, stress and self-esteem in university students: A cross-sectional designed study. *PLoS One* (2016) 11(9):e0161126. doi: 10.1371/journal.pone.0161126
72. Yen CF, Ko CH, Yen JY, Cheng CP. The multidimensional correlates associated with short nocturnal sleep duration and subjective insomnia among Taiwanese adolescents. *Sleep* (2008) 31(11):1515–25. doi: 10.1093/sleep/31.11.1515
73. Choi K, Son H, Park M, Han J, Kim K, Lee B, et al. Internet overuse and excessive daytime sleepiness in adolescents. *Psychiatry Clin Neurosci* (2009) 63(4):455–62. doi: 10.1111/j.1440-1819.2009.01925.x
74. Cheung LM, Wong WS. The effects of insomnia and internet addiction on depression in Hong Kong Chinese adolescents: an exploratory cross-sectional analysis. *J Sleep Res* (2011) 20(2):311–7. doi: 10.1111/j.1365-2869.2010.00883.x
75. Cheng SH, Shih CC, Lee IH, Hou YW, Chen KC, Chen KT, et al. A study on the sleep quality of incoming university students. *Psychiatry Res* (2012) 197 (3):270–4. doi: 10.1016/j.psychres.2011.08.011
76. Canan F, Yildirim O, Sinani G, Ozturk O, Ustunel TY, Ataoglu A. Internet addiction and sleep disturbance symptoms among T urkish high school students. *Sleep Biol Rhythms* (2013) 11(3):210–3. doi: 10.1111/sbr.12022
77. The Financial Express. *Buyers cancel orders of RMG products worth $3.0b* (2020).Available at: https://thefinancialexpress.com.bd/economy/bangladesh/buyers-cancel-orders-of-rmg-products-worth-30b1585842640#:~:text=Bangladesh%20Garment%20Manufacturers%20and%20Exporters,following%20the%20outbreak%20of%20coronavirus (Accessed April 02, 2020).
78. Anner M. Abandoned? The Impact of Covid-19 on Workers and Businesses at the Bottom of Global Garment Supply Chains. Center for Global Workers' Rights Research Report. Available at: https://www. workersrights.org/wp-content/uploads/2020/03/Abandoned-Penn-State-WRC-Report-March-27-2020.Pdf (Accessed 10 May 2020). 2020.
79. The Business Standard. *Covid-19 to cost Bangladesh tourism sector Tk40bn: UNWTO* (2020). Available at: https://tbsnews.net/economy/covid-19-cost-bangladesh-tourism-sector-tk40bn-unwto-78118 (Accessed May 02, 2020).
80. UNB. *Coronavirus: Transport workers unable to bear shutdown impacts* (2020). Available at: https://unb.com.bd/category/Special/coronavirus-transport-workers-unable-to-bear-shutdown-impacts/49883 (Accessed April 18, 2020).
81. Ohayon MM. Prevalence of DSM-IV diagnostic criteria of insomnia: distinguishing insomnia related to mental disorders from sleep disorders. *J Psychiatr Res* (1997) 31(3):333–46. doi: 10.1016/S0022-3956(97)00002-2
82. Anderson DJ, Noyes R, Crowe RR. A comparison of panic disorder and generalized anxiety disorder. *Am J Psychiatry* (1984) 141(4):572–75. doi: 10.1176/ajp.141.4.572
83. Monti JM, Monti D. Sleep disturbance in generalized anxiety disorder and its treatment. *Sleep Med Rev* (2000) 4(3):263–76. doi: 10.1053/smrv.1999.0096
84. Staner L. Sleep and anxiety disorders. *Dialogues Clin Neurosci* (2003) 5(3):249.
85. Jansson M, Linton SJ. The role of anxiety and depression in the development of insomnia: cross-sectional and prospective analyses. *Psychol Health* (2006) 21(3):383–97. doi: 10.1080/14768320500129015
86. Papadimitriou GN, Linkowski P. Sleep disturbance in anxiety disorders. *Int Rev Psychiatry* (2005) 17(4):229–36. doi: 10.1080/09540260500104524
87. LeBlanc M, Mérette C, Savard J, Ivers H, Baillargeon L, Morin CM. Incidence and risk factors of insomnia in a population-based sample. *Sleep* (2009) 32(8):1027–37. doi: 10.1093/sleep/32.8.1027
88. Drake CL, Roehrs T, Richardson G, Walsh JK, Roth T. Shift work sleep disorder: prevalence and consequences beyond that of symptomatic day workers. *Sleep* (2004) 27(8):1453–62. doi: 10.1093/sleep/27.8.1453
89. Ohayon MM, Lemoine P, Arnaud-Briant V, Dreyfus M. Prevalence, and consequences of sleep disorders in a shift worker population. *J Psychosom Res* (2002) 53(1):577–83. doi: 10.1016/S0022-3999(02)00438-5
90. Garbarino S, De Carli F, Nobili L, Mascialino B, Squarcia S, Penco MA, et al. Sleepiness and sleep disorders in shift workers: a study on a group of Italian police officers. *Sleep* (2002) 25(6):642–7. doi: 10.1093/sleep/25.6.642
91. Brooks SK, Webster RK, Smith LE, Woodland L, Wessely S, Greenberg N, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *Lancet* (2020) 395:912–20. doi: 10.1016/S0140-6736(20)30460-8
92. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet* (2020) 395(10223):497–506. doi: 10.1016/S0140-6736(20)30183-5
93. Cao W, Fang Z, Hou G, Han M, Xu X, Dong J, et al. The psychological impact of the COVID-19 epidemic on college students in China. *Psychiatry Res* (2020) 20:112934. doi: 10.1016/j.psychres.2020.112934
94. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *Int J Environ Res Public Health* (2020) 17(5):1729. doi: 10.3390/ijerph17051729
95. Agargun MY, Kara H. Solmaz. Sleep disturbances and suicidal behavior in patients with major depression. *Clin Psychiatry* (1997) 58:245–51. doi: 10.4088/JCP.v58n0602
96. Goldstein TR, Bridge JA, Brent DA. Sleep disturbance preceding completed suicide in adolescents. *J Consult Clin Psychol* (2008) 76(1):84. doi: 10.1037/0022-006X.76.1.84
97. Bernert RA, Joiner TE. Sleep disturbances and suicide risk: a review of the literature. *Neuropsychiatr Dis Treat* (2007) 3(6):735. doi: 10.2147/NDT.S1248
98. Espie CA, Inglis SJ, Tessier S, Harvey L. The clinical effectiveness of cognitive behaviour therapy for chronic insomnia: implementation and evaluation of a sleep clinic in general medical practice. *Behav Res Ther* (2001) 39(1):45–60. doi: 10.1016/S0005-7967(99)00157-6
99. Okajima I, Komada Y, Inoue Y. A meta-analysis on the treatment effectiveness of cognitive behavioral therapy for primary insomnia. *Sleep Biol Rhythms* (2011) 9(1):24–34. doi: 10.1111/j.1479-8425.2010.00481.x

100. Mitchell MD, Gehrman P, Perlis M, Umscheid CA. Comparative effectiveness of cognitive behavioral therapy for insomnia: a systematic review. *BMC Family Pract* (2012) 13(1):40. doi: 10.1186/1471-2296-13-40
101. World Health Organization. *Doing what matters in times of stress: an illustrated guide*. Available at: https://www.who.int/publications/i/item/9789240003927?gclid=EAIaIQobChMI37aFqP6i6wIVU6WWCh1wugMOEAAYASAAEgIwsfD_BwE (Accessed April 29, 2020).
102. World Health Organization. *Coping with stress during the 2019-nCoV outbreak* (Accessed 2020).

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Public Health

MINI REVIEW
published: 22 September 2020
doi: 10.3389/fpubh.2020.574198

OPEN ACCESS

Edited by:
Stefan Swartling Peterson,
Uppsala University, Sweden

Reviewed by:
Xiaojiong Jia,
Harvard Medical School,
United States
Pedro Xavier-Elsas,
Federal University of Rio de
Janeiro, Brazil

***Correspondence:**
Kuldeep Dhama
kdhama@rediffmail.com
Harapan Harapan
harapan@unsyiah.ac.id

†ORCID:
Kuldeep Dhama
orcid.org/0000-0001-7469-4752
Shailesh Kumar Patel
orcid.org/0000-0001-9536-4760
Rakesh Kumar
orcid.org/0000-0002-8481-2094
Jigyasa Rana
orcid.org/0000-0002-8309-9135
Mohd. Iqbal Yatoo
orcid.org/0000-0002-4501-7354
Akshay Kumar
orcid.org/0000-0003-2718-0606
Ruchi Tiwari
orcid.org/0000-0001-7763-5547
Senthilkumar Natesan
orcid.org/0000-0002-1855-5296
Harapan Harapan
orcid.org/0000-0001-7630-8413

Specialty section:
This article was submitted to Infectious Diseases - Surveillance, Prevention and Treatment, a section of the journal Frontiers in Public Health

Received: 19 June 2020
Accepted: 21 August 2020
Published: 22 September 2020

Citation:
Dhama K, Patel SK, Kumar R, Rana J, Yatoo MI, Kumar A, Tiwari R, Dhama J, Natesan S, Singh R and Harapan H (2020) Geriatric Population During the COVID-19 Pandemic: Problems, Considerations, Exigencies, and Beyond. Front. Public Health 8:574198. doi: 10.3389/fpubh.2020.574198

Geriatric Population During the COVID-19 Pandemic: Problems, Considerations, Exigencies, and Beyond

Kuldeep Dhama[1†], Shailesh Kumar Patel[1†], Rakesh Kumar[2†], Jigyasa Rana[3†], Mohd. Iqbal Yatoo[4†], Akshay Kumar[5†], Ruchi Tiwari[6†], Jaideep Dhama[7], Senthilkumar Natesan[8†], Rajendra Singh[1] and Harapan Harapan[9,10,11*†]*

[1] Division of Pathology, ICAR-Indian Veterinary Research Institute, Bareilly, India, [2] Department of Veterinary Pathology, Dr. G.C. Negi College of Veterinary and Animal Sciences, GSK Himachal Pradesh Agricultural University, Palampur, India, [3] Department of Veterinary Anatomy, Faculty of Veterinary and Animal Sciences, Rajiv Gandhi South Campus Banaras Hindu University, Mirzapur, India, [4] Division of Veterinary Clinical Complex, Faculty of Veterinary Sciences and Animal Husbandry, Sher-E-Kashmir University of Agricultural Sciences and Technology of Kashmir, Srinagar, India, [5] Department of Cardiothoracic Surgery, Medanta Hospital, Gurgaon, India, [6] Department of Veterinary Microbiology and Immunology, College of Veterinary Sciences, Uttar Pradesh Pandit Deen Dayal Upadhyaya Pashu Chikitsa Vigyan Vishwavidyalaya Evam Go Anusandhan Sansthan (DUVASU), Mathura, India, [7] Tara Hospital, New Delhi, India, [8] Indian Institute of Public Health Gandhinagar, Gandhinagar, India, [9] Medical Research Unit, School of Medicine, Universitas Syiah Kuala, Banda Aceh, Indonesia, [10] Tropical Disease Centre, School of Medicine, Universitas Syiah Kuala, Banda Aceh, Indonesia, [11] Department of Microbiology, School of Medicine, Universitas Syiah Kuala, Banda Aceh, Indonesia

The coronavirus disease 2019 (COVID-19) pandemic wreaked havoc worldwide, with more than 20 million confirmed cases and nearly 0. 75 million deaths as of 10th August 2020. Various factors determine the severity and symptoms of this infection. Older age and underlying diseases are the challenges being faced in controlling and treating COVID-19. In 2019, 703 million of the global population was older than 65 years of age. The estimated mortality due to COVID-19 in people older than 76 years of age is reportedly 18%. Frequent infections in older people, higher disease severity, and increased mortality are major challenges in the implementation of appropriate preventive measures and future strategies to protect against this disease in geriatric population. Poor health status, weak immune function, lowered organ function, increased probability of multiple underlying diseases, and poor attention to personal health can increase the susceptibility to various diseases in the geriatric population. Concerning inadequate immunity, the decrease expression of receptors and exaggerated pathophysiologic responses can be debilitating. However, future studies will reveal the hidden facets in these aspects in this COVID-19 catastrophe. In this article, we reviewed the main concerns of severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection in the geriatric population, including the risk of acquiring severe COVID-19 resulting in mortality, variation in clinical manifestations, and other pandemic-related concerns. We also discussed the need for increasing attention toward the elderly, taking appropriate prevention and control measures, and considering geriatric-related adjustments in vaccine design and development.

Keywords: SARS-CoV-2, COVID-19, geriatrics, older people, vaccines, prevention, disease control

INTRODUCTION

Coronavirus disease 2019 (COVID-19) is a highly transmissible disease caused by a novel coronavirus that emerged in Wuhan, China, and was named as severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) by the International Committee on Taxonomy of Viruses (ICTV) (1). The disease rapidly became globally disseminated and is confirmed to have presently killed nearly 0.75 million people as of 10th August 2020 out of more than 20 million confirmed cases and has triggered a global panic. The pandemic has created a significant impact on the survival and sustenance of human population, with several questions being raised upon the global scientific community as far as the pandemic preparedness is concerned.

The origin of the infection may have been the transmission of SARS-CoV-2 from wild animals available for sale in the Huanan seafood market of Wuhan to humans (2, 3). The pneumonia caused by SARS-CoV-2 was designated as COVID-19 by the World Health Organization (WHO) on 11 February 2020. Bats may be the natural reservoir of the virus, and the search for an intermediate host is underway (4). Pangolins have been suggested as the probable intermediate host. However, there is no conclusive evidence yet (5). Spillover events and zoonotic links have been implicated in the origin of SARS-CoV-2, and the virus infection has been reported from a few animal species (6).

The search for effective therapies and vaccines is going on worldwide (7–10). The large number of fatalities caused by SARS-CoV-2 attests to the severe global impact of the pandemic, irrespective of age, race, sex, and physiological conditions. A report has suggested that everyone will be exposed to the SARS-CoV-2 and that most of the world's population will be infected with COVID-19 (11). Although COVID-19 affects all ages, individuals having comorbidities, such as diabetes, asthma, hypertension, cerebro-cardiovascular abnormalities, cancer, as well as immunocompromised and elderly people, are affected more severely, and exhibit a higher mortality rate (12–14). Age is believed to be a significant determinant of the clinical outcome, severity, disease course, and prognosis of the disease (14, 15). However, many facets need to be discussed. This review highlights SARS-CoV-2 infection in the geriatric population, risk factors, pandemic-related concerns, and the attention required for the elderly. It also considers the development of an effective and safe vaccine for them.

COVID-19 AND GERIATRIC POPULATION: GLOBAL PROBLEM

The elderly, especially those with underlying diseases, are more susceptible for COVID-19 (2, 14, 16, 17). Initial studies of COVID-19 revealed more cases in people 49–55 years of age (2, 16). Subsequent studies involving more people demonstrated that the prevalence of the disease was higher in individuals $\geq$60 years of age than in younger individuals (14, 18). In developed countries with a very high elderly population, mortality due to COVID-19 was reportedly 83.7% for those >70 years and 16.2% in people younger than 69 years (19). Underlying diseases were noted in 32–51% cases (2, 16). A study also found that SARS-CoV-2 infection is more often associated with detrimental effects in the geriatric population than in younger age groups (20). A retrospective study of 85 patients who had died of SARS-CoV-2 infection in Wuhan reported a median age of the patients was 65.8 years. Among these individuals, underlying non-communicable chronic conditions, such as hypertension, diabetes, and cardiopulmonary diseases, were the most commonly observed comorbidities (21). Most of the patients died due to the multiple organ failure. Clinical manifestations were reportedly more severe and the disease course was more prolonged in the elderly, which required closer monitoring and more medical interventions (14).

GERIATRIC RISK FACTORS FOR COVID-19

The geriatric population faces special risks for COVID-19 (22). Predisposition and severe outcomes enhance the risks for elderly people (22). Older age and underlying diseases have been noted as the main factors for vulnerability to COVID-19. An age $\geq$60 years is a major a risk factor (14, 18). Comorbidities are the main underlying etiologies collectively in 32–60% of cases. Specific rates include 16–20% for diabetes, 15–41% for hypertension, and 14–15% for chronic obstructive pulmonary disease and cardiovascular disease (2, 13). Presumably a consequence of advancing age is an inevitable worsening of health related to vital organs. Furthermore, an age-related diminishing physiological functions of multiple organs include the respiratory system and the resulting impaired mucocilary clearance of foreign particles or micro-organisms, is expected (23, 24). Aging alters pulmonary physiology, pathology, and function during lung infections, which affects responsiveness and tolerance in older patients (14, 25). Angiotensin converting enzyme (ACE) 2 expressed on myocytes, renal endothelial cells, and epithelial lung cells acts as a receptor for SARS-CoV-2 (26). Old age has also been associated with weakened physiological functioning of various vital organs and innate/adaptive immune defense. Furthermore, in association with underlying chronic diseases, acquisition of infections is more likely (27). Aging increases the production of interleukin-6 (IL-6) in the brain and the microglia show increased expression of voltage-activated K^+ channels, potentially enhancing IL-6 production and neuroinflammation with age (28). In innate and adaptive immunity, regulation of membrane potential and calcium influx are determined by the equilibrium potentials of K^+ (KV1.3, KCa3.1), Na^+ (TRPM4), and Cl^- channels in the plasma membrane. Altered immune function through ion signaling can have profound effects on the increased susceptibility to COVID-19 (29).

Other risk factors include poor nutrition, dementia, dehydration, and various clinical complications, especially in frail and bedridden patients (30). A lack of a timely diagnosis and therapeutic and preventive measures increases the risk of a severe infection.

In addition to compromised organ function and immunity in the elderly, pathophysiological susceptibility also increases their vulnerability, attack rate, and infectivity by SARS-CoV-2 (31). The pneumonia severity index (PSI) score is higher in the elderly than that in the young and middle-aged individuals (15). In one study, the proportion of patients with PSI grade IV and V was significantly greater in the elderly group than that found in the young and middle-aged groups (14). Severe complications due to COVID-19 in older people can include acute respiratory distress syndrome, multiorgan failure, and death, especially in cases with underlying comorbidities (22).

The strict and prolonged lockdown initiated in many locales to prevent the spread of SARS-CoV-2, restricted physical inactivity and produced social isolation-associated stress. These factors may further deteriorate the health of older people, contributing to adverse health outcomes in this population (32). Increased age is a major risk factor for COVID-19 due to various factors including weakened immune system, physical inactivity, and stress. These factors require special attention in addressing the pandemic among the elderly. Social distancing and disconnection can predispose to depression and anxiety in the elderly that may further increase risk of adverse outcomes of COVID-19 (33). In addition, secondary complications due to general care and management also need to be addressed in the elderly. These complications include venous thromboembolism, catheter-related bloodstream infection, pressure ulcers, falls, and delirium (22).

CLINICAL MANIFESTATION OF COVID-19 IN GERIATRIC POPULATION

The clinical presentation of COVID-19 infection is variable and ranges from a lack of symptoms to symptoms that are mild, severe, and life-threatening. In a study including 72,314 COVID-19 patients, mild, severe, and critical forms of the disease were reported in 81.4, 13.9, and 4.7% of the patients, respectively (20). In addition to fever and cough, dry cough is an important and common clinical manifestation. Coughing is reported in 60–80% of COVID-19 patients (16, 34). Other respiratory symptoms include like dyspnea, sore throat, and rhinorrhea (7, 16, 35, 36). Clinical manifestations have included anorexia, myalgia, asthenia, headache, anosmia, diarrhea, and cardiovascular complications (36, 37). The most common symptom of infection is fever. However, elderly patients frequently have a low intensity fever or no fever, even in severe cases (38). In one study, 77.7% of 18 COVID-19 patients >60 years of age manifested fever. The finding suggests that SARS-CoV-2 infection is not necessarily accompanied by fever (14). Among clinical presentations of COVID-19, presence can differ between elderly and young/middle-aged individuals (14).

SARS-CoV-2 infection reportedly involves elderly men more often than elderly women; however, infection in elderly patients is also reported in Middle East respiratory syndrome (MERS)-CoV (39, 40). Age-specific detailed analysis of COVID-19 symptoms has not been performed. However, the possibility of non-specific and atypical clinical symptoms in elderly patients is highly expected, as is the case in other diseases (41). Moreover, higher frequency of severe disease and mortality is expected along with need for intensive care unit (ICU) hospitalization in elderly patients. The most frequent laboratory hematological finding in critically ill COVID-19 patients is severe lymphocytopenia (<800 cells/μL). This seems to be more pronounced in older patients (14).

Compared to the people <60 years of age, those who are >60 years of age display higher levels of blood urea nitrogen, lactate dehydrogenase activity, and inflammatory indicators (14). The greater involvement of pulmonary lobes in bilateral lesions and more frequent bacterial co-infection have been reported (14). C-reactive protein (CRP) was found to be significantly higher and lymphocyte proportion significantly lower in elderly individuals compared to the CRP and lymphocyte proportion in younger and middle age individuals (15).

COVID-19 MORTALITY IN GERIATRIC POPULATION

From what is known, a high death toll among the global geriatric population due to SARS-CoV-2 can be expected. The severe impact of the COVID-19 pandemic is more frequently documented in developed countries with a higher life-expectancy, such as Italy. A 7.2% overall case-fatality rate was reported in Italy, which was significantly greater than the rate of 2.3% in China (42). Age stratification of data revealed a nearly identical case-fatality rate in Italy and China for individuals ≤69 years of age. The rate was higher in Italy for those ≥70 years of age, particularly in those ≥80 years of age (42). Moreover, of 1625 fatal cases of COVID-19, 139, 578, and 850 patients were 60–69, 70–79, and ≥80 years of age, respectively (42). Another study in 4021 positive cases indicated a mortality rate of 5.3% in the geriatric population (≥60 years of age) compared with the rate of 1.4% in young and middle-aged individuals (14). In New York, among 5700 hospitalized COVID-19 patients, the in-hospital mortality rate was 15.8, 32.2, 54.3, and 52.3% for adults aged 60–69, 70–79, 80–89, and >90 years, respectively (43).

Older COVID-19 patients with dementia may exhibit mild and atypical symptoms, including diarrhea or drowsiness. However, such old and frail patients have fewer chances to survive the COVID-19 infection. Adequate and appropriate supportive measures, and clinical care may improve their survival rate, even without the use of targeted therapies. Moreover, few COVID-19 patients may die due to worsening of the underlying comorbid health conditions during the infection, rather than by the infection itself (30). In this context, poor nutrition, dementia, dehydration, and other clinical complications are common in frail and bedridden patients, even with mild infective diseases, and well-established risk factors are responsible for worsening health

and death, if adequate supportive measures are not provided in time (30).

Immune dysfunction and severity of inflammation are other reasons for increased mortality in COVID-19 patients (2, 16, 44). Antibody-dependent enhancement (ADE) due to cross-reactive antibodies produced in the course of previous infections by other viruses may be a possible cause for this phenomenon (45). Although COVID-19 results in acute respiratory distress syndrome due to acute lung injury in elderly people, which causes many of the deaths, heart attack could be a principle reason for mortality in older people affected with COVID-19, irrespective of the occurrence of pneumonia (46).

Among older COVID-19 patients, higher Sequential Organ Failure Assessment score and elevated d-dimer (>1 μg/mL) were revealed as markers for an increased risk of death. These markers could be used to identify patients with poor prognosis at an early stage (47). Another study involving 179 patients with pre-existing concurrent cardiovascular or cerebrovascular diseases showed an association of high cardiac troponin with a high risk of mortality (21).

COVID-19 PREVENTION AND CONTROL MEASURES IN GERIATRIC POPULATION

The current lack of specific vaccines for SAR-CoV-2 or any efficacious vital medications are the main challenges faced in the treatment of COVID-19. Immune-compromised elderly people are especially at risk. An effective vaccine may take more than a year to become widely available. However, considering the rapid pace of vaccine development, there are grounds for optimism concerning the availability of an effective COVID-19 vaccine sooner rather than later (48). In the present scenario, self-quarantine or self-isolation is enforced in most countries to control or mitigate the overwhelming detrimental effects of this pandemic. The recommended measures to prevent the spread of this deadly virus include a regular use of personal protective equipment (PPE), physical distancing, and self-isolation. Social distancing emphasizes reducing the number of cases and preventing community spread. However, this social disconnection has led to an enhanced development of mental deterioration, depression, and suicidal attempts in the geriatric population (49). Self-quarantine during this critical phase of COVID-19 outbreak is specifically oriented toward "social distancing, not social isolation."

Hand hygiene and respiratory etiquette are also essential recommendations for older people (50). Disinfection of the surroundings in which geriatric people are living should be frequently carried out to prevent contamination of surfaces and reduce chances of infection (50). Healthcare workers, family members, and caregivers of older people should actively implement these basic protocols to prevent the COVID-19 infection among the older population (51).

GERIATRIC-RELATED CONSIDERATIONS AND VACCINE DEVELOPMENT

Initial results of clinical trials on SARS-CoV-2 spike-based DNA vaccine and inactivated virus vaccine were reported to be safe and induced good neutralizing antibody titers (52, 53). The receptor-binding domain (RBD) of SARS-CoV-2 is reportedly a potential antigen and has been suggested to be a crucial subunit vaccine candidate (54). Moreover, an mRNA-based vaccine (mRNA1273-COVID-19 vaccine) has so-far proven to be safe and is in clinical trial stage (55). A DNA plasmid-based vaccine for COVID-19 designated INO-4800, is being developed by INOVIO Pharmaceuticals, and will be administered by two intradermal injections followed by electroporation (55). Issues with vaccination in older people (who will be the main target of vaccination) include their weaker immune system, which can compromise the recognition and response to novel viruses (56). In addition, amplifying the strength of vaccine may have side-effects in older people and weaker vaccines may require regular boosters/doses. Hence, when vaccines are developed, they will need to be effective for older people (57). Some trials have focused on enrolling older adults for vaccine trials, taking into account the weaker immune system in these individuals. In this context, a Chimpanzee Adenovirus Vector (ChAdOx1)-based vaccine under development for SARS-CoV-2 by the Jenner Institute, Oxford has reached the phase I/II clinical trial stage. Chimpanzee Adenovirus Vector based vaccine is a non-replicating virus and is reported to generate a strong immune response. Thus, it can be safely used in older individuals along with children and individuals with comorbidities (55, 58). Another adenovirus vector-based vaccine (Ad5-nCoV) is among the top contenders for COVID-19 vaccine according to the WHO. However, immunity against Ad5 vector along with safety of the vaccine are major concerns that must be addressed before this vaccine could be used in the geriatric population (59).

SARS-CoV-2 may produce varied pathogenesis, immune responses, and outcomes in older people. The results can include a more severe disease, higher mortality, and prolonged disease (14, 15, 60). In older individuals, a dysfunctional immune system can lead to dysregulated immune response characterized by excessive infiltration of immune cells, cytokine storm, pulmonary edema, pneumonia, widespread inflammation, and multiorgan failure. A healthy immune response usually clears the infection quickly and inactivates the virus with neutralizing antibody with minimal inflammation and tissue damage. However, slower responding, less coordinated, and less efficient immune responses in older individuals can render them more susceptible to emerging infections (60). The inability to switch from innate to adaptive (little to no antibody production) immunity in SARS-CoV infections, especially in older individuals, may need revision (60). In general, most vaccines may not induce effective immune response in older people. However, some vaccines work very well in elderly people (61, 62). For example, the Shingrix vaccine for shingles was found to be 90% effective in people >70 years of age. Immune responses vary greatly among elderly people. Understanding this variability can help in developing new and

improved vaccines to protect the most vulnerable elderly people (63). Age-appropriate adjuvants need to be explored (60).

SPECIAL ATTENTION, WELFARE, AND MOTIVATIONAL ACTIVITIES DURING THE COVID-19 PANDEMIC

The incidences of physical violence, discrimination in terms of maltreatment and health care facilities have increased during this global pandemic. However, the pivotal role played by the elderly in retired scientific communities, health workers, and others during this pandemic in terms of sharing their past experiences and providing moral support to those worried about COVID-19 and to their family members cannot be ignored. Geriatrics witnessed World War-2. This experience could help guide policy-making in the aftermath of the current pandemic with the goal of lessening the existing global socioeconomic disparity (64). The WHO must issue different guidelines concerning the special COVID-19 related care of older and geriatric individuals people with disabilities (65). These individuals are vulnerable and they need special attention in the form of social support interventions. The significantly adverse impact of COVID-19 on older people globally, whether they reside in developed or developing countries, can be attributed to a lack of preparedness and the lack of recognition of geriatric health. Fatalities in the geriatric population can be minimized to some extent by providing immediate adequate supportive measures, good health facilities, nursing homes, and care units (66). Geriatrics must be acknowledged and honored for their contributions toward society in their functional life by assisting them to maintain social relationships along with desirable social distancing.

The extensive period of lockdown in nations has made it difficult for some elderly people to obtain food, especially those living alone or those who do not have family members nearby. It is important for citizens, civic bodies, non-governmental organizations, as well as industry leaders to come together and help them in this vulnerable time.

Online platforms need to be explored for betterment of older people so they do not feel isolated and forgotten, to foster a sense of belonging, and to provide social support (67). Older people may not be familiar with online technologies, including smart phones and the internet. To reduce depression and mental stress in the geriatric population, regular behavioral therapy via online motivation and monitoring programs should be implemented. A pilot randomized control trial that assessed the feasibility of reducing loneliness by internet-based cognitive and behavioral interventions reported encouraging results (68). During the current pandemic, elderly people must be motivated to use cell phones, online games, radios, television, to engage in indoor exercise like yoga, and to listen to music (69). Promotion of proper sleep, balanced nutrition, physical activities, and social care in the life style of the geriatric population can reduce the negative effects of SARS-CoV-2 infection. A multidimensional and age-friendly approach with better health care strategies and minimal physical and physiological stressors can be helpful. A number of social welfare programs specifically catering to the elderly should be developed at the local, state, and national levels by various government and non-government organizations. The assistance provided by younger individuals cannot be overstated. This assistance includes running errands, acquiring and delivering groceries, timely provision of medications, and transportation during medical emergencies.

The COVID-19 pandemic has highlighted the need for adequate nursing care for the elderly that is evidence-based and tailored to the needs of this population. A strong public health response and global preparedness to protect the elderly at risk for infectious diseases, including COVID-19, are needed (70). A commentary contributed by 20 international researchers in the field of aging raised the issues of the lack of preparation for crises, such as COVID-19, in long-term care homes and the initial perception of the public that the virus was a problem of elderly people (71). Higher mortality rates among the elderly have devastating consequences in families, as the elderly are a source of generational knowledge and wisdom, and contribute to the workforce critical for the economy and our family (71).

Mental health is also one of the important cornerstones of public health for the elderly. There is a need for regular telephone counseling sessions, contact with family members, provision of relevant and updated information on the pandemic, continued supply of general medications, meeting psychological needs, and instilling a sense of respect and dignity to maintain the health mental status among the elderly (72). The COVID-19 pandemic has revealed the need for a new era of care for older people, including the use of communication technology, more home-based care, and novel approaches to enhance the resilience of the elderly to stress and depression (73). This resilience will build stronger elderly communities with better physical and mental health.

Figure 1 provides an overview of the COVID-19 pandemic in older people, associated risk factors, related worries, need of special attention and care during the pandemic, and the development of effective and safer vaccines and mitigation strategies.

CONCLUSION AND FUTURE PROSPECTS

The COVID-19 pandemic has spread unimpeded. Millions have been infected with SARS-CoV-2 and over 715,000 hundreds have died. Numerous factors are involved, as reflected in the higher rates of infection in certain classes of society and in different locations. Although individuals of all age groups with diverse physiological conditions are susceptible to infection by the virus, the severity and mortality of COVID-19 is higher in geriatric individuals. Old age, weaker immunity, and underlying diseases are the main predisposing factors for these people. Immunosuppression, decreased organ vitality, and poor healthcare management have increased the suffering of the elderly. Besides increased susceptibility/pathogenicity or infection rate of the virus, dysregulated immune response and hyperinflammation significantly increase the pathophysiology of

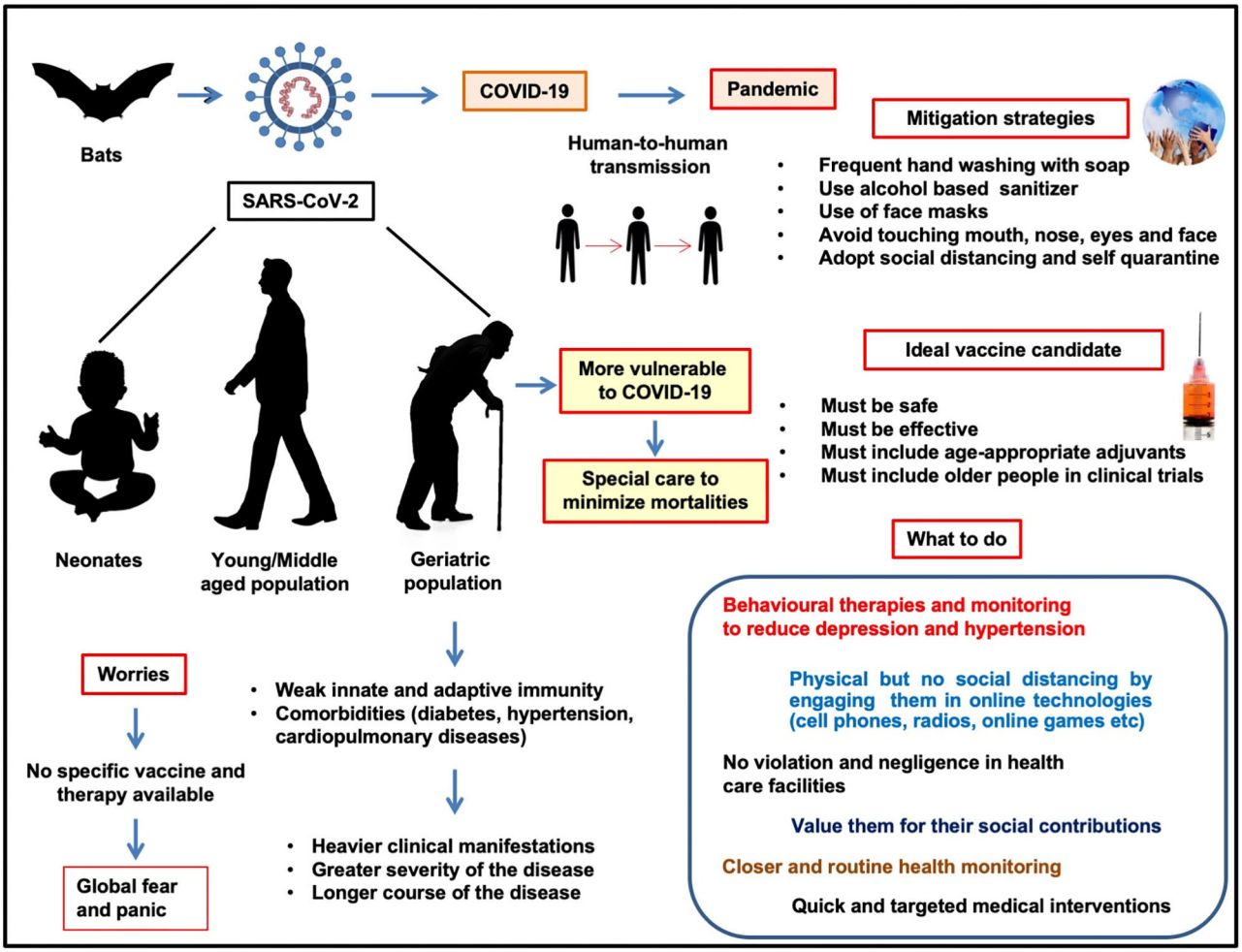


FIGURE 1 | COVID-19 and geriatric population: risk factors and worries, need of special attention during pandemic, development of effective and safer vaccines, and mitigation strategies.

COVID-19, resulting in higher disease severity and consequently increased mortality in the elderly. Prevention measures need to focus on special requirements of health, nutrition, psychological, and mental well-being of the geriatric population. Physical isolation, rather than social distancing, along with proper hand and respiratory hygiene need to be supported by providing personnel protective equipment, environmental disinfection, and a nutritious diet. Regular behavioral therapy via online motivation and monitoring for older people who are not well-versed with online technologies may reduce depression and mental stress in the geriatric population, and increase their survival. A multidimensional age-friendly approach will certainly minimize physical and physiological stress, and help diminish the toll of the pandemic. Regular monitoring and caring of elderly people will be beneficial in easing COVID-19 related worries, and will facilitate better management of the pandemic. Therapeutics and vaccines must be designed with the elderly in mind to avoid a heavy death toll. Ignorance and insufficient healthcare monitoring and services to the geriatric population may lead to increased mortality. Therefore, health agencies worldwide must pay attention to the geriatric population and issue guidelines specific for this age group.

AUTHOR CONTRIBUTIONS

KD: validation, conceptualization, writing—original draft, writing—review and editing, and visualization. SP, RK, JR, MY, AK, RT, JD, SN, and RS: validation and writing—original draft. HH: validation, writing—original draft, and writing—review and editing. All authors: contributed to the article and approved the submitted version.

ACKNOWLEDGMENTS

All the authors acknowledge and thank their respective Institute and Universities.

REFERENCES

1. Gorbalenya AE, Baker SC, Baric R, Groot RJd, Drosten C, Gulyaeva AA, et al. Severe acute respiratory syndrome-related coronavirus: the species and its viruses–a statement of the Coronavirus Study Group. *Nat Microbiol.* (2020) 5:536–44. doi: 10.1101/2020.02.07.937862
2. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet.* (2020) 395:497–506. doi: 10.1016/S0140-6736(20)30183-5
3. Zhu N, Zhang D, Wang W, Li X, Yang B, Song J, et al. A novel coronavirus from patients with pneumonia in China, 2019. *N Engl J Med.* (2020) 382:727–33. doi: 10.1056/NEJMoa2001017
4. Malik YS, Sircar S, Bhat S, Sharun K, Dhama K, Dadar M, et al. Emerging novel coronavirus (2019-nCoV)-current scenario, evolutionary perspective based on genome analysis and recent developments. *Vet Q.* (2020) 40:68–76. doi: 10.1080/01652176.2020.1727993
5. Zhang YZ, Holmes EC. A genomic perspective on the origin and emergence of SARS-CoV-2. *Cell.* (2020) 181:223–7. doi: 10.1016/j.cell.2020.03.035
6. Tiwari R, Dhama K, Sharun K, Iqbal Yatoo M, Malik YS, Singh R, et al. COVID-19: animals, veterinary and zoonotic links. *Vet Q.* (2020) 40:169–82. doi: 10.1080/01652176.2020.1766725
7. Dhama K, Sharun K, Tiwari R, Dadar M, Malik YS, Singh KP, et al. COVID-19, an emerging coronavirus infection: advances and prospects in designing and developing vaccines, immunotherapeutics, and therapeutics. *Hum Vaccin Immunother.* (2020) 2020:1–7. doi: 10.1080/21645515.2020.1735227
8. Keam S, Megawati D, Patel S, Tiwari R, Dhama K, Harapan H. Immunopathology and immunotherapeutic strategies in SARS-CoV-2 infection. *Rev Medical Virol.* (2020). doi: 10.1002/rmv.2123. [Epub ahead of print].
9. Frediansyah A, Tiwaric R, Sharun K, Dhama K, Harapan H. Antivirals for COVID-19: a critical review. *Clin Epidemiol Glob Health.* (in press). doi: 10.1016/j.cegh.2020.07.006
10. Frediansyah A, Nainu F, Dhama K, Mudatsir M, Harapan M. Remdesivir and its antiviral activity against COVID-19: a systematic review. *Clin Epidemiol Glob Health.* (2020). doi: 10.1016/j.cegh.2020.07.011. [Epub ahead of print].
11. Giesecke J. The invisible pandemic. *Lancet.* (2020) 395:e98. doi: 10.1016/S0140-6736(20)31035-7
12. Tian S, Hu W, Niu L, Liu H, Xu H, Xiao SY. Pulmonary pathology of early-phase 2019. novel Coronavirus (COVID-19) pneumonia in two patients with lung cancer. *J Thorac Oncol.* (2020) 15:700–4. doi: 10.1016/j.jtho.2020.02.010
13. Chu DKW, Pan Y, Cheng SMS, Hui KPY, Krishnan P, Liu Y, et al. Molecular diagnosis of a Novel Coronavirus (2019-nCoV) causing an outbreak of pneumonia. *Clin Chem.* (2020) 66:549–55. doi: 10.1093/clinchem/hvaa029
14. Liu K, Chen Y, Lin R, Han K. Clinical features of COVID-19 in elderly patients: a comparison with young and middle-aged patients. *J Infect.* (2020) 80:e14–8. doi: 10.1016/j.jinf.2020.03.005
15. Liu Y, Mao B, Liang S, Yang J-W, Lu H-W, Chai Y-H, et al. Association between age and clinical characteristics and outcomes of COVID-19. *Eur Resp J.* (2020) 55:2001112. doi: 10.1183/13993003.01112-2020
16. Chen N, Zhou M, Dong X, Qu J, Gong F, Han Y, et al. Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *Lancet.* (2020) 395:507–13. doi: 10.1016/S0140-6736(20)30211-7
17. Guan W-j, Ni Z-y, Hu Y, Liang W-h, Ou C-q, He J-x, et al. Clinical characteristics of 2019 novel coronavirus infection in China. *medRxiv.* (2020) 80:656–65. doi: 10.1101/2020.02.06.20020974
18. Xiang YT, Yang Y, Li W, Zhang L, Zhang Q, Cheung T, et al. Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. *Lancet Psychiatry.* (2020) 7:228–9. doi: 10.1016/S2215-0366(20)30046-8
19. Abbatecola AM, Antonelli-Incalzi R. Editorial: COVID-19 spiraling of frailty in older italian patients. *J Nutr Health Aging.* (2020) 24:453–5. doi: 10.1007/s12603-020-1357-9
20. Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72314 cases from the chinese center for disease control and prevention. *JAMA.* (2020) 323:1239–42. doi: 10.1001/jama.2020.2648
21. Du RH, Liang LR, Yang CQ, Wang W, Cao TZ, Li M, et al. Predictors of mortality for patients with COVID-19 pneumonia caused by SARS-CoV-2: a prospective cohort study. *Eur Respir J.* (2020) 55:2000524. doi: 10.1183/13993003.00524-2020
22. Garnier-Crussard A, Forestier E, Gilbert T, Krolak-Salmon P. Novel coronavirus (COVID-19) epidemic: what are the risks for older patients? *J Am Geriatr Soc.* (2020) 68:939–40. doi: 10.1111/jgs.16407
23. Dent E, Martin FC, Bergman H, Woo J, Romero-Ortuno R, Walston JD. Management of frailty: opportunities, challenges, and future directions. *Lancet.* (2019) 394:1376–86. doi: 10.1016/S0140-6736(19)31785-4
24. Skloot GS. The effects of aging on lung structure and function. *Clin Geriatr Med.* (2017) 33:447–57. doi: 10.1016/j.cger.2017.06.001
25. Miller EJ, Linge HM. Age-related changes in immunological and physiological responses following pulmonary challenge. *Int J Mol Sci.* (2017) 18:1294. doi: 10.3390/ijms18061294
26. Wan Y, Shang J, Graham R, Baric RS, Li F. Receptor recognition by the novel coronavirus from Wuhan: an analysis based on decade-long structural studies of SARS coronavirus. *J Virol.* (2020) 94:e00127-20. doi: 10.1128/JVI.00127-20
27. Oh SJ, Lee JK, Shin OS. Aging and the immune system: the impact of immunosenescence on viral infection, immunity and vaccine immunogenicity. *Immune Netw.* (2019) 19:e37. doi: 10.4110/in.2019.19.e37
28. Schilling T, Eder C. Microglial K(+) channel expression in young adult and aged mice. *Glia.* (2015) 63:664–72. doi: 10.1002/glia.22776
29. Feske S, Wulff H, Skolnik EY. Ion channels in innate and adaptive immunity. *Annu Rev Immunol.* (2015) 33:291–353. doi: 10.1146/annurev-immunol-032414-112212
30. Isaia G, Marinello R, Tibaldi V, Tamone C, Bo M. Atypical presentation of Covid-19 in an older adult with severe alzheimer disease. *Am J Geriatr Psychiatry.* (2020) 28:790–1. doi: 10.1016/j.jagp.2020.04.018
31. Dhochak N, Singhal T, Kabra SK, Lodha R. Pathophysiology of COVID-19: why children fare better than adults? *Indian J Pediatr.* (2020) 87:537–46. doi: 10.1007/s12098-020-03322-y
32. Roschel H, Artioli GG, Gualano B. Risk of increased physical inactivity during covid-19 outbreak in older people: a call for actions. *J Am Geriatr Soc.* (2020) 68:1126–8. doi: 10.1111/jgs.16550
33. Santini ZI, Jose PE, York Cornwell E, Koyanagi A, Nielsen L, Hinrichsen C, et al. Social disconnectedness, perceived isolation, and symptoms of depression and anxiety among older Americans (NSHAP): a longitudinal mediation analysis. *Lancet Public Health.* (2020) 5:e62–70. doi: 10.1016/S2468-2667(19)30230-0
34. Li LQ, Huang T, Wang YQ, Wang ZP, Liang Y, Huang TB, et al. COVID-19 patients' clinical characteristics, discharge rate, and fatality rate of meta-analysis. *J Med Virol.* (2020) 92:577–83. doi: 10.1002/jmv.25924
35. Dhama K, Patel SK, Pathak M, Yatoo MI, Tiwari R, Malik YS, et al. An update on SARS-CoV-2/COVID-19 with particular reference to its clinical pathology, pathogenesis, immunopathology and mitigation strategies. *Travel Med Infect Dis.* (2020) 101755. doi: 10.1016/j.tmaid.2020.101755. [Epub ahead of print].
36. Rodriguez-Morales AJ, Cardona-Ospina JA, Gutierrez-Ocampo E, Villamizar-Pena R, Holguin-Rivera Y, Escalera-Antezana JP, et al. Clinical, laboratory and imaging features of COVID-19: A systematic review and meta-analysis. *Travel Med Infect Dis.* (2020) 34:101623. doi: 10.1016/j.tmaid.2020.101623
37. Harapan H, Itoh N, Yufika A, Winardi W, Keam S, Te H, et al. Coronavirus disease 2019 (COVID-19): a literature review. *J Infect Public Health.* (2020) 13:667v73. doi: 10.1016/j.jiph.2020.03.019
38. High KP, Bradley SF, Gravenstein S, Mehr DR, Quagliarello VJ, Richards C, et al. Clinical practice guideline for the evaluation of fever and infection in older adult residents of long-term care facilities: 2008 update by the infectious diseases society of America. *J Am Geriatr Soc.* (2009) 57:375–94. doi: 10.1111/j.1532-5415.2009.02175.x
39. Jin JM, Bai P, He W, Wu F, Liu XF, Han DM, et al. Gender differences in patients with COVID-19: focus on severity and mortality. *Front Public Health.* (2020) 8:152. doi: 10.3389/fpubh.2020.00152
40. Jansen A, Chiew M, Konings F, Lee CK, Ailan L, on behalf the World Health Organization Regional Office for the Western Pacific MEMT. Sex matters - a preliminary analysis of Middle East respiratory syndrome in the Republic of Korea, 2015. *Western Pac Surveill Response J.* (2015) 6:68–71. doi: 10.5365/wpsar.2015.6.3.002

41. Bonanad C, Garcia-Blas S, Tarazona-Santabalbina FJ, Diez-Villanueva P, Ayesta A, Sanchis Fores J, et al. Coronavirus: the geriatric emergency of 2020 joint document of the section on geriatric cardiology of the spanish society of cardiology and the spanish society of geriatrics and gerontology. *Rev Esp Cardiol.* (2020) 73:569–76. doi: 10.1016/j.rec.2020.05.001
42. Onder G, Rezza G, Brusaferro S. Case-fatality rate and characteristics of patients dying in relation to COVID-19 in Italy. *JAMA*. (2020)323:1775–6. doi: 10.1001/jama.2020.4683
43. Richardson S, Hirsch JS, Narasimhan M, Crawford JM, McGinn T, Davidson KW, et al. Presenting characteristics, comorbidities, and outcomes among 5700 patients hospitalized with COVID-19 in the New York City area. *JAMA*. (2020) 23:2052–9. doi: 10.1001/jama.2020.6775
44. Tay HS, Harwood R. Atypical presentation of COVID-19 in a frail older person. *Age Ageing.* (2020) 49:523–4. doi: 10.1093/ageing/afaa068
45. Tetro JA. Is COVID-19 receiving ADE from other coronaviruses? *Microb Infect.* (2020) 22:72–3. doi: 10.1016/j.micinf.2020.02.006
46. *An Expert Explains: How to Help Older People Through the COVID-19 Pandemic.* Available online at: https://www.weforum.org/agenda/2020/03/coronavirus-covid-19-elderly-older-people-health-risk/
47. Zhou F, Yu T, Du R, Fan G, Liu Y, Liu Z, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *Lancet.* (2020) 395:1054–62. doi: 10.1016/S0140-6736(20)30566-3
48. Patel SK, Pathak M, Tiwari R, Yatoo MI, Malik YS, Sah R, et al. A vaccine is not too far for COVID-19. *J Infect Dev Count.* (2020) 14:450–3. doi: 10.3855/jidc.12744
49. Armitage R, Nellums LB. COVID-19 and the consequences of isolating the elderly. *Lancet Public Health.* (2020) 5:e256. doi: 10.1016/S2468-2667(20)30061-X
50. Rios P, Radhakrishnan A, Thomas SM, Darvesh N, Straus SE, Tricco AC. Guidelines for preventing respiratory illness in older adults aged 60 years and above living in long-term care: a rapid review of clinical practice guidelines. *medRxiv [Preprint].* (2020). doi: 10.1101/2020.03.19.20039180
51. Chhetri JK, Chan P, Arai H, Chul Park S, Sriyani Gunaratne P, Setiati S, et al. Prevention of COVID-19 in older adults: a brief guidance from the International Association for Gerontology and Geriatrics (IAGG) Asia/Oceania region. *J Nutr Health Aging.* (2020) 24:471–2. doi: 10.1007/s12603-020-1359-7
52. Lin JT, Zhang JS, Su N, Xu JG, Wang N, Chen JT, et al. Safety and immunogenicity from a phase I trial of inactivated severe acute respiratory syndrome coronavirus vaccine. *Antivir Ther.* (2007) 12:1107–13.
53. Martin JE, Louder MK, Holman LA, Gordon IJ, Enama ME, Larkin BD, et al. A SARS DNA vaccine induces neutralizing antibody and cellular immune responses in healthy adults in a phase I clinical trial. *Vaccine.* (2008) 26:6338–43. doi: 10.1016/j.vaccine.2008.09.026
54. Yi C, Sun X, Ye J, Ding L, Liu M, Yang Z, et al. Key residues of the receptor binding motif in the spike protein of SARS-CoV-2 that interact with ACE2 and neutralizing antibodies. *Cell Mol Immunol.* (2020) 17:621–30. doi: 10.1038/s41423-020-0458-z
55. Kim YC, Dema B, Reyes-Sandoval A. COVID-19 vaccines: breaking record times to first-in-human trials. *NPJ Vaccines.* (2020) 5:34. doi: 10.1038/s41541-020-0188-3
56. *What You Need to Know About the COVID-19 Vaccine.* Available online at: https://www.gatesnotes.com/Health/What-you-need-to-know-about-the-COVID-19-vaccine
57. Pawelec G, Weng NP. Can an effective SARS-CoV-2 vaccine be developed for the older population? *BioMed Central.* (2020) 17:8. doi: 10.1186/s12979-020-00180-2
58. *COVID-19 Vaccine Development.* Available online at: https://www.ovg.ox.ac.uk/news/covid-19-vaccine-development
59. Cohen J. Vaccine designers take first shots at COVID-19. *Science.* (2020) 368:14–6. doi: 10.1126/science.368.6486.14
60. Nikolich-Zugich J, Knox KS, Rios CT, Natt B, Bhattacharya D, Fain MJ. SARS-CoV-2 and COVID-19 in older adults: what we may expect regarding pathogenesis, immune responses, and outcomes. *Geroscience.* (2020) 42:505–14. doi: 10.1007/s11357-020-00186-0
61. Gustafson CE, Kim C, Weyand CM, Goronzy JJ. Influence of immune aging on vaccine responses. *J Allergy Clin Immunol.* (2020) 145:1309–21. doi: 10.1016/j.jaci.2020.03.017
62. Crooke SN, Ovsyannikova IG, Poland GA, Kennedy RB. Immunosenescence and human vaccine immune responses. *Immun Ageing.* (2019) 16:25. doi: 10.1186/s12979-019-0164-9
63. Koff WC, Williams MA. Covid-19 and immunity in aging populations - a new research Agenda. *N Engl J Med.* (2020) 383:840–5. doi: 10.1056/NEJMp2006761
64. Petretto DR, Pili R. Ageing and COVID-19: what is the role for elderly people? *Geriatrics.* (2020) 5:25. doi: 10.3390/geriatrics5020025
65. Lloyd-Sherlock PG, Kalache A, McKee M, Derbyshire J, Geffen L, Casas FG. WHO must prioritise the needs of older people in its response to the covid-19 pandemic. *BMJ.* (2020) 368:m1164. doi: 10.1136/bmj.m1164
66. Morley JE, Vellas B. Editorial: COVID-19 and older adults. *J Nutr Health Aging.* (2020) 24:364–5. doi: 10.1007/s12603-020-1349-9
67. Newman MG, Zainal NH. The value of maintaining social connections for mental health in older people. *Lancet Public Health.* (2020) 5:e12–3. doi: 10.1016/S2468-2667(19)30253-1
68. Kall A, Backlund U, Shafran R, Andersson G. Lonesome no more? A two-year follow-up of internet-administered cognitive behavioral therapy for loneliness. *Internet Interv.* (2020) 19:100301. doi: 10.1016/j.invent.2019.100301
69. Lloyd-Sherlock P, Ebrahim S, Geffen L, McKee M. Bearing the brunt of covid-19: older people in low and middle income countries. *BMJ.* (2020) 368:m1052. doi: 10.1136/bmj.m1052
70. Fischer F, Raiber L, Boscher C, Winter MH. COVID-19 and the elderly: who cares? *Front Public Health.* (2020) 8:151. doi: 10.3389/fpubh.2020.00151
71. Fraser S, Lagace M, Bongue B, Ndeye N, Guyot J, Bechard L, et al. Ageism and COVID-19: What does our society's response say about us? *Age Ageing.* (2020) 49:692–5. doi: 10.1093/ageing/afaa097
72. Banerjee D. The impact of Covid-19 pandemic on elderly mental health. *Int J Geriatr Psychiatry.* (2020). doi: 10.1002/gps.5320. [Epub ahead of print].
73. Chen LK. Older adults and COVID-19 pandemic: Resilience matters. *Arch Gerontol Geriatr.* (2020) 89:104124. doi: 10.1016/j.archger.2020.104124

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Public Health

PERSPECTIVE
published: 25 September 2020
doi: 10.3389/fpubh.2020.00508

A Syndemic Perspective on the Management of Non-communicable Diseases Amid the COVID-19 Pandemic in Low- and Middle-Income Countries

Uday Narayan Yadav[1,2*], *Binod Rayamajhee*[3,4], *Sabuj Kanti Mistry*[1,5], *Shradha S. Parsekar*[6] *and Shyam Kumar Mishra*[3,7]

[1] *Centre for Primary Health Care and Equity, University of New South Wales (UNSW), Sydney, NSW, Australia,* [2] *Forum for Health Research and Development, Dharan, Nepal,* [3] *School of Optometry and Vision Science, Faculty of Science, University of New South Wales, Sydney, NSW, Australia,* [4] *Department of Infectious Diseases and Immunology, Kathmandu Research Institute for Biological Sciences (KRIBS), Lalitpur, Nepal,* [5] *James P Grant School of Public Health, BRAC University, Dhaka, Bangladesh,* [6] *Public Health Evidence South Asia, Prasanna School of Public Health, Manipal Academy of Higher Education, Manipal, India,* [7] *Department of Microbiology, Institute of Medicine, Tribhuvan University, Kathmandu, Nepal*

OPEN ACCESS

Edited by:
Joanna Lai,
UNICEF United Nations International Children's Emergency Fund, United States

Reviewed by:
Anu Mary Oommen,
Christian Medical College and Hospital, India
Rosemary Mamka Anyona,
UNICEF United Nations International Children's Emergency Fund, United States

***Correspondence:**
Uday Narayan Yadav
unyadav1@gmail.com;
u.yadav@unsw.edu.au

Specialty section:
This article was submitted to Public Health Policy, a section of the journal Frontiers in Public Health

Received: *27 June 2020*
Accepted: *07 August 2020*
Published: *25 September 2020*

Citation:
Yadav UN, Rayamajhee B, Mistry SK, Parsekar SS and Mishra SK (2020) A Syndemic Perspective on the Management of Non-communicable Diseases Amid the COVID-19 Pandemic in Low- and Middle-Income Countries. Front. Public Health 8:508. doi: 10.3389/fpubh.2020.00508

The global coronavirus disease (COVID-19) pandemic has greatly affected the lives of people living with non-communicable diseases (PLWNCDs). The health of PLWNCDs worsens when synergistic epidemics or "syndemics" occur due to the interaction between socioecological and biological factors, resulting in adverse outcomes. These interactions can affect the physical, emotional, and social well-being of PLWNCDs. In this paper, we discuss the effects of the COVID-19 syndemic on PLWNCDs, particularly how it has exposed them to NCD risk factors and disrupted essential public health services. We conclude by reflecting on strategies and policies that deal with the COVID-19 syndemic among PLWNCDs in low- and middle-income countries.

Keywords: SARS-CoV-2, COVID-19, LMICs, NCDS, syndemic framework

INTRODUCTION

The entire world has been affected by the coronavirus disease (COVID-19) pandemic caused by severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), which has led to thousands of deaths each day. The COVID-19 pandemic is one of the greatest public health calamities since World War II and, despite best efforts, has been challenging to control (1). Recognizing the rapid spread of COVID-19 and the threats it poses, the World Health Organization (WHO) declared it an international public health emergency on 30 January 2020. This allowed countries to exert maximum effort and allot resources to limit the rapid transmission of SARS-CoV-2. Despite the low fatality rate and government efforts, people are living in uncertainty and fear, as there is no vaccine for COVID-19. COVID-19 has weakened healthcare systems and economies, emptied open spaces, and filled hospitals (2). The pandemic has separated many people from their family, friends, and workstations and has severely disrupted modern life.

To mitigate this unprecedented pandemic, physical, and social distancing along with nationwide lockdowns and restrictions, have been implemented for the past few months in several countries (3). COVID-19 is creating a profound impact on all parts of the community, including the physical and mental health of the public. The growing pandemic is augmenting existing mental health

problems (4), including loneliness, anxiety, paranoia, panic, depression, and hoarding, with long-term psychosocial impacts (5). Social distancing, stress, and fear are the main factors behind these psychological problems, leading to a global increase in suicides (6). Self-isolation and quarantine measures disproportionately affect people, especially older adults, migrants, laborers, refugees, people with chronic diseases, and marginalized and vulnerable populations (7). The COVID-19 cataclysm has become the most serious problem worldwide, and its consequences have left no one untouched (6).

The effects of a pandemic intensify due to its diverse nexus of intertwined biological and socioecological factors. This diverse nexus was coined a "syndemic" by medical anthropologist Merrill Singer in the 1990s to describe the relationship between HIV/AIDS, substance use, and violence (8). A "syndemic" is defined as a synergistic interaction between socioecological and biological factors (**Figure 1**), resulting in adverse health outcomes (9). The COVID-19 pandemic has escalated into a syndemic due to several driving factors, such as overcrowding, loneliness, uncertainty, poor nutrition, and lack of access to health services; consequently, depression, suicide, domestic violence, and psychiatric illnesses have significantly increased (11). Social determinants of health, such as poverty, social inequality, social stigma, and the environment where people live and work, greatly affect the intensity of the syndemic (12). Additionally, xenophobia, ostracism, and racism are reported in many places. Generally, people living in countries with higher social and economic inequalities have more coexisting non-communicable diseases (NCDs) and are therefore more vulnerable to the syndemic impact of COVID-19.

We argue that, for people living with NCDs (PLWNCDs), COVID-19 is considered a syndemic—a synergistic pandemic that interacts with various pre-existing medical conditions and social, ecological, and political factors and exacerbates existing NCDs. Studies have reported higher proportions of frailty (13, 14), malnutrition (15), psychological problems (16), and co-infections, including antimicrobial resistance pathogens, among PLWNCDs (17) in low- and middle-income countries (LMICs). NCDs have been recognized as a key risk factor for COVID-19 patients (18); however, vulnerability to catching SARS-CoV-2 increases in the presence of other pre-existing factors. Prevailing inequalities in the social determinants of health, including poor social, economic, and environmental conditions (e.g., social behavioral factors, physical environment, social marginalization, and supportive government policies; **Figure 1**), have an impact on various aspects of life such as health, wellness, and financial status. For example, PLWNCDs with comorbidities and higher social and economic deprivation are less likely to access health services during this pandemic. This results in worse health outcomes, such as poor quality of life, mortality, suicide (6, 19, 20), and increased hospitalization due to poor self-management (21, 22).

During the COVID-19 pandemic, PLWNCDs from disadvantaged groups are less likely to receive healthcare compared to PLWNCDs from socially advantaged groups. The disadvantaged population (particularly individuals from low socioeconomic conditions) have a high chance of falling sick (23), dying, and experiencing catastrophe. Furthermore, socioeconomically deprived individuals who were dependent on daily wages have lost their jobs; this has pushed them further into poverty and poor health (23).

A synergistic association between the severity of COVID-19 and NCDs was reported in China (24), which shows the negative effects of this syndemic. This suggests the urgency of a paradigm shift from a single-condition approach to a syndemic approach to tackle the current and future impacts of pandemics among PLWNCDs in LMICs. The pandemic is unlikely to end soon, and it is difficult to predict the arrival of the next pandemic, but the syndemic will certainly continue in LMICs. In this paper, we discuss COVID-19 among PLWNCDs, exposure to NCD risk factors, and the disruption of essential public health services for NCDs. It considers literature on this topic, following a search on Google and PubMed to identify publications that considered populations with COVID-19 and NCDs. We conclude by reflecting on strategies and policies that deal with the COVID-19 syndemic among PLWNCDs in LMICs.

COVID-19 AMONG PLWNCDs

The global COVID-19 pandemic has resulted in 16,923,006 cases in 213 countries and territories around the world and two international conveyances, with 664,191 fatalities as of July 29, 2020 (25). COVID-19 cases are decreasing in many countries, but the opposite is true in LMICs such as India and Brazil. Many seriously ill COVID-19 patients had multiple comorbidities (26); for instance, 96.2% of those who died in hospitals in Italy had comorbidities. The case fatality rate increases with age, especially in countries with a high percentage of older adults. The comorbidities were mostly NCDs, such as hypertension, diabetes, cardiovascular disease, and chronic lung disease, especially chronic obstructive pulmonary disease (27, 28). The prevalence of comorbidities is higher among COVID-19 patients compared to the general population who are not infected with coronavirus; for instance, 86% of the COVID-19 patients in India and 72% of the COVID-19 patients in China had comorbidities (28). The prevalence of comorbidities is expected to be similar in other LMICs where the prevalence of NCDs is high; however, there is a lack of literature on this topic from LMICs. The health condition is more severe and mortality is higher among older adults with NCDs (29) and people with bacterial infections caused by antibiotic resistant pathogens, such as superinfections (30).

NCDs cause around 72% of deaths worldwide and are the primary cause of death in Southeast Asia among those aged 30 to 70 years (28). LMICs have a large NCD burden; in some LMICs, such as India, there is an early onset of NCDs, thereby increasing the risk of COVID-19 among young individuals (31).

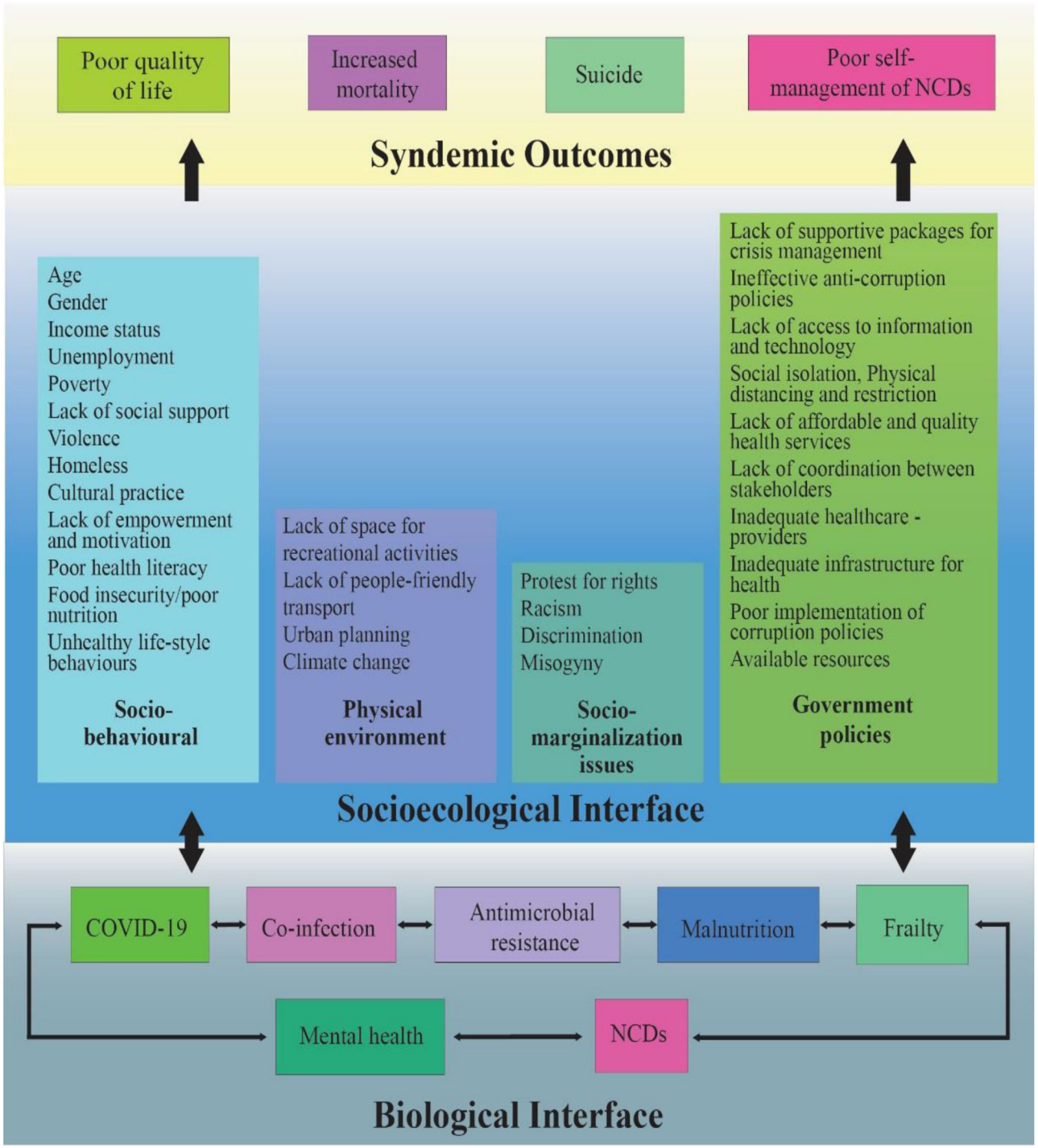


FIGURE 1 | Fueling factors responsible for COVID 19 syndemic outcomes among PLWNCDs [adapted from Singer (8), Bambra (9), and Shaiu (10)].

The addition of COVID-19 to pre-existing NCDs results in increased morbidity and mortality (32). NCDs can exhibit several characteristics with infectious manifestations, including parameters like a proinflammatory state and compromised innate immune response (33). This condition is further worsened because many PLWNCDs have been deprived of treatment for their diseases since the onset of the COVID-19 pandemic.

COVID-19 AND EXPOSURE TO NCD RISK FACTORS

Preventive methods for this pandemic, such as physical/social distancing, lockdowns, self-isolation, and quarantine, may increase exposure to NCD risk factors, such as the increased use of tobacco products and alcohol as coping strategies (34), increased reliance on unhealthy processed foods and barriers to physical activities (34), which lead to weight gain (31). These factors increase the incidence of NCDs and related mortality (35). Moreover, financial crises and the lack of social contact might enhance the burden of anxiety and depression among PLWNCDs. The economic slowdown predisposes people to malnourishment, which further increases the risk of infectious diseases (31).

DISRUPTION OF ESSENTIAL PUBLIC HEALTH SERVICES AND THE WAY FORWARD

Since the COVID-19 pandemic began, prevention and treatment services around the globe have been severely impaired, and the disruption is worse in LMICs. The results from a survey conducted by the WHO in 155 countries (36) revealed that PLWNCDs were not able to access services for their health conditions, which made their lives even more difficult during this crisis. More than 53% of the surveyed countries reported partially or completely impaired services for NCDs and related complications, particularly after the COVID-19 trajectory changed from sporadic to community transmission. This is supported by the stories and pictures of PLWNCDs captured in the news and social media of LMICs, where people were unable to access basic medicines or care (particularly in areas with protracted lockdowns) for their chronic conditions. This problem is exacerbated by the reassignment of health staff from NCD facilities to COVID-19 in all surveyed countries (36) and the disruption of medical supplies and diagnostics as a result of nationwide lockdowns (23). For example, in India, some outpatient services have been temporarily closed, and hospitals have been converted into designated COVID-19 care homes (23). This arrangement will have a further adverse effect on access to healthcare services and treatment adherence by PLWNCDs. Similar painful stories regarding PLWNCDs have been reported in the news and social media platforms of many LMICs, such as Nepal, Bangladesh, Brazil, Pakistan, Ghana, and Iran. Governments in various countries have made efforts to focus on NCD services while tackling COVID-19, but only 42% of low-income countries have done so compared to 72% of high-income countries (HICs) (36). This shows the global impact of COVID-19 on the disruption of healthcare services for NCDs.

The interaction of COVID-19 with other biological and social factors appears to increase the risk of complications, worsen health outcomes, and intensify the burden on healthcare professionals and health systems. On the one hand, there is a global rush to respond to COVID-19 by increasing intensive care unit beds, installing ventilators, extending lockdowns, and adopting other containment measures. On the other hand, there is a disruption of routine health services, such as screening and diagnosis, supplies of essential medicines, and access to health service providers and support services.

The COVID-19 syndemic and other conditions have not only posed a challenge to health systems but have also exposed gaps within the healthcare delivery system in many HICs (e.g., Italy, Spain, and the United States) and LMICS (e.g., Pakistan, India, Nepal, Bangladesh, Mexico, and Brazil). Due to COVID-19, the priorities of health services have shifted; as a result, the progress required to achieve Sustainable Development Goals is threatened (37).

In the subsequent section, we describe strategies that are essential to overcoming and managing the syndemic condition. We divide these strategies into four broad categories (**Figure 2**).

Essential Supplies and Information Dissemination

The sudden lockdowns imposed by authorities caused panic in many countries. To avoid such situations, there should be a supply of basic needs, such as groceries and sanitary items. Home delivery is an important strategy that can be implemented with the help of volunteers, especially for older adults and people with disabilities. Misinformation and fake news on social media platforms are fuelling this panic. People should follow information from trusted sources such as government guidelines. Additionally, authorities should disseminate the appropriate information to the general public in a timely manner.

Self-Management Support at the Community Level

PLWNCDs should be encouraged to monitor their symptoms, practice self-care, adhere to medication, seek healthcare services including counseling, practice physical distancing, wash their hands with soap, and wear masks. Providing information on self-management behavior changes for NCDs and COVID-19 through SMS and social media platforms is an important step. In this situation, health literacy (having the necessary information and skills to manage health) and activation (motivation and the ability to take action) can play an important role (37, 38) in self-management (39) of conditions among PLWNCDs in LMICs. Promoting both the health literacy and empowerment of PLWNCDs would enable patients to navigate health services, use technology to contact healthcare providers, develop problem-solving skills, and adhere to healthy lifestyle behaviors (40).

Healthy lifestyle activities must be promoted, such as eating nutritious foods and engaging in physical and wellness activities. Individuals should have access to open spaces and be allowed to exercise at scheduled times while maintaining all precautionary measures, and PLWNCDs could be given timecards for physical activity. The expansion of existing community health worker (CHW) roles can be crucial to the self-management of NCDs and COVID-19 and to delivering basic services among PLWNCDs during this extreme health workforce shortage, particularly in LMICs with weak health systems. Recovered COVID-19 patients can also spread information on health and self-care management and help debunk the myths and lessen the stigma related to COVID-19.

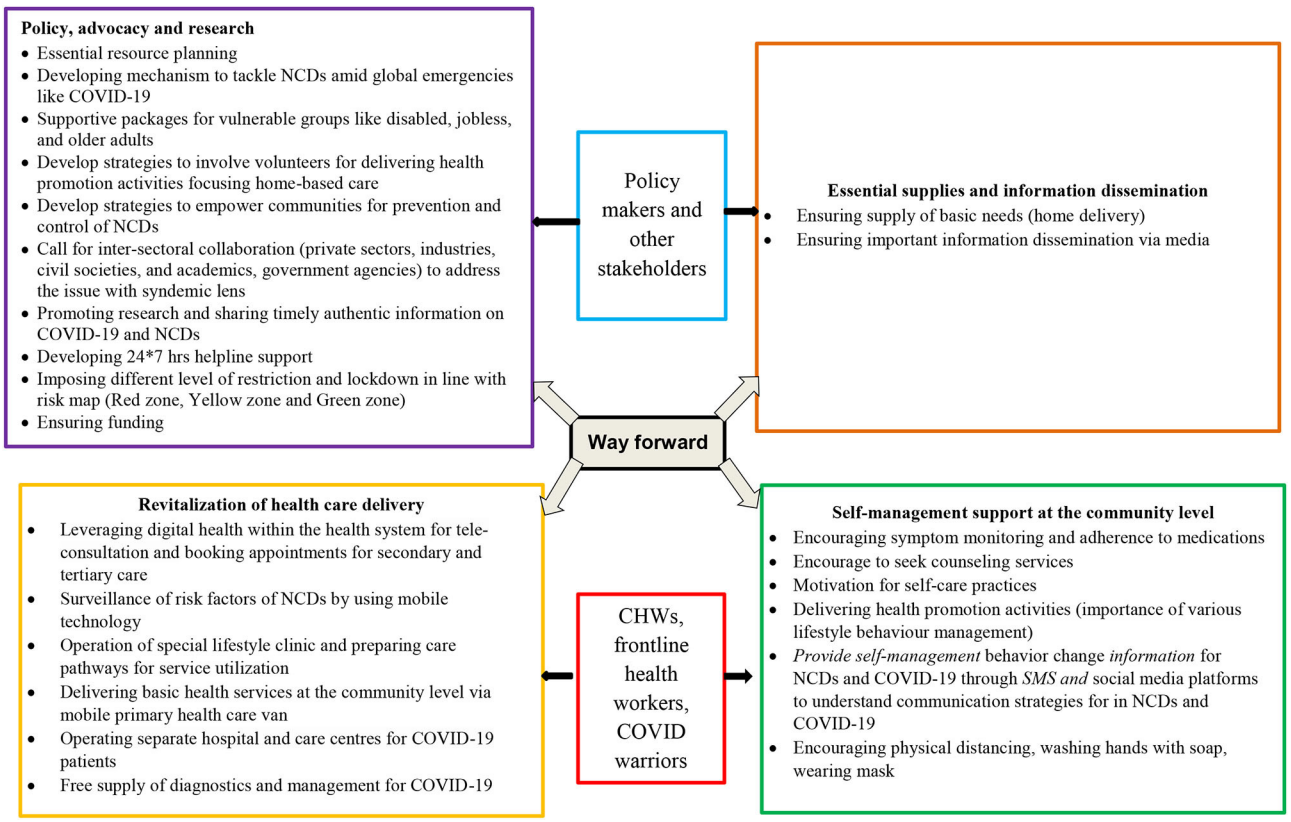


FIGURE 2 | Strategies to overcome and manage the syndemic condition.

Revitalizing Healthcare Delivery

Although countries (mostly developed ones) are trying to provide care through telemedicine, it is still in the formative stage. While telemedicine is a boon for developed nations when it comes to the diagnosis, treatment, self-management support, and surveillance of conditions, LMICs with fragile health systems often struggle to launch telemedicine services. Using digital healthcare platforms in the health system (41) would greatly increase access to the services and information required by PLWNCDs. This would, in turn, improve the management of chronic conditions and provide relief from emotional turmoil and stress (42).

In fragmented health systems, CHWs can promote coordinated care by improving access to care and providing navigation support (43). CHWs can also carry out surveillance of risk factors and implement preventive and self-management strategies for PLWNCDs, who are at high risk of COVID-19. Potential CHW roles in COVID-19 management include community engagement, community sensitization, promoting isolation and quarantine, and performing contact tracing (44, 45). Despite their huge potential in pandemic management, CHWs have been underutilized in the COVID-19 pandemic, especially in countries where CHWs are available, such as Bangladesh, India, and Nepal. However, before involving CHWs in the COVID-19 response, they must be provided with appropriate training and adequate personal protective equipment (46).

While responding to COVID-19, the governments of LMICs have failed to ensure health services for PLWNCDs because of the blanket lockdown approach. Insufficient attention has been paid to the unnoticed drivers of COVID-19-related mortality among PLWNCDs. While governments enforce mitigating measures during this pandemic, they also need to develop strategies to map national-level data on NCD patients, as such data do not exist in many LMICs. There is also a need to prepare care pathways for severely ill PLWNCDs by engaging private and public healthcare institutions and delivering basic health services (e.g., screening, medical checkups, and pharmacy services) at the community level *via* mobile primary healthcare vans. In many LMICs, out-of-pocket (OOP) health expenditures are high and will rise further during the COVID-19 pandemic (28). To reduce the burden of OOP due to COVID-19, authorities should make provisions for free diagnostic and treatment facilities and focus on equitable, accessible, and affordable healthcare.

These measures will prevent the deterioration of health among PLWNCDs amid the COVID-19 pandemic.

Policy, Advocacy, and Research

A situational analysis of available resources and resource planning must be carried out. Supportive packages should be provided to vulnerable groups, such as older adults, people with disabilities, and the unemployed. Involving the private sector, civil society, academia, non-governmental, and governmental

organizations through intersectoral coordination and teamwork would address the situation with a syndemic lens. HICs can help LMICs in setting up 24/7 helpline support to provide essential information and guidance related to the availability of services and contact in case of emergency. Authorities should also consider imposing different levels of restrictions by mapping the incidence and active cases of COVID-19, such as by designating red, yellow, and green zones. Providing an uninterrupted supply of funds is a major challenge for LMICs during the COVID-19 pandemic. International organizations, philanthropists, and industrialists through their corporate social responsibility should come forward to help countries facing a financial crisis. High-quality research and data on effective interventions to prevent the spread of infection and treatment of active cases are also needed.

Moreover, authorities should impose taxes on items such as sweetened beverages, tobacco, and alcohol to subsidize prices or lower taxes for nutritious food items and ease movement restrictions for food production, processing, and delivery, which will indirectly lessen the use of unhealthy products.

CONCLUSION

COVID-19 and NCDs have a reciprocal effect on each other; NCDs increase vulnerability to COVID-19, and COVID-19 increases NCD-related risk factors. The COVID-19 pandemic may not be the last to threaten the global community. Therefore, there is a need to understand the drivers of the syndemic and design safety nets. The health system must address not just one or some medical problems but ensure holistic care for those that need it, particularly PLWNCDs. Care for PLWNCDs, who are at most risk of COVID-19, must be included in national response frameworks and plans so that the government can protect citizens' health and well-being during the current COVID-19 pandemic and for similar crises in the future, otherwise, the interaction of COVID-19 and NCDs will result in disastrous effects that could be difficult to handle given the preexisting stress on healthcare delivery systems and impede progress in achieving the Sustainable Development Goals.

The governments of LMICs are crippled by a lack of technical and financial resources to address this overwhelming problem. Tackling the COVID-19 syndemic is a matter of urgency. Funding bodies that advocate for and want to be part of a change in LMICs need to invest in prevention and health promotion programs that could address issues within a syndemic framework (47). Government agencies positioned to develop and implement policies must understand that asking citizens to sacrifice without providing appropriate support packages will not work. Rather than gearing up for a vertical approach, governments, concerned stakeholders, development partners, and civil society must build synergy across healthcare platforms to tackle this crisis through a holistic approach. If they fail to do so, the post-pandemic era could experience a great divide in health equity that could be much worse than ever before, undoing the progress made in developing healthcare policies and strengthening healthcare systems and infrastructure. Evidence-guided decisions must be made to overcome this formidable crisis in LMICs.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

AUTHOR CONTRIBUTIONS

UNY conceived the idea. UNY, BR, and SKY drafted the manuscript. SP and SKM provided the significant inputs. All authors approved the final version of manuscript.

ACKNOWLEDGMENTS

Authors acknowledge the assistance of Scientia Prof. Mark Fort Harris (Executive Director, Centre for Primary Health Care and Equity, UNSW, Sydney) for providing expertise inputs in this piece. We greatly acknowledge Mr. Bhupendra Lama from Central Department of Microbiology, Tribhuvan University, Nepal for contribution in design of **Figure 1**.

REFERENCES

1. Sobral MFF, Duarte GB, da Penha Sobral AIG, Marinho MLM, de Souza Melo A. Association between climate variables and global transmission oF SARS-CoV-2. *Sci Total Environ.* (2020) 729:138997. doi: 10.1016/j.scitotenv.2020.138997
2. OECD. *The World Economy on a Tightrope France: Organisation for Economic Co-operation and Development*. (2020). Available online at: http://oecd.org/economic-outlook
3. Galea S, Merchant RM, Lurie N. The mental health consequences of COVID-19 and physical distancing: the need for prevention and early intervention. *JAMA Intern Med.* (2020) 180:817–8. doi: 10.1001/jamainternmed.2020.1562
4. Holmes EA, O'Connor RC, Perry VH, Tracey I, Wessely S, Arseneault L, et al. Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science. *Lancet Psychiatry.* (2020) 7:547–60. doi: 10.1016/S2215-0366(20)30168-1
5. Duan L, Zhu G. Psychological interventions for people affected by the COVID-19 epidemic. *Lancet Psychiatry.* (2020) 7:300–2. doi: 10.1016/S2215-0366(20)30073-0
6. Thakur V, Jain A. COVID 2019-suicides: a global psychological pandemic. *Brain Behav Immun.* (2020) 88:952–3. doi: 10.1016/j.bbi.2020.04.062
7. Hawryluck L, Gold WL, Robinson S, Pogorski S, Galea S, Styra R. SARS control and psychological effects of quarantine, Toronto, Canada. *Emerg Infect Dis.* (2004) 10:1206–12. doi: 10.3201/eid1007.030703
8. Singer M. A dose of drugs, a touch of violence, a case of AIDS: conceptualizing the SAVA syndemic. *Free Inq Creativ Sociol.* (1996). 24:99–110.
9. Bambra C, Riordan R, Ford J, Matthews F. The COVID-19 pandemic and health inequalities. *J Epi Commu Health.* (2020) 1–5. doi: 10.1136/jech-2020-214401
10. Shiau S, Krause KD, Valera P, Swaminathan S, Halkitis PN. The burden of COVID-19 in people living with HIV: a syndemic perspective. *AIDS Behav.* (2020) 24:2244–9. doi: 10.1007/s10461-020-02871-9
11. Brown E, Gray R, Lo Monaco S, O'Donoghue B, Nelson B, Thompson A, et al. The potential impact of COVID-19 on psychosis: a rapid review of contemporary epidemic and pandemic research. *Schizophr Res.* (2020) 1–9. doi: 10.1016/j.schres.2020.05.005

12. Dubey S, Biswas P, Ghosh R, Chatterjee S, Dubey MJ, Chatterjee S, et al. Psychosocial impact of COVID-19. *Diabetes Metab Syndr Clin Res Rev.* (2020) 14:779–88. doi: 10.1016/j.dsx.2020.05.035
13. Yadav UN, Tamang MK, Thapa TB, Hosseinzadeh H, Harris MF, Yadav KK. Prevalence and determinants of frailty in the absence of disability among older population: a cross sectional study from rural communities in Nepal. *BMC Geriatr.* (2019) 19:283. doi: 10.1186/s12877-019-1290-0
14. Siriwardhana DD, Hardoon S, Rait G, Weerasinghe MC, Walters KR. Prevalence of frailty and prefrailty among community-dwelling older adults in low-income and middle-income countries: a systematic review and meta-analysis. *BMC J.* (2018). 8:e018195. doi: 10.1136/bmjopen-2017-018195
15. Branca F, Lartey A, Oenema S, Aguayo V, Stordalen GA, Richardson R, et al. Transforming the food system to fight non-communicable diseases. *BMJ.* (2019) 364:l296. doi: 10.1136/bmj.l296
16. Yadav UN, Thapa TB, Mistry SK, Pokhrel R, Harris MF. Socio-demographic characteristics, lifestyle factors, multi-morbid conditions and depressive symptoms among Nepalese older adults. *BMC Psychiatry.* (2020) 20:261. doi: 10.1186/s12888-020-02680-3
17. Remais JV, Zeng G, Li G, Tian L, Engelgau MM. Convergence of non-communicable and infectious diseases in low- and middle-income countries. *Int J Epidemiol.* (2012) 42:221–7. doi: 10.1093/ije/dys135
18. Wang B, Li R, Lu Z, Huang Y. Does comorbidity increase the risk of patients with COVID-19: evidence from meta-analysis. *Aging.* (2020) 12:6049–57. doi: 10.18632/aging.103000
19. Gunnell D, Appleby L, Arensman E, Hawton K, John A, Kapur N, et al. Suicide risk and prevention during the COVID-19 pandemic. *Lancet Psychiatry.* (2020) 7:468–71. doi: 10.1016/S2215-0366(20)30171-1
20. Mamun MA, Ullah I. COVID-19 suicides in Pakistan, dying off not COVID-19 fear but poverty?—the forthcoming economic challenges for a developing country. *Brain Behav Immu.* (2020) 87:163–6. doi: 10.1016/j.bbi.2020.05.028
21. Kretchy IA, Asiedu-Danso M, Kretchy JP. Medication management and adherence during the COVID-19 pandemic: perspectives and experiences from low-and middle-income countries. *Res Soc Adm Pharm.* (2020) 1–4. doi: 10.1016/j.sapharm.2020.04.007
22. Banerjee M, Chakraborty S, Pal R. Diabetes self-management amid COVID-19 pandemic. *Diabetes Metab Syndr.* (2020) 14:351–4. doi: 10.1016/j.dsx.2020.04.013
23. Basu S. Non-communicable disease management in vulnerable patients during Covid-19. *Indian J Med Ethics.* (2020) V:103–5. doi: 10.20529/IJME.2020.041
24. Epidemiology Working Group for NCIP Epidemic Response, Chinese Center for Disease Control and Prevention. [The epidemiological characteristics of an outbreak of 2019 novel coronavirus diseases (COVID-19) in China]. *Zhonghua Liu Xing Bing Xue Za Zhi.* (2020) 41:145–51. doi: 10.3760/cma.j.issn.0254-6450.2020.02.003
25. Covid-19 Coronavirus Pandemic. (2020). Available online at: https://www.worldometers.info/coronavirus/ (accessed June 13, 2020).
26. Pal R, Bhadada SK. COVID-19 and non-communicable diseases. *BMJ J.* (2020) 96:429–30. doi: 10.1136/postgradmedj-2020-137742
27. Kluge HHP, Wickramasinghe K, Rippin HL, Mendes R, Peters DH, Kontsevaya A, et al. Prevention and control of non-communicable diseases in the COVID-19 response. *Lancet.* (2020) 395:1678–80. doi: 10.1016/S0140-6736(20)31067-9
28. Thakur J. Novel coronavirus pandemic may worsen existing global noncommunicable disease crisis. *Int J Noncommun Dis.* (2020) 5:1–3. doi: 10.4103/jncd.jncd_2_20
29. HHP K. *Older People are at Highest Risk From COVID-19, but all Must act to Prevent Community Spread Copenhegan: World Health Organisation Reginal Office for Europe*. (2020). Available online at: https://www.euro.who.int/en/health-topics/health-emergencies/coronavirus-covid-19/statements/statement-older-people-are-at-highest-risk-from-covid-19,-but-all-must-act-to-prevent-community-spread (accessed June 4, 2020).
30. Clancy CJ, Nguyen MH. Coronavirus disease 2019 superinfections, and antimicrobial development: what can we expect? *Clin Infect Dis.* (2020) ciaa524. doi: 10.1093/cid/ciaa524
31. Gopalan HS, Misra A. COVID-19 pandemic and challenges for socio-economic issues, healthcare and national health programs in India. *Diabetes Metab Syndr.* (2020) 14:757–9. doi: 10.1016/j.dsx.2020.05.041
32. World Heart Federeation. *COVID 19 and CVD: World Heart Federation*. (2020). Available online at: https://www.world-heart-federation.org/covid-19-and-cvd/ (accessed June 4, 2020).
33. Chen L, Deng H, Cui H, Fang J, Zuo Z, Deng J, et al. Inflammatory responses and inflammation-associated diseases in organs. *Oncotarget.* (2018) 9:7204–18. doi: 10.18632/oncotarget.23208
34. NCD Alliance. Impacts of COVID-19 on people living with NCDs. NCD Alliance (2020). Available online at: https://ncdalliance.org/sites/default/files/resource_files/COVID-19_%26_NCDs_BriefingNote_27April_FinalVersion_0.pdf (accessed June 10, 2020).
35. Alqahtani JS, Oyelade T, Aldhahir AM, Alghamdi SM, Almehmadi M, Alqahtani AS, et al. Prevalence, severity and mortality associated with COPD and smoking in patients with COVID-19: a rapid systematic review and meta-analysis. *PLoS ONE.* (2020) 15:e0233147. doi: 10.1371/journal.pone.0233147
36. WHO. *COVID-19 Significantly Impacts Health Services for Noncommunicable Diseases: World Health Organisation*. (2020). Available online at: https://www.who.int/news-room/detail/01-06-2020-covid-19-significantly-impacts-health-services-for-noncommunicable-diseases (accessed June 4, 2020).
37. Khetrapal S, Bhatia R. Impact of COVID-19 pandemic on health system & Sustainable Development Goal 3. *Indian J Med Res.* (2020) 151:395-9. doi: 10.4103/ijmr.IJMR_1920_20
38. Hearn J, Ssinabulya I, Schwartz JI, Akiteng AR, Ross HJ, Cafazzo JA. Self-management of non-communicable diseases in low- and middle-income countries: A scoping review. *PLoS ONE.* (2019) 14:e0219141. doi: 10.1371/journal.pone.0219141
39. Yadav UN, Hosseinzadeh H, Lloyd J, Harris MF. How health literacy and patient activation play their own unique role in self-management of chronic obstructive pulmonary disease (COPD)? *Chron Respir Dis.* (2019) 16:1479973118816418. doi: 10.1177/1479973118816418
40. Paakkari L, Okan O. COVID-19: health literacy is an underestimated problem. *Lancet Public Health.* (2020) 5:e249–50. doi: 10.1016/S2468-2667(20)30086-4
41. Zarocostas J. How to fight an infodemic. *Lancet.* (2020) 395:676. doi: 10.1016/S0140-6736(20)30461-X
42. Mahmood S, Hasan K, Colder Carras M, Labrique A. Global preparedness against COVID-19: we must leverage the power of digital health. *JMIR Public Health Surveill.* (2020) 6:e18980. doi: 10.2196/18980
43. Balaban RB, Galbraith AA, Burns ME, Vialle-Valentin CE, Larochelle MR, Ross-Degnan D. A patient navigator intervention to reduce hospital readmissions among high-risk safety-net patients: a randomized controlled trial. *J Gener Intern Med.* (2015) 30:907–15. doi: 10.1007/s11606-015-3185-x
44. Bhaumik S, Moola S, Tyagi J, Nambiar D, Kakoti M. Community health workers for pandemic response: a rapid evidence synthesis. *BMJ Global Health.* (2020) 5:e002769. doi: 10.1136/bmjgh-2020-002769
45. Ballard M, Bancroft E, Nesbit J, Johnson A, Holeman I, Foth J, et al. Prioritising the role of community health workers in the COVID-19 response. *BMJ Global Health.* (2020) 5:e002550. doi: 10.1136/bmjgh-2020-002550
46. McMahon SA, Ho LS, Brown H, Miller L, Ansumana R, Kennedy CE. Healthcare providers on the frontlines: a qualitative investigation of the social and emotional impact of delivering health services during Sierra Leone's Ebola epidemic. *Health Policy Plan.* (2016) 31:1232–9. doi: 10.1093/heapol/czw055
47. Singer M, Clair S. Syndemics and public health: reconceptualizing disease in bio-social context. *Med Anthropol Q.* (2003) 17:423–41. doi: 10.1525/maq.2003.17.4.423

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychiatry

ORIGINAL RESEARCH
published: 30 October 2020
doi: 10.3389/fpsyt.2020.579289

Mental Violence: The COVID-19 Nightmare

Fernanda Cristina Coelho Musse[1,2]*, *Laura de Siqueira Castro*[3], *Ksdy Maiara Moura Sousa*[4], *Thiago Fuentes Mestre*[5], *Camila De Masi Teixeira*[4], *Sandra Marisa Pelloso*[1], *Dalva Poyares*[3,4] and *Maria Dalva de Barros Carvalho*[1,2]

[1] Faculty of Medicine, Maringá State University, Maringá, Brazil, [2] Faculty of Medicine, UniCesumar University, Maringá, Brazil, [3] Department of Medicine, Universidade Federal de São Paulo, São Paulo, Brazil, [4] Department of Psychobiology, Universidade Federal de São Paulo, São Paulo, Brazil, [5] Faculty of Medicine, Uningá University, Maringá, Brazil

The year 2020 has generated profound changes in personal and working relations, and in dreams of millions of people worldwide. The aim of this study was to investigate the frequency and content of nightmares during the COVID-19 pandemic in Brazil, evaluating its associations with sociodemographic, occupational, and clinical factors. Cross-sectional exploratory study, including 1,057 participants who responded to an online survey about mental violence and nightmares during the pandemic, between May 25 and June 1, 2020. A descriptive analysis of the results was done to obtain frequency tables. McNemar's non-parametric test was used to compare the frequency of nightmares before and after the pandemic, and logistic regression models, to identify factors most strongly associated with the pandemic nightmares. Participants were from 21 Brazilian states, with a mean age of 38 ± 14 years, and 78% women. Half of them (n = 529) reported at least one nightmare episode during the pandemic, and 32.9% (n = 348) described a pandemic content. There was nearly a 3-fold increase in the occurrence of nightmares "once a week or more" during the pandemic, 9% before vs. 25% after. Prior psychiatric care, suicidal ideation, sleep medication, increased pandemic alcohol consumption, perceiving high risk of contamination, being woman, and of younger age were factors associated with having nightmares during the pandemic. Prior psychiatric care, sleep medication, and age remained significant after excluding participants without nightmares and comparing between individuals with and without a pandemic content. We conclude the COVID-19 pandemic has affected people's dreams. The increase in the frequency of nightmares, their pandemic content, and association with previous conditions are a concerning public mental health issue and should be taken into consideration by authorities and policy makers.

Keywords: pandemic (COVID-19), dreams, mental health, health behaviors, healthcare personnel

OPEN ACCESS

Edited by:
Joanna Lai,
UNICEF United Nations International Children's Emergency Fund, United States

Reviewed by:
Gabriela Pavarini, University of Oxford, United Kingdom
Ivan Fabrizzio Canaval Díaz, UNICEF, Panama

***Correspondence:**
Fernanda Cristina Coelho Musse
fcoelho_med@hotmail.com; fcoelhomed@gmail.com

Specialty section:
This article was submitted to Public Mental Health, a section of the journal Frontiers in Psychiatry

Received: *02 July 2020*
Accepted: *25 September 2020*
Published: *30 October 2020*

Citation:
Musse FCC, Castro LdS, Sousa KMM, Mestre TF, Teixeira CDM, Pelloso SM, Poyares D and Carvalho MDdB (2020) Mental Violence: The COVID-19 Nightmare. Front. Psychiatry 11:579289. doi: 10.3389/fpsyt.2020.579289

INTRODUCTION

Nightmares are REM parasomnias (1) defined as repeated episodes of dysphoric and well-remembered dreams, which generally involve fight to survive or for physical integrity (2). Although nightmare content differs between cultures, it generally includes attempts to escape an imminent threat, often replicating menacing situations (2, 3). The year 2020 is being marked by the expansion of the "Coronavirus Disease 2019" (COVID-19) pandemic, a new disease with high potential

for transmissibility and morbidity (4), forcing many countries to implement extreme measures to restrain its dissemination. One of these global strategies is the establishment of the lockdown (5–8), which is generating profound changes on personal and working relations of millions of people—beyond a health crisis, a real economic threat, particularly in Brazil, one of the five largest countries worldwide in both geographical and populational sizes.

We believe our multiculturalism and diversity reflect on our current state of disagreement regarding measures to restrain the pandemic, and perhaps amplify this global context that has already caused suffering and fear to too many. The imminent threat of being contaminated by the unknown virus is real, particularly to those closely exposed to it, as is the case of healthcare professionals; besides the grief of hundreds of families who have lost their beloved ones (9–16). One could name the COVID-19 pandemic as a "collective mental violence," involving great emotional impact and a context of potential "collective trauma" of global extension. No precedent data addresses behaviors or mechanisms involved in the metabolization of negative feelings in such a scale of global collectivity, as well as how they might reflect on people's dreams and nightmares.

Most theories dedicated to explaining the origin of dreams and, therefore, nightmares, argue in favor of episodic and autobiographical memory participation, although this is not a consensus (3, 17–21). Since the beginning of the twentieth century, authors analyze dream content as a response to waking experiences (17, 18). Levin and Nielsen (17), for instance, propose that a dysfunction in affective processes leads to conditioning and to repetition of fear memories, producing nightmares through neural networks associated to limbic (hyperactivated) and prefrontal (hypoactivated) areas (17). This becomes more evident among individuals with post-traumatic stress disorder, such as those experiencing periods of war or torture, whom recurrently report repeated nightmares" (11, 22, 23).

We believe that the experience of a pandemic as COVID-19 may be generating a series of potentially traumatic memories. Reasons are countless, the speed in which real time information travels the globe, their morbid content, the consequences and severity of this new disease without treatment, added to the experience of physical distancing, economic impact, interrupted education, changes in working and familial relations, in ways we obtain food, among others. These memories are in the making and they can modify the occurrence of mental disorders in several ways (21, 22). For many of these disorders, their first manifestation is trouble sleeping, particularly nightmares. This becomes even more important when we analyze current evidence demonstrating an association between bad dreams and an increase in suicide and self-injury (24–28); beyond the development of medical diseases (29, 30).

We hypothesize that social distancing and the perception of risk of acquiring COVID-19 impact on the occurrence of nightmares and how they associate to health-risk behaviors and suicidal ideation during this unprecedented moment in time. In order to provide current data to healthcare organizations and policy makers, considering the need for innovative psychosocial interventions in the near future, and stressing the relevance of such threats to public mental health, we designed an online survey aimed at identifying changes in the frequency and content of nightmares and their associated factors.

METHODS

This study was registered on Plataforma Brazil, under the identification number 31799220.4.0000.0104 and approved by the Ethics and Research Committee of Universidade Estadual de Maringá—Paraná—Brazil, approval number 4.045.034, on May 22nd, 2020.

Participants and Procedures

Participants were invited to complete an online survey entitled "Mental Violence: the COVID nightmare." Link access to the structured survey, along with an informed consent form, was spread through social media, for 7 days, between May 25th and June 1st, 2020. Initially, the research access link was launched for groups of family members, students, Church members, multidisciplinary health groups, teachers, groups of engineers, artists, parents from nursery schools, and several other groups asked to replicate the link through Facebook and other social media. The survey included questions about nightmares, sociodemographic characteristics, occupational status, health-risk behaviors, and clinical antecedents. Participation was voluntary and anonymous, via an online Google Form. Individuals could participate and invite others in an active way, by individual or collective call (transmission groups).

Study Design and Instruments

This is an exploratory cross-sectional study including a structured survey elaborated by the researchers, focused on determining the occurrence of nightmares and related events before (until December 2019) and during the pandemic (after January 2020 onwards), analyzing associations with risk perception and self-protection measures.

The survey was structured with the following sections: (1) sociodemographic data—age, gender, ethnicity, marital status, state of residence, and religion; (2) occupational status and exposure to the COVID-19—professional category, occupation, exposure and threat related to coronavirus, as well as social isolation and the use of facial mask; (3) personal and clinical antecedents—health-risk behaviors, sleep, and previous medical and psychiatric conditions, including suicidal ideation related to the pandemic; and (4) nightmares assessment—frequency of nightmares before and during the pandemic ("no nightmares," "less than once a week," and "once a week or more"), along with specific content related to the pandemic.

Definition of Pandemic and Non-pandemic Nightmares

We used two questions to define pandemic and non-pandemic nightmares, based on the literature (31). The first question was close ended and included 10 pre-categorized items based on previously described nightmare contents (violence/aggression, venomous animals, screaming, or seeing blood), as well as on pandemic related situations, such as dying, people dying, or

having relatives dying from COVID-19, difficulty breathing, lung failure, and other symptoms. The second question was open-ended and asked for brief examples of nightmares during the pandemic. The answers were analyzed and grouped according to the presence or absence of elements related to the pandemic context, after a series of team discussions.

Pandemic nightmares included contents such as: "being confined and not being able to see anyone," unexpected and premature deaths, being contaminated or having a family member contaminated, "being chased by infected people," suffocation or respiratory symptoms, "forgetting to use individual protection equipment," facing conflicts with medical decisions and inpatients, having COVID-19 symptoms (such as anosmia, loss of taste), hospitalization because of COVID-19, funerals, financial struggle because of the pandemic, "noise from fans and alarms in the ICU," among others.

Non-pandemic nightmares included: being chased, physical aggression, screaming, family fights, being haunted, extraterrestrials, childhood nightmares, miscarriage, work related conflicts, ghosts, conflicts with family and friends, "being alone and looking for a destiny and not finding it," having a house destroyed, accidents, failing tests or exams, assaults, robberies, getting lost in strange places, among others.

Independent Variables

Independent variables included health-risk behaviors, clinical antecedents, and COVID-19 related variables. Participants were asked whether they were following social distancing and self-protection measures, for how long, whether they needed to isolate from family members due to risk of contamination, or for interacting with coworkers with a high risk of exposure to other infected individuals. Usual frequency and amount of alcohol consumed before the pandemic, as well as changes in consumption during the pandemic were also assessed, along with average sleep duration in the past month, use of sleep medication, and previous psychiatric care for insomnia, depression, or anxiety. We also asked whether participants were having suicidal ideation (or a desire to die) during the pandemic.

Statistical Analysis

Descriptive statistics include absolute frequencies and percentages for categorical variables and means with standard deviation for continuous variables. To compare proportions and test association between groups we used the Chi-square test. To compare the proportion of nightmares before and during the pandemic we performed the McNemar's non-parametric test (32), used for comparison of paired samples. We used logistic regression models to evaluate the strength of association between the independent variables and the occurrence of nightmares during the pandemic. Analyses were performed with IBM SPSS Statistics, version 25 (33).

RESULTS

Sample's Characteristics

A total of 1,057 participants from 21 Brazilian states, with a mean age of 38.1 ± 13.7 years (ranging 18–79) and 78% women, responded the questionnaire and were included in this study. Most were white (77%), married (45%), from either the South (55%) or Southeast (36%) regions in Brazil, and declared being Catholic (42%). Over 1/3 of the respondents were healthcare professionals (38%). We observed nearly a 3-fold increase in the frequency of nightmares during the pandemic. Whilst 8.9% ($n = 94$) of the participants had nightmares more than once a week until before the pandemic, during the outbreak this number raised to 25.5% ($n = 270$). **Table 1** shows sample characteristics.

TABLE 1 | Sample's characteristics ($N = 1,057$).

		***N* (%)**
Gender	Women	829 (78.4)
	Men	226 (21.4)
	Not binary	2 (0.2)
Age	<20	80 (7.6)
	21–29	261 (24.7)
	30–39	278 (26.3)
	40–49	194 (18.4)
	50–59	148 (14.0)
	60>	85 (8.0)
	Not declared	11 (1.0)
Ethnicity	White	817 (77.3)
	Brown	155 (14.7)
	Black	39 (3.7)
	Other	46 (4.4)
Marital Status	Single	406 (38.4)
	Married	477 (45.1)
	Living together	87 (8.2)
	Other	87 (8.2)
Region of Brazil	South	583 (55.2)
	Southeast	379 (35.9)
	Midwest	40 (3.8)
	North	16 (1.5)
	Northeast	38 (3.6)
Religion	No religion	259 (24.5)
	Catholic	446 (42.2)
	Evangelical	167 (15.8)
	Kardecism	127 (12)
	Afro-Brazilian traditions	13 (1.2)
	Other	45 (4.3)
Healthcare professional		409 (38.7)
Nightmares before the pandemic	Never or rarely	367 (34.7)
	Less than once a week	596 (56.4)
	Once a week or more	94 (8.9)
Nightmares during the pandemic	None	528 (50.0)
	Less than once a week	259 (24.5)
	Once a week or more	270 (25.5)
Pandemic nightmares	No report of nightmare	536* (50.7)
	Pandemic content	348 (32.9)
	Non-pandemic nightmare	173 (16.4)

**Eight participants reported having nightmares during the pandemic but did not describe an example of such nightmares.*

In **Table 2,** we show associations between sample characteristics and groups defined by the frequency of nightmares during the pandemic. Women, younger, and single individuals were found to report more nightmares, as well as participants without religious affiliations. We observed no differences in the frequency of nightmares by ethnic groups, regions of Brazil, or occupational status. Of all the participants, 32.9% ($n = 348$) reported nightmares with a pandemic content; 42% having these pandemic nightmares less than once a week and 57% once a week or more. Four participants (1%) answered they had no nightmares during the pandemic but did describe a pandemic nightmare in the open-ended question (**Table 1**).

TABLE 2 | Nightmares during the pandemic by sample's characteristics ($N = 1,057$).

	None	Less than once a week	Once a week or more	Chi-square (*p*-value)
	N (%)	*N* (%)	*N* (%)	
Gender				
Women	380 (45.8)	218 (26.3)	231 (27.9)	26.4 (<0.001)
Men	147 (65)	41 (18.1)	38 (16.8)	
AGE				
<20	30 (37.5)	23 (28.7)	27 (33.8)	104.9 (<0.001)
21–29	86 (32.9)	78 (29.9)	97 (37.2)	
30–39	122 (43.9)	76 (27.3)	80 (28.8)	
40–49	120 (61.9)	33 (17)	41 (21.1)	
50–59	96 (64.9)	35 (23.6)	17 (11.5)	
60>	69 (81.2)	11 (12.9)	5 (5.9)	
MARITAL STATUS				
Single	166 (40.9)	108 (26.6)	132 (32.5)	57.3 (<0.001)
Married	275 (57.7)	113 (23.7)	89 (18.7)	
Living together	27 (31)	30 (34.5)	30 (34.5)	
Other	60 (69)	8 (9.2)	19 (21.8)	
RELIGION				
No religion	100 (38.6)	72 (27.8)	87 (33.6)	35.2 (<0.001)
Catholic	243 (54.5)	113 (25.3)	90 (20.2)	
Evangelical	86 (51.5)	37 (22.2)	44 (26.3)	
Kardecism	76 (59.8)	23 (18.1)	28 (22)	
Afro-Brazilian traditions	2 (15.4)	4 (30.8)	7 (53.8)	
Other	21 (46.7)	10 (22.2)	14 (31.2)	
HEALTHCARE PROFESSIONAL				
No	324 (50)	151 (23.3)	173 (26.7)	1.8 (0.395)
Yes	204 (49.9)	108 (26.4)	97 (23.7)	
NIGHTMARES BEFORE THE PANDEMIC[a]				
Never or rarely	308 (83.9)	33 (9.0)	26 (7.1)	<0.001
Less than once a week	217 (36.4)	216 (36.2)	163 (27.4)	
Once a week or more	3 (3.2)	10 (10.6)	81 (86.2)	
CONTENT OF THE NIGHTMARES				
No reports of nightmare	516 (96.3)	15 (2.8)	5 (0.9)	<0.001
Non-pandemic content	8 (4.6)	98 (56.6)	67 (38.7)	
Pandemic content	4 (1.1)	146 (42.0)	198 (56.9)	

**The Chi-square statistic is significant at the 0.05 level. [a]Comparison on the frequency of nightmares before and after the pandemic was tested with the McNemar's test.*

Health-Risk Behaviors and Clinical Antecedents

Drinking generally over two doses of alcohol once a week or more was associated with more nightmares during the pandemic. Both increasing and decreasing alcohol consumption had an effect in the occurrence of nightmares during the pandemic (**Table 3**). Respondents who slept fewer hours and were taking sleeping pills reported more frequent nightmares during the pandemic, as well as those with a history of psychiatric disturbances. One-third of the participants with more frequent nightmares during the pandemic reported having experienced suicidal thoughts and ideation (**Table 3**).

Risk Perception and Self-Protection Measures During COVID-19

Table 4 shows associations between the frequency of nightmares during the pandemic and variables related to COVID-19. "Perceiving high risk of contamination" and "isolation from family members" were associated with more frequent nightmares. Positive COVID-19 diagnosis, judging it dangerous, contacting exposed individuals, following isolation measures, and the use of facial masks were not associated. We also checked whether the frequency of pandemic and non-pandemic nightmares would be different between healthcare professionals and individuals with other occupations, and we observed no effects.

In the multiple regression analysis, we applied the Backward stepwise selection method to retain variables and found the following independent risk factors for the occurrence of nightmares during the pandemic, independently of their frequency: being woman, of younger age, having previous psychiatric conditions, use of sleep medication, perceiving a high risk of contracting COVID-19, increased alcohol consumption during the pandemic, and suicidal ideation. The later with the strongest effect, that is, individuals reporting suicidal ideation during the pandemic were almost 3 times more likely to be experiencing nightmares. In a second model, we excluded individuals without nightmares and compared between those reporting or not nightmares with a pandemic content. Previous psychiatric conditions, the use of sleep medication, and younger ages were the variables that remained significant and with independent effects on pandemic nightmares (**Table 5**).

DISCUSSION

This is one of the first studies to analyze nightmares in the context of the COVID-19 pandemic. Compared to the frequency of nightmares seen before the pandemic, we observed nearly

TABLE 3 | Nightmares during the pandemic by health-risk behaviors and clinical antecedents ($N = 1,057$).

	None	Less than once a week	Once a week or more		Chi-square
	N (%)	*N* (%)	*N* (%)	*N* total	(*p*-value)
SMOKING					
Never smoked	381 (51)	174 (23.3)	192 (25.7)	747	6.9 (0.328)
Passive smoker	32 (39.5)	22 (27.2)	27 (33.3)	81	
Former smoker >6 mo	75 (51.7)	40 (27.6)	30 (20.7)	145	
Current smoker	40 (47.6)	23 (27.4)	21 (25)	84	
ALCOHOL FREQUENCY					
Never/rarely	154 (55.6)	54 (19.5)	69 (24.9)	277	12.9 (0.043)
Occasional	253 (50.2)	134 (26.6)	117 (23.2)	504	
1–4 days/week	110 (43)	68 (26.6)	78 (30.5)	256	
5–7 days/week	11 (55)	3 (15)	6 (30)	20	
ALCOHOL DOSES					
No consumption	164 (56.9)	56 (19.4)	68 (23.6)	228	30.5 (<0.001)
1–2 doses	229 (53.5)	110 (25.7)	89 (20.8)	428	
3–4 doses	91 (41.4)	59 (26.8)	70 (31.8)	220	
5–7 doses	28 (32.9)	27 (31.8)	30 (35.3)	85	
8 or more	16 (44.4)	7 (19.4)	13 (36.1)	36	
ALCOHOL DURING THE PANDEMIC					
No change	368 (55.8)	144 (21.9)	147 (22.3)	659	26.5 (<0.001)
Drinking less	76 (40.9)	48 (25.8)	62 (33.3)	186	
Drinking more	84 (39.6)	67 (31.6)	61 (28.8)	212	
REPORTED SLEEP DURATION					
Less than 4 h	8 (29.6)	5 (18.5)	14 (51.9)	27	38.5 (<0.001)
4–6 h	123 (42.4)	68 (23.4)	99 (34.1)	290	
6–8 h	323 (56.1)	145 (25.2)	108 (18.8)	576	
More than 8 h	74 (45.1)	41 (25)	49 (29.9)	164	
IN USE OF SLEEP MEDICATION					
No	457 (53.8)	206 (24.2)	187 (22)	850	34.0 (<0.001)
Yes	71 (34.3)	53 (25.6)	83 (40.1)	207	
PREVIOUS PSYCHIATRIC CONDITIONS					
No	319 (64.7)	95 (19.3)	79 (16)	493	83.3 (<0.001)
Yes	209 (37)	164 (29.1)	191 (33.9)	564	
SUICIDE IDEATION DURING THE PANDEMIC					
No	501 (54.6)	226 (24.6)	190 (20.7)	917	93.5 (<0.001)
Yes	27 (19.3)	33 (23.6)	80 (57.1)	140	

Results are based on non-empty rows and columns in each innermost sub-table.
**The Chi-square statistic is significant at the 0.05 level.*

TABLE 4 | Nightmares during the pandemic by variables related to the COVID-19 pandemic.

	None	Less than once a week	Once a week or more		Chi-square (*p*-value)
	N (%)	*N* (%)	*N* (%)	*N* total	
COVID-19 POSITIVE					
Yes	10 (62.5)	2 (12.5)	4 (25)	16	1.4 (0.480)[a]
No	518 (49.8)	257 (24.7)	266 (25.6)	1041	
JUDGING THE COVID-19 DANGER					
Little dangerous	14 (63.6)	2 (9.1)	6 (27.3)	22	4.9 (0.294)[a]
Moderately dangerous	144 (53.1)	61 (22.5)	66 (24.4)	271	
Extremely dangerous	370 (48.4)	196 (25.7)	198 (25.9)	764	
RISK ASSESSMENT OF CONTRACTING COVID-19					
None/Low risk	118 (55.1)	46 (21.5)	50 (23.4)	214	16.0 (0.003)*
Moderate risk	283 (52.6)	135 (25.1)	120 (22.3)	538	
High risk	127 (41.6)	78 (25.6)	100 (32.8)	305	
CONTACT WITH PEOPLE WHO MAY BE INFECTED					
Yes	179 (50.1)	90 (25.2)	88 (24.6)	357	0.2 (0.868)
No	349 (49.9)	169 (24.1)	182 (26)	700	
FULFILLING SOCIAL ISOLATION MEASURES					
Yes	406 (49.9)	203 (25)	204 (25.1)	813	0.5 (0.743)
No	122 (50)	56 (23)	66 (27)	244	
ISOLATION FROM FAMILY MEMBERS					
Yes	202 (48.6)	92 (22.1)	122 (29.3)	416	5.7 (0.058)
No	326 (50.9)	167 (26.1)	148 (23.1)	641	
USE OF MASK EVERY TIME YOU LEAVE THE HOUSE IN THE LAST 4 WEEKS					
Yes	503 (50.3)	246 (24.6)	251 (25.1)	1000	0.4 (0.236)[a]
I don't leave home	14 (38.9)	7 (19.4)	15 (41.7)	36	
No	11 (52.4)	6 (28.6)	4 (19)	21	

Results are based on non-empty rows and columns in each innermost sub-table.
**The Chi-square statistic is significant at the 0.05 level.*
[a]More than 33% of cells in this sub-table have expected cell counts <5. Chi-square results may be invalid.

a 3-fold increase in the number of participants reporting nightmares "once a week or more" during the pandemic. Over 2/3 of these participants also described nightmares with a pandemic content. These findings are supported by previous theoretical conceptualizations reporting dreams and nightmares as adaptative biological responses with an adjustment function (18).

According to epidemiological data, ∼6–16% of the general population report having nightmares at least once a week (3, 34, 35). The prevalence of nightmares is generally more frequent among younger individuals, particularly children and adolescents as compared to adults (1, 2, 23, 35). Women are more likely to complaint of nightmares, also individuals with other psychiatric conditions, such as those with post-traumatic stress disorders (2, 22, 23).

TABLE 5 | Independent factors associated with the occurrence of nightmares and pandemic nightmares.

	Model 1 ($n = 1,057$) Having or not nightmares during the pandemic		Model 2 ($n = 521$) Having or not nightmares with a pandemic content	
	OR value	***p*-value**	**OR value**	***p*-value**
Suicidal ideation	2.8 (1.7–4.7)	<0.001		
Previous psychiatric conditions	2.3 (1.7–3.0)	<0.001	1.6 (1.0–2.4)	0.019
Alcohol during the pandemic				
No change	–	0.072		
Less consumption	1.3 (0.9–1.9)	0.133		
More consumption	1.4 (1.0–2.1)	0.042		
Perception of risk of contamination				
Low risk	–	0.019		
Moderate risk	1.0 (0.7–1.5)	0.746		
High risk	1.6 (1.0–2.4)	0.019		
Use of sleep medication	1.9 (1.3–2.8)	<0.001	1.6 (1.0–2.7)	0.033
Women	1.9 (1.4–2.8)	<0.001		
Age	0.9 (0.9–1.0)	<0.001	0.9 (0.9–1.0)	<0.001
Constant	1.109	0.745	4.192	<0.001

Logistic regression models using Backward stepwise variable selection method. Variables entered on step 1 of both models were: Previous psychiatric conditions, suicide ideation during the pandemic, sleep duration, sleep medication, occupational status, smoking, frequency of alcohol consumption, change in alcohol consumption during the pandemic, following social distance measures, use of facial mask, positive COVID-19 diagnosis, perceived danger of the COVID-19, perceived risk of contracting COVID-19, contact with exposed individuals, isolation from family members, gender, and age.
Model 1 stopped at the 11th step, whereas model 2 at the 15th step.

Several theoretical studies indicate that not all recent daytime experiences will turn into oniric experiences, but rather, those with emotional content (36, 37). The significant high frequency of nightmares may reflect the anxiogenic context experienced during the unprecedented pandemic, emphasizing the status of "mental violence" or "collective trauma." Nightmares are REM parasomnias; which role seems to be linked to consolidation of memories processes and emotional memories (38).

In this context, with a significant proportion of participants reporting nightmares during the pandemic, and most of them have pandemic content, this becomes particularly relevant given the anxiogenic new condition, in which people tend to have negative interpretations of reality. The exposure to pandemic-related stressors and the emotional content of daily memories could corroborate to explain some aspects of nightmares disorders and REM parasomnia (39, 40). Thus, experiences with intense emotional content, whether positive or negative, would be more easily stored and, consequently, processed during REM sleep, by the activation of cortical regions related to recognition and emotion confrontation, such as amygdala, hippocampus, medial prefrontal cortices and the anterior cingulate gyrus (38, 41).

As previously noted, dysfunctional affective processes may lead to a repeating reprocessing of fear memories (17). Neural networks associated with limbic areas (hyperactivated) and prefrontal (hypoactivated) are related to this repetitive activation of fear memories, which would generate the nightmares, and whose frequency increases when the emotional charge or stress level elevate (17, 35). This would happen in patients with mental disorders such as anxiety, depression and post-traumatic stress disorder (PTSD) (17, 35). Indeed, having previous history of psychiatric disorder increased the risk of nightmares in our study. We have also found that women are more likely to have nightmares than men and that the frequency of nightmares decreases with age. It might be expected, since anxiety, depression and insomnia are also more prevalent among women (42). With regard to age, the prevalence of nightmares is higher among children and younger individuals and tend to lower with aging (1, 2, 23, 35, 43).

We have not found significant difference between the frequency of pandemic and non-pandemic nightmares, when comparing the results of health professionals to that from the general population, although we found a greater chance of nightmares among those who had a perceived increased risk of contamination. Interestingly, when pandemic-related content nightmares were regarded, only age, previous psychiatry condition, and taking sleeping pills.

Another possible explanation for this result, may rely on the fact that even though the health professionals spend more time in contact with the new COVID-19 disease reality, the general population is over-exposed to real-time information of great emotional impact, especially through the media and social networks. Gao et al. (44) made an association between the prevalence of mental health issues and the social media exposure during the pandemic, in a sample of 4,872 participants, demonstrating the high prevalence of mental health issues associated to the "infodemic" during the COVID-19 outbreak.

Another relevant result refers to the significant association between the frequency of nightmares during the pandemic and the 2.6-fold increase in the chance of suicidal ideation. Tae et al. (45) reported, with a sample of 909 adults the correlations between sleeping problems and suicidal ideation, associated or not with depressive disorders, finding out that more than 94% of the participants with suicidal ideation also had sleeping problems. However, another study demonstrated that insomnia and nightmares are associated with an elevated suicide risk as well as suicidal thoughts and behaviors among a sample of young adults (24).

Regression results also showed a dose-response association between alcohol consumption and the presence of nightmares. This is in agreement with previous report that compared a group of 37 patients with alcohol addiction to a group of 35 non-addicted patients, and found that the quality of sleep was lower among the alcohol addicted individuals and the subjective experience of dreams was more negatively toned in this group, improving after 4 weeks of abstinence (46). Similar result was found among sleeping pills users. Drugs acting on GABAergic receptors, as well as with sedative hypnotic effects are likely to induce nightmares in some patients (47).

Potential limitations of this study refer to selection bias. We describe a non-probabilistic sample including mostly women who responded to an online survey about nightmares during the pandemic. It is possible that a larger proportion of individuals suffering from nightmares responded and men are underrepresented. Nevertheless, participants were from 21 out of 26 Brazilian states, half had no nightmare complaint whatsoever, and the prevalence of frequent nightmares before the pandemic—occurring at least once a week and as described in diagnostic manuals—was similar to that described by epidemiological studies (3, 34, 35). Moreover, we were particularly interested in seeing the frequency of pandemic contents among individuals with and without previous nightmare complaints. The other potential limitation is that nightmare frequency was assessed at a single point in time, and therefore relied on participant's long-term memory from the pre-pandemic period. People might be more likely to recall nightmares that happened in the recent past rather than nightmares that happened a while ago. As aforementioned, however, nightmare frequency reported for the pre-pandemic period is similar to general nightmare frequency reported in the literature. Future research could evaluate whether nightmare frequency changes if measured with a dream-log that participants fill in everyday for a period.

In summary, our findings suggest the COVID-19 pandemic is significantly affecting people's lives and dreams, what is evidenced by the significant increase in the frequency of nightmares and in association with suicidal ideation, as well as with changes in health-risk behaviors. High frequency of nightmares whether related or not to pandemic contents, should be inquired by healthcare professionals, as it is associated with significant mental health morbidity.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

AUTHOR CONTRIBUTIONS

FM, MC, LC, DP, and CT wrote the manuscript. FM conducted the analyses supervised by MC. LC conducted the analyses. All authors contributed to the study design, critically reviewed the manuscript, and approved the final manuscript.

REFERENCES

1. Singh S, Kaur H, Singh S, Khawaja I. Parasomnias: a comprehensive review. *Cureus*. (2018) 10:e3807. doi: 10.7759/cureus.3807
2. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders: DSM-V-TR*. American Psychiatric Association (2014). Available online at: http://www.clinicajorgejaber.com.br/2015/estudo_supervisionado/dsm.pdf
3. Schredl M, Göritz AS. Nightmare themes: an online study of most recent nightmares and childhood nightmares. *J Clin Sleep Med*. (2018) 14:465–71. doi: 10.5664/jcsm.7002
4. Rodriguez-Morales AJ, Cardona-Ospina JA, Gutiérrez-Ocampo E, Villamizar-Peña R, Holguin-Rivera Y, Escalera-Antezana JP, et al. Clinical, laboratory and imaging features of COVID-19: a systematic review and meta-analysis. *Travel Med Infect Dis*. (2020) 34:101623. doi: 10.1016/j.tmaid.2020.101623
5. Lau H, Khosrawipour V, Kocbach P, Mikolajczyk A, Schubert J, Bania J, et al. The positive impact of lockdown in Wuhan on containing the COVID-19 outbreak in China. *J Travel Med*. (2020) 27:taaa037. doi: 10.1093/jtm/taaa037
6. Cellini N, Canale N, Mioni G, Costa S. Changes in sleep pattern, sense of time and digital media use during COVID-19 lockdown in Italy. *J Sleep Res*. (2020) 29:1–5. doi: 10.1111/jsr.13074
7. Nakada LYK, Urban RC. COVID-19 pandemic: impacts on the air quality during the partial lockdown in São Paulo state, Brazil. *Sci Total Environ*. (2020) 730:139087. doi: 10.1016/j.scitotenv.2020.139087
8. Reis RF, de Melo Quintela B, de Oliveira Campos J, Gomes JM, Rocha BM, Lobosco M, et al. Characterization of the COVID-19 pandemic and the impact of uncertainties, mitigation strategies, and underreporting of cases in South Korea, Italy, and Brazil. *Chaos Soliton Fract.* (2020) 136:109888. doi: 10.1016/j.chaos.2020.109888
9. Hao F, Tan W, Jiang L, Zhang L, Zhao X, Zou Y, et al. Do psychiatric patients experience more psychiatric symptoms during COVID-19 pandemic and lockdown? A case-control study with service and research implications for immunopsychiatry. *Brain Behav Immun*. (2020) 87:100–6. doi: 10.1016/j.bbi.2020.04.069
10. Liu N, Zhang F, Wei C, Jia Y, Shang Z, Sun L, et al. Prevalence and predictors of PTSS during COVID-19 outbreak in China hardest-hit areas: gender differences matter. *Psychiatry Res*. (2020) 287:112921. doi: 10.1016/j.psychres.2020.112921
11. Huang Y, Zhao N. Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. *Psychiatry Res*. (2020) 288:112954. doi: 10.1016/j.psychres.2020.112954
12. Rajkumar RP. COVID-19 and mental health: a review of the existing literature. *Asian J Psychiatr*. (2020) 52:102066. doi: 10.1016/j.ajp.2020.102066
13. Zhang C, Yang L, Liu S, Ma S, Wang Y, Cai Z, et al. Survey of Insomnia and related social psychological factors among medical staff involved in the 2019 novel coronavirus disease outbreak. *Front Psychiatry*. (2020) 11:1–9. doi: 10.3389/fpsyt.2020.00306
14. Altena E, Baglioni C, Espie CA, Ellis J, Gavriloff D, Holzinger B, et al. Dealing with sleep problems during home confinement due to the COVID-19 outbreak: practical recommendations from a task force of the European CBT-I Academy. *J Sleep Res*. (2020) 29:e13052. doi: 10.1111/jsr.13052
15. Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Netw Open*. (2020) 3:e203976. doi: 10.1001/jamanetworkopen.2020.3976
16. Murry B, Stein. *Coronavirus Disease 2019 (COVID-19): Psychiatric issues. Literature Review Current Through*. (2020). Avaliable online at: https://www.uptodate.com/contents/coronavirus-disease-2019-covid-19-psychiatric-illness (accessed April 23, 2020).
17. Levin R, Nielsen TA. Disturbed dreaming, posttraumatic stress disorder, and affect distress: A review and neurocognitive model. *Psychol Bull*. (2007) 133:482–528. doi: 10.1037/0033-2909.133.3.482
18. Revonsuo A. The reinterpretation of dreams: an evolutionary hypothesis of the function of dreaming. *Behav Brain Sci*. (2000) 23:877–1121. doi: 10.1017/S0140525X00004015
19. Revonsuo A, Valli K. How to test the threat-simulation theory. *Conscious Cogn*. (2008) 17:1292–301. doi: 10.1016/j.concog.2008.01.007
20. Malcolm-Smith S, Solms M, Turnbull O, Tredoux C. Threat in dreams: an adaptation? *Conscious Cogn*. (2008) 17:1281–91. doi: 10.1016/j.concog.2007.07.002
21. Mota NB, Furtado R, Maia PP, Copelli M, Ribeiro S. Graph analysis of dream reports is especially informative about psychosis. *Sci Rep*. (2014) 4:3691. doi: 10.1038/srep03691

22. El-Solh AA. Management of nightmares in patients with posttraumatic stress disorder: current perspectives. *Nat Sci Sleep.* (2018) 10:409–20. doi: 10.2147/NSS.S166089
23. Campbell RL, Germain A. Nightmares and Posttraumatic Stress Disorder (PTSD). *Curr Sleep Med Rep*. (2016) 2:74–80. doi: 10.1007/s40675-016-0037-0
24. Russell K, Allan S, Beattie L, Bohan J, MacMahon K, Rasmussen S. Sleep problem, suicide and self-harm in University students: a systematic review. *Sleep Med Rev.* (2019) 44:58–69. doi: 10.1016/j.smrv.2018.12.008
25. Stanley IH, Hom MA, Luby JL, Joshi PT, Wagner KD, Emslie GJ, et al. Comorbid sleep disorders and suicide risk among children and adolescents with bipolar disorder. *J Psychiatr Res.* (2017) 95:54–9. doi: 10.1016/j.jpsychires.2017.07.027
26. Li SX, Lam SP, Zhang J, Yu MW, Chan JW, Chan CS, et al. Sleep disturbances and suicide risk in an 8-year longitudinal study of schizophrenia-spectrum disorders. *Sleep.* (2016) 39:1275–82. doi: 10.5665/sleep.5852
27. Sheaves B, Porcheret K, Tsanas A, Espie CA, Foster RG, Freeman D, et al. Insomnia, nightmares, and chronotype as markers of risk for severe mental illness: results from a student population. *Sleep.* (2016) 39:173–81. doi: 10.5665/sleep.5342
28. Weber FC, Norra C, Wetter TC. Sleep disturbances and suicidality in posttraumatic stress disorder: an overview of the literature. *Front Psychiatry*. (2020) 11:167. doi: 10.3389/fpsyt.2020.00167
29. Ramirez FD, Chen S, Langan SM, Prather AA, McCulloch CE, Kidd SA, et al. Association of atopic dermatitis with sleep quality in children. *JAMA Pediatr.* (2019) 173:e190025. doi: 10.1001/jamapediatrics.2019.0025
30. Baldelli L, Addimanda O, Burattini M, Chiaro G, Brusi V, Pignotti E, et al. Nightmare disorder and REM sleep behavior disorder in inflammatory arthritis: Possibility beyond neurodegeneration. *Brain Behav.* (2019) 9:e01230. doi: 10.1002/brb3.1230
31. Robert G, Zadra A. Thematic and content analysis of idiopathic nightmares and bad dreams. *Sleep.* (2014) 37:409–17. doi: 10.5665/sleep.3426
32. McNemar Q. Note on the sampling error of the difference between correlated proportions or percentages. *Psychometrika.* (1947) 12:153–7. doi: 10.1007/BF02295996
33. IBM Corp Released. *IBM SPSS Statistics for Windows, Version 25.0*. Armonk, NY: IBM Corp (2017).
34. Nadorff MR, Nadorff DK, Germain A. Nightmares: under-reported, undetected, and therefore untreated. *J Clin Sleep Med.* (2015) 11:747–50. doi: 10.5664/jcsm.4850
35. Schredl M, Goeritz AS. Nightmare frequency and nightmare distress: socio-demographic and personality factors. *Sleep Sci.* (2019) 12:178–84. doi: 10.5935/1984-0063.20190080
36. Eichenlaub JB, Van Rijn E, Gaskell MG, Lewis PA, Maby E, Malinowski JE, et al. Incorporation of recent waking-life experiences in dreams correlates with frontal theta activity in REM sleep. *Soc Cogn Affect Neurosci.* (2018) 13:637–47. doi: 10.1093/scan/nsy041
37. Durrant SJ, Cairney SA, McDermott C, Lewis PA. Schema-conformant memories are preferentially consolidated during REM sleep. *Neurobiol Learn Mem*. (2015) 122:41–50. doi: 10.1016/j.nlm.2015.02.011
38. Wamsley EJ. Dreaming and offline memory consolidation. *Curr Neurol Neurosci Rep.* (2014) 14:433. doi: 10.1007/s11910-013-0433-5
39. Tempesta D, Socci V, De Gennaro L, Ferrara M. Sleep and emotional processing. *Sleep Med Rev.* (2018) 40:183–95. doi: 10.1016/j.smrv.2017.12.005
40. Cipolli C, Ferrara M, De Gennaro L, Plazzi G. Beyond the neuropsychology of dreaming: insights into the neural basis of dreaming with new techniques of sleep recording and analysis. *Sleep Med Rev.* (2017) 35:8–20. doi: 10.1016/j.smrv.2016.07.005
41. Murkar A, De Koninck J. Consolidative mechanisms of emotional processing in REM sleep and PTSD. *Sleep Med Rev.* (2018) 41:173–84. doi: 10.1016/j.smrv.2018.03.001
42. Kobayashi I, Howell MK. Impact of traumatic stress on sleep and management options in women. *Sleep Med Clin.* (2018) 13:419–31. doi: 10.1016/j.jsmc.2018.04.009
43. Schredl M, Reinhard I. Gender differences in nightmare frequency: a meta-analysis. *Sleep Med Rev*. (2011) 15:115–21. doi: 10.1016/j.smrv.2010.06.002
44. Gao J, Zheng P, Jia Y, Chen H, Mao Y, Chen S, et al. Mental health problems and social media exposure during COVID-19 outbreak. *PLoS ONE.* (2020) 15:e0231924. doi: 10.1371/journal.pone.0231924
45. Tae H, Jeong B, Chae JH. Sleep Problems as a Risk Factor for Suicide: are certain specific sleep domains associated with increased suicide risk? *J Affect Disord*. (2019) 252:182–9. doi: 10.1016/j.jad.2019.04.053
46. Steinig J, Foraita R, Happe S, Heinze M. Perception of sleep and dreams in alcohol-dependent patients during detoxication and abstinence. *Alcohol Alcohol.* (2011) 46:143–7. doi: 10.1093/alcalc/agq087
47. Pagel JF, Helfter P. Drug induced nightmares—an etiology based review. *Hum Psychopharmacol*. (2003) 18:59–67. doi: 10.1002/hup.465

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychiatry

PERSPECTIVE
published: 24 November 2020
doi: 10.3389/fpsyt.2020.598746

An Integrated Approach to Improve Maternal Mental Health and Well-Being During the COVID-19 Crisis

Rahul Shidhaye[1,2]*, *Purnima Madhivanan*[3,4,5], *Pallavi Shidhaye*[6] and *Karl Krupp*[3,5]

[1] Directorate of Research, Pravara Institute of Medical Sciences, Loni, India, [2] Department of Psychiatry, Pravara Institute of Medical Sciences, Loni, India, [3] Department of Health Promotion Sciences, Mel and Enid Zuckerman College of Public Health, University of Arizona, Tucson, AZ, United States, [4] Division of Infectious Diseases and Department of Family and Community Medicine, College of Medicine, University of Arizona, Tucson, AZ, United States, [5] Public Health Research Institute of India, Mysore, India, [6] Indian Council of Medical Research-National AIDS Research Institute, Pune, India

The ongoing COVID-19 pandemic has led to disruption of normal life across the globe, severely affecting the already vulnerable populations such as the pregnant women. Maternal mental health and well-being is a public health priority and the evidence about the impact of COVID-19 on mental health status of pregnant women is gradually emerging. The findings of the recently published studies suggest that increased risk perception about contracting COVID-19, reduced social support, increase in domestic violence, disruption of antenatal care, and economic consequences of COVID-19 mitigation strategies can lead to adverse mental health outcomes in antenatal period. There is a significant increase in antenatal depression and anxiety since the onset of COVID-19 and social determinants of health (e.g., younger age, lower education, lower income) are associated with these poor outcomes. In this paper, we propose an integrated approach to improve the mental health and well-being of pregnant women. Physical activity and/or mind-body interventions like yoga can be practiced as self-care interventions by pregnant women. Despite social distancing being the current norm, efforts should be made to strengthen social support. Evidence-based interventions for perinatal depression should be integrated within the health system and stepped, collaborative care using non-specialist health workers as key human resource be utilized to improve access to mental health services. Use of digital platforms and smartphone enabled delivery of services has huge potential to further improve the access to care. Most importantly, the COVID-19 related policy guidelines should categorically include maternal mental health and well-being as a priority area.

Keywords: pregnancy, maternal mental health, self-care (MeSH), social support (MeSH term), health system, COVID-19 pandemic

OPEN ACCESS

Edited by:
Manasi Kumar,
University of Nairobi, Kenya

Reviewed by:
Ali Ahsan Ali,
Icahn School of Medicine at Mount Sinai, United States
Aikaterini Arvaniti,
Democritus University of Thrace, Greece
Sally Field,
University of Cape Town, South Africa

***Correspondence:**
Rahul Shidhaye
rahulshidhaye@gmail.com

Specialty section:
This article was submitted to Public Mental Health, a section of the journal Frontiers in Psychiatry

Received: *25 August 2020*
Accepted: *27 October 2020*
Published: *24 November 2020*

Citation:
Shidhaye R, Madhivanan P, Shidhaye P and Krupp K (2020) An Integrated Approach to Improve Maternal Mental Health and Well-Being During the COVID-19 Crisis. Front. Psychiatry 11:598746. doi: 10.3389/fpsyt.2020.598746

INTRODUCTION

In just over 6 months, the COVID-19 pandemic has upended lives across the world. Governments in most of the countries have imposed varying levels of "lockdowns" and requested citizens to "stay at home" to contain the spread of the virus and prevent health systems from being overrun. The resultant closure of workplaces, schools, day-care centers, and healthcare services has disrupted

almost every aspect of life-with disastrous consequences especially for the vulnerable sections of the population such as adolescents, elderly, women, people living in poverty, and those with severe mental health conditions (1). Pregnancy also increases vulnerability as women undergo changes in physical and psychological functioning throughout gestation, labor, and delivery. Recent data suggests that pregnant women may be at elevated risk for COVID-19 infection and hypoxic compromise due to changes in the cardiorespiratory and immune function (1), and a previous systematic review found that the pregnant women had significantly higher rates of mood disorders during disasters compared to the general population (2). In low-and-middle income countries (LMIC), antenatal depression is already a major public health problem with a prevalence of 25.3% (95 confidence interval [CI]: 21.4–29.6%) (3). Severe disruption of life due to COVID-19, fear of contracting the disease, and anticipation of negative economic consequences have led to increased symptoms of depression, anxiety, and stress in the general population as well as in the health care providers (4). However, a rapid evidence review and two other editorials did not find any studies on the impact of COVID-19 on maternal mental health and well-being (5–7). Evidence in this domain is gradually emerging and in this perspective paper, we provide a high-level overview of the recently published epidemiological studies assessing the impact of COVID-19 on maternal mental health, and propose an integrated approach to improve mental health and well-being of pregnant women during the current crisis. A comprehensive search strategy was designed to identify the evidence; however, the search was limited only to the Pubmed. The details about the search strategy, screening, and selection of published articles are provided in **Box 1**.

BOX 1 | Search strategy and study selection.

In order to understand the impact of COVID-19 on maternal mental health, we searched PUBMED using the terms, (((pregnancy OR pregnant OR pre-nat* OR prenat* OR prepart* OR prepart* OR ante-nat* OR antenat* OR ante-part* OR antepart* OR peri-nat* OR perinat* OR peri-part* OR peripart* OR puerper* OR post-nat* OR postnat* OR post-part* OR postpart*)) AND (mental* OR psych* OR anxiety OR anxious OR depress* OR mood? OR affect* OR distress* OR stress or trauma* OR posttrauma* OR post-trauma* OR adjustment disorder* OR phobia* OR phobic OR obsessive compulsive OR wellbeing OR well-being)) AND (coronavir* OR coronovirus* OR "corona virus" OR "virus corona" OR "corono virus" OR "virus corono" OR hcov* OR "covid-19" OR covid19* OR "covid 19" OR "2019-nCoV" OR cv19* OR "cv-19" OR "cv 19" OR "n-cov" OR ncov* OR "sars-cov-2" OR (wuhan AND (virus OR viruses OR viral OR coronav*)) OR (covid* AND (virus OR viruses OR viral)) OR "sars-cov" OR "sars cov" OR "sars-coronavirus" OR "severe acute respiratory syndrome)

The search was carried out from 15 July to 23 July (the last date of our search) and all the articles in English language were included. Our search identified a total of 1010 citations which were imported in Mendeley. One author (PS) screened the titles and abstracts using Rayyan software. Full text of 26 articles was screened and 11 articles were found to be relevant. Forward and backward searches of included studies were carried out and two articles were additionally included.

THE INTERSECTION OF COVID-19 AND MATERNAL MENTAL HEALTH

COVID-19 can impact maternal mental health in following ways:

First, there is increased **risk perception** about contracting COVID-19, which can directly increase maternal anxiety. In China, pregnant women living in the epidemic center (Wuhan city) and those experiencing subjective symptoms were far more likely to have anxiety than otherwise healthy pregnant women (8). A study of pregnant women attending tertiary care center in Turkey reports that 80% of the respondents were overwhelmingly distressed about the pandemic and half of them (52%) felt vulnerable due to their pregnancy. The respondents were also preoccupied about getting infected during/following the delivery (35.5%) or that their baby may get the infection after being born (42%) (9). Infection of other family members was perceived as a bigger concern in pregnant women in Israel than being infected themselves (71.7 vs. 59.2%) (10). Half of the pregnant women interviewed during ante-natal care visit in Ireland, expressed worry about their health often or all the time. They had heightened anxiety about the health of their older relatives (83.3%), concerns about their children (66.7%), and their unborn baby (63.4%) (11).

Second, COVID-19 mitigation strategies have restricted movement and transportation, socialization and engagement in normal routines leading to isolation and **reduced social support.** There are a range of traditional practices associated with pregnancy and birth in various cultures across the world such as *Seemantham* and *Garbhasanskaras* in India (12), *Tsao-Yueh-Tzu ("doing the month")* in China (13), *Sam chil il* in Korea, *la cuarenta* in Mexico, and so on (14). Pandemic mitigation strategies have led to disruption of several of these activities which can potentially impact the mental health of pregnant women. In Asian countries, women often return to their parent's home for the delivery and remain there for several months after the delivery for nurturing care of the baby. In Japan this practice is called *Satogaeri* and the restrictions by the Japanese government on the same may lead to adverse maternal mental health outcomes (15). Another Japanese study also documents that concerns about social support were significantly associated with perceived stress in pregnant women (16). Lack of support in child-care was expressed as a major concern by pregnant women from other parts of the world as well (11, 17).

Third, staying at home increases the risk of **intimate partner violence** (IPV) for women who are in abusive relationships (18). Globally, 30% of women experience physical or sexual violence by an intimate partner in their lifetime (19). Such violence typically increases in frequency and severity during pregnancy (20) and humanitarian crises and natural disasters (18). Recent reports indicate that physical distancing measures may limit the ability of victims of violence to distance themselves from abusers or access external support (21). The evidence suggests that ongoing IPV has a substantial effect on a woman's physical and mental health, especially during the antenatal period (22).

Fourth, serious disruption in the **provision of antenatal care** can further increase the treatment gap for maternal mental

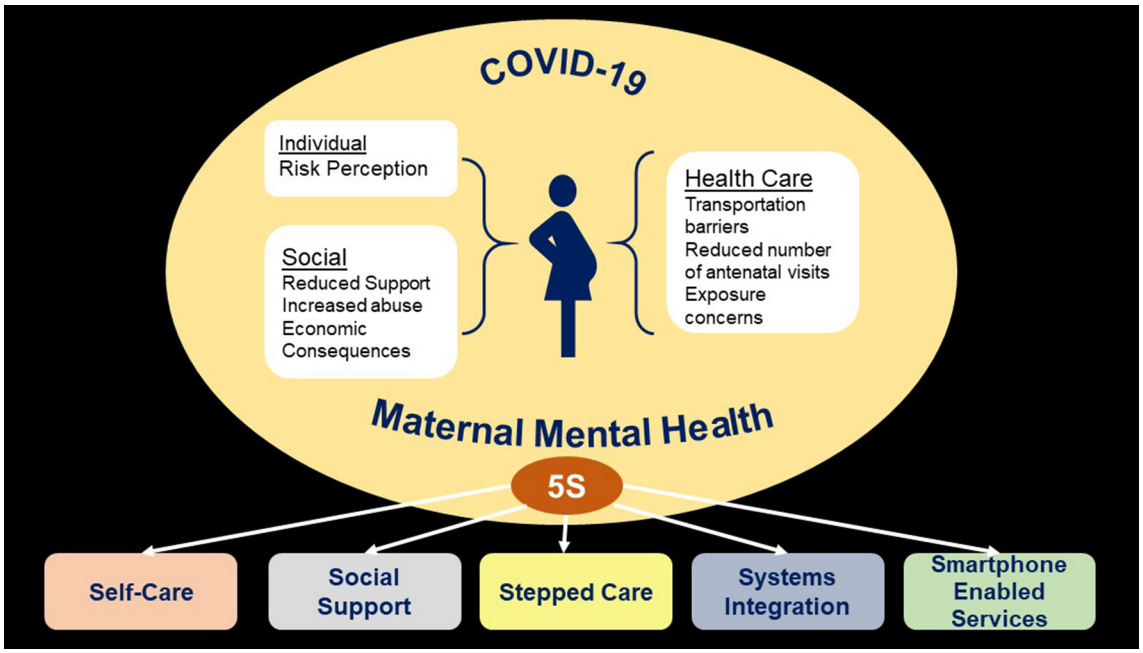


FIGURE 1 | 5S approach for maternal mental health in COVID-19 crisis.

disorders. The health systems, especially in the LMICs are extremely stretched due to the pandemic. The availability of sexual and reproductive health services in the Asia Pacific region will decrease by about one fifth in the best scenario, and by half in the worst scenario according to the World Economic Forum (23). The reasons are several. Pregnant women have been reluctant to visit the health facilities during the pandemic (8) due to concerns related to use of public transportation and exposure to COVID-19 during the check-up visit (10). On the other hand, health care providers have been minimizing non-essential obstetric visits, excluding birth partners during labor and birth, separating mother and baby in the immediate postnatal period and restricting breastfeeding ultimately affecting the overall quality of care (21, 24). Mental health is generally accorded low priority in LMIC health systems and with the current crisis the situation will worsen further.

Fifth, the medium- and long-term **economic consequences** of COVID-19 and the financial uncertainties will escalate the psychological burden and worsen the mental well-being of pregnant women and new mothers. This may be particularly harmful for women in low socio-economic class as they constitute high risk and vulnerable group for antenatal depression. In a cross-sectional study from Japan, pregnant women expressed concerns about future expenditure related to delivering the baby and the nursing care. These concerns about future household finances were associated with increased maternal stress (16). Approximately two-thirds of the pregnant women respondents in the US survey reported stress about losing a job or loss of household income (63.7%) (17), while in Israel the proportion of pregnant women feeling anxious about the possible economic damage of the pandemic was much less (38.1%) (10). Global recession because of the pandemic will likely lead to job loss, reduced income, and most importantly disruption of food supply chains leading to Household Food Insecurity (HFI) (25). Research evidence suggests that food insecurity is negatively associated with the mental health of mothers and has negative impact on early child development outcomes (26).

EFFECT OF COVID-19 ON MATERNAL MENTAL HEALTH

Several studies from different parts of the world published in last 3 months have now assessed the impact of COVID-19 situation on mental health outcomes in pregnant women.

Mental Health Status Pre-COVID-19 and During COVID-19

Two studies, one from China (27) and other from Canada (28) compared mental health outcomes in pregnant women recruited before and after the onset of COVID-19. The Chinese study recruited a total of 4,124 pregnant women from 10 different provinces to assess the impact of COVID-19 on the prevalence of depression and anxiety and the risk factors associated with these outcomes (27). Pregnant women assessed after the declaration had higher prevalence of depressive symptoms (29.6 vs. 26.0%), and this increase of 3.4% was statistically significant ($p = 0.2$). They were more likely to have thoughts of self-harm. A linear positive correlation was found between the prevalence of depression and the number of newly confirmed cases of COVID-19, suspected infections, and deaths per day (27). Similar findings were reported from Canada. Cohort of pregnant women

recruited after the onset of COVID-19 were twice likely to have clinically significant symptoms of depression and anxiety than those recruited prior to COVID-19 (10.9 vs. 6.0%) (28). They also had higher levels of symptoms of post-traumatic disorder, dissociative symptoms, negative affectivity, and less positive affectivity (28).

Increase in psychological distress during COVID-19 is also supported by other cross-sectional studies. The prevalence of self-identified depression and anxiety more than doubled in a large sample of Canadian pregnant women who completed an online survey. Moderate to high anxiety was identified in 29% of women before the pandemic compared to 72% of women after the pandemic started while 15% of the respondents had depression pre-pandemic compared to 40.7% during the pandemic (29). An assessment of Italian pregnant women using State-Trait Anxiety Inventory (STAI) found that there was doubling of state anxiety scores compared to trait anxiety scores (30). An online survey of 5,866 women in Belgium (2,421 pregnant women) found that almost half of the women experienced depressive or anxious symptoms during the lockdown period, and the prevalence of self-reported major depressive symptoms was 25.3% and 14% met the criteria for high anxiety. This was higher compared to estimates obtained in Belgium prior to the pandemic (31). Psychological impact of COVID-19 was severe in more than half of the pregnant women in Italy while a third of the pregnant women (35.4%) were screened positive for depression in Turkey (32, 33).

Risk Factors Associated With Mental Health Outcomes

Cross-sectional survey of 2,740 pregnant women from 47 states in the United States found that younger age, advanced pregnancy (third trimester), previous history or recent diagnosis of depression/anxiety, and being an essential worker (or family member an essential worker) were associated with increase in scores on Pregnancy Related Anxiety Scale (PRAS). Pregnant women residing in areas with high number of COVID-19 infections, those experiencing stress about availability of food and conflict at home also reported higher anxiety scores (17). Similar factors such as younger age, lower education, lower household income, and history of a psychiatric disorder were associated with psychological distress in the Canadian survey of pregnant women (28). The evidence from China about the association of income and mental health outcomes is equivocal. Liu et al., found that pregnant women from middle-level income families were less likely to report anxiety than those from low or high-income families (8). On the other hand, according to Wu et al., pregnant women from the middle-income category, and working full time were more likely to experience depressive symptoms (27). In the US, women in the third trimester had higher anxiety scores (17) while in Italy, one study found that women in the first trimester of pregnancy were more affected (32), but another study from Italy found no association with gestational age (30). Residence was another important factor associated with mental health outcomes. Pregnant women in Wuhan, the epicenter of this global pandemic, had twice the odds of developing anxiety (OR: 1.83, 95% CI 1.38–2.41) compared to the pregnant women in Chongqing (less affected city in China) (8).

5S APPROACH TO IMPROVE MATERNAL MENTAL HEALTH AND WELL-BEING

Till now, the papers published on the topic of maternal mental health and COVID-19 are either cross-sectional epidemiological studies or editorials/commentaries. We did not find any publication which provides an approach to improve maternal mental health and well-being. We try to address this gap through the "***5S***" approach described below. This approach is based on our previous work related to improving mental health services, included in the mental health volume of Disease Control Priorities-3 (34). We now modify the health care platforms-based approach described earlier to address the issue of maternal mental health in the current pandemic. The approach described below is also supported by the findings in the recently published papers including a qualitative study which assessed the factors related to resilience in pregnant women (35).

The 5S approach comprises of Self-Care, Social Support, Stepped Care, Systems Integration, and Smartphone enabled services (**Figure 1**).

Self-Care and Mind-Body Interventions

In order to achieve the goal of Universal Health Coverage, Self-Care is becoming increasingly important with half of the world's population (3.6 billion) having little or no access to needed health services and the World Health Organization (WHO) estimating a shortage of nearly 13 million mental healthcare workers by 2035 (36). There is growing support for self-care management and informal community mental health services as "base-of-the-pyramid" interventions' (37, 38).

During the current COVID-19 crisis, home-based physical activity, mind-body interventions such as yoga, mindfulness, and relaxation exercises can be practiced by pregnant women as Self-Care to improve their mental health and well-being. They are easy to learn and use in self-isolation and lock-down contexts (6). Davenport et al., found that pregnant (and post-partum) women engaging in at least 150 min of moderate intensity physical activity per week during the pandemic had significantly lower scores for both anxiety (large effect) and depression (small effect) than those who did not (29). Physical activity was also independently associated with depression in a study by Wu et al. (27), as a result they recommend programs to support exercise/physical activity across the perinatal period.

Recently published meta-analysis found that yoga compared with treatment as usual/waitlist control had positive impact on improving depression outcomes with a standardized mean difference of −0.41 (95% CI −0.65 to −0.17) (39). Thus, physical activity and yoga can be potentially used as Self-Care interventions by pregnant women. In the current situation, closure of indoor recreation centers, yoga studios, gymnasiums, and outdoor parks/greenspace are critical barriers to practice. Activities such as gardening, going for walks while maintaining physical distance, household chores, home-based practice of

yoga, and online exercise classes are some feasible alternatives. They can be promoted to increase physical activity in pregnant women (29).

Social Support

During the current times when "social distancing" has become the new normal, the importance of social support has increased. Social support was found to play an important role in reducing antenatal anxiety in a cross-sectional study of 308 Chinese pregnant women. Social support reduced antenatal anxiety directly as well as indirectly by reducing the risk perception (40). Supportive networks are of central importance to maternal mental health and can still be engaged with virtually during the COVID-19 pandemic. Health care providers can actively mobilize the social support system for pregnant women by encouraging them to maintain contact with loved ones and referring them to support groups and other social services coordinated by the Non-Governmental Organizations. Through health education programs they can reduce the risk perception level of pregnant women in relation COVID-19. In a study from a rural low-resource setting in India, we found that pregnant women more frequently visited by community health workers at home and more frequently accompanied by them to antenatal care visits were less likely to report anxiety during pregnancy (41). In low resource settings with overburdened public health system, Non-Governmental Organizations can play an important role in providing support to pregnant women through integrated community-based activities focusing on reducing household food insecurity and improving social support to improve maternal mental health.

Stepped Collaborative Care

Stepped care approach involves delivery of low-intensity, low-cost interventions to patients as a first step and only if necessary, they move to higher-intensity treatment. Stepped care is usually combined with collaborative care which brings together different care providers to improve quality of care, satisfaction of patients and the system efficiency (42). Collaborative care has been used successfully for the management of common mental disorders such as depression and various other co-morbid conditions across a range of settings have been successfully managed by the collaborative care approach (43).

The bedrock of stepped collaborative care is delivery of low intensity psychosocial interventions by the non-specialist health workers. A number of such interventions have been developed and evaluated for treatment of perinatal depression in LMICs (44). Although none of these interventions have been developed for mental health crisis during pandemic, they can be adapted for a particular context and setting. The Thinking Health Program (45) is one such intervention and has been successfully evaluated in Pakistan (46) and India (47). The intervention is delivered by the community health workers or peers in the community and pregnant women not showing improvement are referred to primary care physicians and/or specialists for further management. The challenges in delivering interventions by the non-specialist health workers include lack of financial resources, infrastructure for training, providing continuing clinical supervision to non-specialist health workers, difficulty in retaining these workers in the absence of compensation/incentives, high workloads, logistic barriers related to scheduling follow-up appointments and transportation costs (48). These challenges can be addressed by health systems strengthening and using an implementation research approach as described below.

Systems Integration

Interventions proven to be effective in a controlled setting of a randomized trial, often fail to deliver outcomes in a routine practice (49). This may not be due to any problem in the intervention itself, but rather the unpredictability of the system around it (50). In an unmapped and misunderstood health system, even a simple intervention fails. The evidence-based interventions described above should be adapted for the specific culture and the health system context before they are implemented (51). In addition to the training and clinical supervision of the health care providers, facilitation by the support team (52) using a range of implementation strategies (53) can be helpful in mitigating the challenges associated with the delivery of mental health services.

One potential way to integrate maternal mental health services in the existing health systems is by providing psychological support to midwives and other health care providers working on the frontline who are likely to suffer from moral injury (54), burnout, and other mental health problems (55) due to major changes in patient management. Measures to improve mental health of frontline workers and health care providers may lead to positive attitudes toward mental disorders among the staff members and establish an enabling environment to integrate mental health services in the maternal and child health care system (24).

Smartphone Enabled Services

The current pandemic provides us an opportunity to revolutionize the use of smartphone to deliver digital mental health. It has the potential to scale up the delivery of mental health services to patients across a wide range of platforms, from tele-mental health to smartphone-based interventions such as apps and text messaging (56). Tele-health through video-conferencing is as effective as in-person service provision and researchers in China successfully provided online psychological counseling and self-help in medical institutions and universities (56). However, telehealth and digital services should not replace face-to-face treatment for patients in need, particularly those requiring intensive mental health treatment and support when "in-person" contact is once again safe. All pregnant women in low resource settings may not have access to digital platforms, especially those in the lower quintiles of socioeconomic strata. The inequitable access to care will be further widened if the face-to-face services are extensively shifted to digital platforms and due to this "*digital divide*," women with social vulnerabilities may suffer the most. Another critical aspect is to ensure the safety of women who are already experiencing domestic violence. Use of mobile phones may endanger their health and

safety, if the abuser finds out that they are looking for help or reporting abuse.

IMPLICATIONS FOR RESEARCH, PRACTICE, AND POLICY

In the general population, social determinants of health such as female gender, low education, lower household income, and low level of social capital are associated with the depression and anxiety due to COVID-19 pandemic (4). The current evidence however, is unable to inform us of the risk factors in pregnant women for adverse mental health outcomes. As a result, it is critical to collect data on social determinants of health to effectively address COVID-19 related health inequities. The other important research gap is related to lack of data from the LMICs. Except for a few, most of the studies are from high income countries. We also need to understand the impact of poor maternal mental health due to COVID-19 on the birth outcomes, neonatal care including exclusive breastfeeding and duration of breastfeeding, and immunization rates. If the pandemic continues for long it can adversely affect early childhood development. Interventions which have proven to be effective in improving maternal mental health need to adapted for the current situation and their effectiveness in the "new normal" needs to be assessed. Efforts should also be made to integrate evidence-based mental health interventions in routine maternal health care. Finally, the policy documents and guidelines issued by the health ministries and other agencies should pay adequate attention to improve physical as well as mental health and well-being of pregnant and postnatal women.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

RS: conceptualization, methodology, formal analysis, data curation, and writing-original draft. PM: conceptualization, writing-review, and editing. PS: methodology, formal analysis, data curation, writing-review, and editing. KK: writing-review and editing. All authors read and approved the final draft of the paper. All authors contributed to the article and approved the submitted version.

REFERENCES

1. Dashraath P, Wong JLJ, Lim MXK, Lim LM, Li S, Biswas A, et al. Coronavirus disease 2019 (COVID-19) pandemic and pregnancy. *Am. J. Obstet. Gynecol.* (2020) 222:521–31. doi: 10.1016/j.ajog.2020.03.021
2. Harville E, Xiong X, Buekens P. Disasters and perinatal health:a systematic review. *Obstet. Gynecol. Surv.* (2010) 65:713–28. doi: 10.1097/OGX.0b013e31820eddbe
3. Gelaye B, Rondon MB, Araya R, Williams MA. Epidemiology of maternal depression, risk factors, and child outcomes in low-income and middle-income countries. *Lancet Psychiatry.* (2016) 3:973–82. doi: 10.1016/S2215-0366(16)30284-X
4. Moreno C, Wykes T, Galderisi S, Nordentoft M, Crossley N, Jones N, et al. How mental health care should change as a consequence of the COVID-19 pandemic. *Lancet Psychiatry.* (2020) 7:813–24. doi: 10.1016/S2215-0366(20)30307-2
5. Topalidou A, Thomson G, Downe S. COVID-19 and maternal mental health: are we getting the balance right? *medRxiv.* (2020). doi: 10.1101/2020.03.30.20047969
6. Matvienko-Sikar K, Meedya S, Ravaldi C. Perinatal mental health during the COVID-19 pandemic. *Women Birth.* (2020) 33:309–10. doi: 10.1016/j.wombi.2020.04.006
7. Thapa SB, Mainali A, Schwank SE, Acharya G. Maternal mental health in the time of the COVID-19 pandemic. *Acta Obstet. Gynecol. Scand.* (2020) 99:817–18. doi: 10.1111/aogs.13894
8. Liu X, Chen M, Wang Y, Sun L, Zhang J, Shi Y, et al. Prenatal anxiety and obstetric decisions among pregnant women in Wuhan and Chongqing during the COVID-19 outbreak: a cross-sectional study. *BJOG.* (2020) 127:1229–40. doi: 10.1111/1471-0528.16381
9. Yassa M, Birol P, Yirmibes C, Usta C, Haydar A, Yassa A, et al. Near-term pregnant women's attitude toward, concern about and knowledge of the COVID-19 pandemic. *J. Matern. Fetal. Neonatal. Med.* (2020) 33:3827–34. doi: 10.1080/14767058.2020.1763947
10. Taubman-Ben-Ari O, Chasson M, Abu Sharkia S, Weiss E. Distress and anxiety associated with COVID-19 among Jewish and Arab pregnant women in Israel. *J. Reprod. Infant Psychol.* (2020) 38:340–8. doi: 10.1080/02646838.2020.1786037
11. Corbett GA, Milne SJ, Hehir MP, Lindow SW, O'connell MP. Health anxiety and behavioural changes of pregnant women during the COVID-19 pandemic. *Eur. J. Obstet. Gynecol. Reprod. Biol.* (2020) 249:96–7. doi: 10.1016/j.ejogrb.2020.04.022
12. Shindhe V, Trivedi D, Naravi A. Garbhasanskar: knowledge, attitude and practice among antenatal mothers of Dharwad, Karnataka. *Int. J. Adv. Nurs. Manage.* (2015) 3:319. doi: 10.5958/2454-2652.2015.00025.6
13. Tung W-C. Doing the month and asian cultures: implications for health care. *Home Health Care Manage. Pract.* (2010) 22:369–71 doi: 10.1177/1084822310367473
14. Dennis C-L, Fung K, Grigoriadis S, Robinson GE, Romans S, Ross L. Traditional postpartum practices and rituals: a qualitative systematic review. *Women's Heal.* (2007) 3:487–502. doi: 10.2217/17455057.3.4.487
15. Haruna M, Nishi D. Perinatal mental health and COVID-19 in Japan. *Psychiatry Clin. Neurosci.* (2020) 74:502–3. doi: 10.1111/pcn.13091
16. Suda T, Miura Y, Katayama M, Senba H, Takahata M, Nakano S. Worries and concerns about COVID-19 lockdown aggravate stress reactions among pregnant women. *Res. Square.* (2020). doi: 10.21203/rs.3.rs-45832/v1
17. Moyer C, Compton S, Kaselitz E, Muzik M. Pregnancy-related anxiety during COVID-19: a nationwide survey of 2,740 pregnant women. *Arch. Womens Ment. Health.* (2020) 1–9. doi: 10.1007/s00737-020-01073-5. [Epub ahead of print].
18. Roesch E, Amin A, Gupta J, García-Moreno C. Violence against women during covid-19 pandemic restrictions. *BMJ.* (2020) 369:m1712–12. doi: 10.1136/bmj.m1712
19. WHO (2013). *Global and Regional Estimates of Violence Against Women: Prevalence and Health Effects of Intimate Partner Violence and Non-partner Sexual Violence*. Geneva: WHO.
20. Taillieu TL, Brownridge DA. Violence against pregnant women: prevalence, patterns, risk factors, theories, and directions for future research. *Aggress. Violent. Behav.* (2010) 15:14–35. doi: 10.1016/j.avb.2009.07.013
21. Cohen MA, Powell AM, Coleman JS, Keller JM, Livingston A, Anderson JR. Special ambulatory gynecologic considerations in the era of coronavirus disease (2019) (COVID-19) and implications for future practice. *Clin. Opin.* (2020) 223:P372–8. doi: 10.1016/j.ajog.2020.06.006
22. Chisholm CA, Bullock L, Ferguson JE. Intimate partner violence and pregnancy: epidemiology and impact. *Am. J.*

Obstet. Gynecol. (2017) 217:141–4. doi: 10.1016/j.ajog.2017.05.042
23. De Beni D, Maurizio F. *Coronavirus is Leaving Pregnant Women with Tough Choices and Bleaker Outcomes*. World Economic Forum (2020). Available online at: https://www.weforum.org/agenda/2020/05/women-children-covid19-srh-mortality-rates/ (accessed Jul 31, 2020).
24. Horsch A, Lalor J, Downe S. Moral and mental health challenges faced by maternity staff during the COVID-19 pandemic. *Psychol. Trauma.* (2020) 12:S141–2. doi: 10.1037/tra0000629
25. *Global Report on Food Crises. World Food Programme* (2020). Available online at: https://www.wfp.org/publications/2020-global-report-food-crises (accessed October 6, 2020).
26. Pedroso J, Buccini G, Venancio SI, Pérez-Escamilla R, Gubert MB. Maternal mental health modifies the association of food insecurity and early child development. *Matern. Child Nutr.* (2020) 16:e12997. doi: 10.1111/mcn.12997
27. Wu Y, Zhang C, Liu H, Duan C, Li C, Fan J, et al. Perinatal depressive and anxiety symptoms of pregnant women during the coronavirus disease 2019 outbreak in China. *Am. J. Obstet. Gynecol.* (2020) 223:240.e1–240.e9. doi: 10.1016/j.ajog.2020.05.009
28. Berthelot N, Lemieux R, Garon-Bissonnette J, Drouin-Maziade C, Martel É, Maziade M. Uptrend in distress and psychiatric symptomatology in pregnant women during the coronavirus disease 2019 pandemic. *Acta Obstet. Gynecol. Scand.* (2020) 99:848–55. doi: 10.1111/aogs.13925
29. Davenport MH, Meyer S, Meah VL, Strynadka MC, Khurana R. Moms are not OK: COVID-19 and maternal mental health. *Front. Glob. Womens Health.* (2020) 1:1. doi: 10.3389/fgwh.2020.00001
30. Mappa I, Distefano FA, Rizzo G. Effects of coronavirus 19 pandemic on maternal anxiety during pregnancy: a prospectic observational study. *J. Perinat. Med.* (2020) 48:545–50. doi: 10.1515/jpm-2020-0182
31. Ceulemans D, Thijs I, Schreurs A, Vercammen J, Lannoo L, Deprest J, et al. Screening for COVID-19 at childbirth: is it effective? *Ultrasound Obstet. Gynecol.* (2020) 56:113–14. doi: 10.1002/uog.22099
32. Saccone G, Florio A, Aiello F, Venturella R, De Angelis MC, Locci M, et al. Psychological impact of coronavirus disease 2019 in pregnant women. *Am. J. Obstet. Gynecol.* (2020) 223:293–5. doi: 10.1016/j.ajog.2020.05.003
33. Durankuş F, Aksu E. Effects of the COVID-19 pandemic on anxiety and depressive symptoms in pregnant women: a preliminary study. J. *Matern. Neonatal. Med.* (2020) 1–7. doi: 10.1080/14767058.2020.1763946. [Epub ahead of print].
34. Shidhaye R, Lund C, Chisholm D. Closing the treatment gap for mental, neurological and substance use disorders by strengthening existing health care platforms: strategies for delivery and integration of evidence-based interventions. *Int. J. Ment. Health Syst.* (2015) 9:40. doi: 10.1186/s13033-015-0031-9
35. Farewell C V, Jewell J, Walls J, Leiferman JA. A mixed-methods pilot study of perinatal risk and resilience during COVID-19. *J. Prim. Care Commun. Health.* (2020) 11:2150132720944074. doi: 10.1177/2150132720944074
36. WHO. *What Do We Mean by Self-Care*? (2020). Available online at: https://www.who.int/reproductivehealth/self-care-interventions/definitions/en/ (accessed July 30, 2020).
37. WHO. Organization of Services for Mental Health In: *WHO Mental Health Policy and Service Guidance Package*. Geneva: The World Health Organization (2003).
38. Patel V, Chisholm D, Parikh R, Charlson FJ, Degenhardt L, Dua T, et al. Addressing the burden of mental, neurological, and substance use disorders: key messages from disease control priorities, 3rd edition. *Lancet.* (2016) 387:1672–85. doi: 10.1016/S0140-6736(15)00390-6
39. Brinsley J, Schuch F, Lederman O, Girard D, Smout M, Immink MA, et al. Effects of yoga on depressive symptoms in people with mental disorders: a systematic review and meta-analysis. *Br. J. Sports Med.* (2020). doi: 10.1136/bjsports-2019-101242. [Epub ahead of print].
40. Yue C, Liu C, Wang J, Zhang M, Wu H, Li C, et al. Association between social support and anxiety among pregnant women in the third trimester during the coronavirus disease 2019 (COVID-19) epidemic in Qingdao, China: the mediating effect of risk perception. *Int. J. Soc. Psychiatry.* (2020). doi: 10.1177/0020764020941567. [Epub ahead of print].
41. Bhushan NL, Krupp K, Jaykrishna P, Ravi K, Khan A, Shidhaye R, et al. The association between social support through contacts with Accredited Social Health Activists (ASHAs) and antenatal anxiety among women in Mysore, India: a cross-sectional study. *Soc. Psychiatry Psychiatr. Epidemiol.* (2020) 55:1323–33. doi: 10.1007/s00127-020-01854-4
42. Archer J, Bower P, Gilbody S, Lovell K, Richards D, Gask L, et al. Collaborative care for depression and anxiety problems. *Cochrane Database Syst. Rev.* (2012) 10:CD006525. doi: 10.1002/14651858.CD006525.pub2
43. Katon WJ, Lin EHB, Von Korff MR, Ciechanowski PS, Ludman E, Young BA, et al. Collaborative care for patients with depression and chronic illnesses. *N. Engl. J. Med.* (2010) 363:2611–20. doi: 10.1056/NEJMoa1003955
44. Chowdhary N, Sikander S, Atif N, Singh N, Ahmad I, Fuhr DC, et al. The content and delivery of psychological interventions for perinatal depression by non-specialist health workers in low and middle income countries: a systematic review. *Best Pract. Res. Clin. Obstet. Gynaecol.* (2014) 28:113–33. doi: 10.1016/j.bpobgyn.2013.08.013
45. Rahman A, Waqas A, Nisar A, Nazir H, Sikander S, Atif N. Improving access to psychosocial interventions for perinatal depression in low- and middle-income countries: lessons from the field. *Int. Rev. Psychiatry.* (2020) 1–4. doi: 10.1080/09540261.2020.1772551. [Epub ahead of print].
46. Rahman A, Malik A, Sikander S, Roberts C, Creed F. Cognitive behaviour therapy-based intervention by community health workers for mothers with depression and their infants in rural Pakistan: a cluster-randomised controlled trial. *Lancet.* (2008) 372:902–9. doi: 10.1016/S0140-6736(08)61400-2
47. Fuhr DC, Weobong B, Lazarus A, Vanobberghen F, Weiss HA, Singla DR, et al. Delivering the thinking healthy programme for perinatal depression through peers: an individually randomised controlled trial in India. *Lancet Psychiatry.* (2019) 6:115–27. doi: 10.1016/S2215-0366(18)30466-8
48. Padmanathan P, De Silva MJ. The acceptability and feasibility of task-sharing for mental healthcare in low and middle income countries: a systematic review. *Soc. Sci. Med.* (2013) 97:82–6. doi: 10.1016/j.socscimed.2013.08.004
49. Bauer MS, Kirchner J. Implementation science: what is it and why should I care? *Psychiatry Res.* (2020) 283:112376. doi: 10.1016/j.psychres.2019.04.025
50. Shidhaye R. Implementation science for closing the treatment gap for mental disorders by translating evidence base into practice: experiences from the PRIME project. *Australas. Psychiatry.* (2015) 23(6_suppl):35–37. doi: 10.1177/1039856215609771
51. Stirman SW, Miller CJ, Toder K, Calloway A. Development of a framework and coding system for modifications and adaptations of evidence-based interventions. *Implement. Sci.* (2013) 8:65. doi: 10.1186/1748-5908-8-65
52. Damschroder LJ, Aron DC, Keith RE, Kirsh SR, Alexander JA, Lowery JC. Fostering implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implement Sci.* (2009) 4:50. doi: 10.1186/1748-5908-4-50
53. Powell BJ, Waltz TJ, Chinman MJ, Damschroder LJ, Smith JL, Matthieu MM, et al. A refined compilation of implementation strategies: results from the expert recommendations for Implementing change (ERIC) project. *Implement Sci.* (2015) 10:21. doi: 10.1186/s13012-015-0209-1
54. Greenberg N, Docherty M, Gnanapragasam S, Wessely S. Managing mental health challenges faced by healthcare workers during covid-19 pandemic. *BMJ.* (2020) 368:m1211. doi: 10.1136/bmj.m1211
55. Fernandez R, Lord H, Halcomb E, Moxham L, Middleton R, Alananzeh I, et al. Implications for COVID-19: a systematic review of nurses' experiences of working in acute care hospital settings during a respiratory pandemic. *Int. J. Nurs. Stud.* (2020) 111:103637. doi: 10.1016/j.ijnurstu.2020.103637
56. Figueroa CA, Aguilera A. The need for a mental health technology revolution in the COVID-19 pandemic. *Front. Psychiatry.* (2020) 11:523. doi: 10.3389/fpsyt.2020.00523

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychiatry

ORIGINAL RESEARCH
published: 26 November 2020
doi: 10.3389/fpsyt.2020.570786

An Intervention to Increase Situational Awareness and the Culture of Mutual Care (Foco) and Its Effects During COVID-19 Pandemic: A Randomized Controlled Trial and Qualitative Analysis

Elisa H. Kozasa[1,2]*, *Shirley S. Lacerda*[2], *Monica Aparecida Polissici*[2], *Roseli da Silva Coelho*[2], *Gedeon da Silva Farias*[2], *Patrícia Chaves*[2] *and Eliseth R. Leão*[2]

[1] Hospital Israelita Albert Einstein, Instituto Do Cérebro, São Paulo, Brazil, [2] Hospital Israelita Albert Einstein, São Paulo, Brazil

OPEN ACCESS

Edited by:
Manasi Kumar,
University of Nairobi, Kenya

Reviewed by:
Margot Mutsch,
University of Zurich, Switzerland
Christos Theleritis,
National and Kapodistrian University of Athens, Greece

***Correspondence:**
Elisa H. Kozasa
ehkozasa@gmail.com

Specialty section:
This article was submitted to Public Mental Health, a section of the journal Frontiers in Psychiatry

Received: *09 June 2020*
Accepted: *02 November 2020*
Published: *26 November 2020*

Citation:
Kozasa EH, Lacerda SS, Polissici MA, Coelho RdS, Farias GdS, Chaves P and Leão ER (2020) An Intervention to Increase Situational Awareness and the Culture of Mutual Care (Foco) and Its Effects During COVID-19 Pandemic: A Randomized Controlled Trial and Qualitative Analysis. Front. Psychiatry 11:570786. doi: 10.3389/fpsyt.2020.570786

Situational awareness is especially important to decision-making in health care. Comprehending the situation is crucial for anticipating any change in the environment and delivering optimal care. The objective of this study was to evaluate the effects of a training to increase situational awareness and mutual care designed for health care workers (FoCo) in a randomized controlled trial with additional qualitative analysis. We also investigated the perception of the training for the COVID-19 pandemic moment, in May 2020, almost 6 months after we finished the data collection at the Emergency Care Unit, which became a COVID-19 treatment reference for the care of a population depending on the public health system, in Sao Paulo, Brazil. We conclude that FoCo training can be an important instrument for health care professionals both in times of pandemic and "normal times," to increase situational awareness, the culture of mutual care and decrease the possibility of occupational injuries and illnesses.

Keywords: situational awareness, mental health, health care workers (HCW), safety, care, mindfulness

INTRODUCTION

Situational awareness (SA) "describes the ability of an individual to maintain an adequate internal representation of the status of the environment in complex and dynamic domains where time constants are short and conditions may change within seconds and minutes" (1). It was initially studied in the context of aviation as a crucial factor for decision making. The failures in SA were classified in three levels: (I) -failure to correctly perceive the information, (II)- failure to comprehend the situation-, or (III) failure to project the situation into the future. In Level I, relevant data is not available; difficult to detect or discriminate; information is misperceived, or a memory problem happens. Level II involves mainly the use of an incorrect mental model, lack of or incomplete mental model, overreliance on default values. Level III involves, for example, an over projection of current trends (2). SA is especially important to decision-making in health care. Comprehending the situation to provide a mental model is crucial for anticipating any change in the environment and delivering optimal care (3).

It is known that stress is associated with health problems such as mental and cardiovascular disorders, also being a cause of absenteeism and reduced productivity in companies (4, 5). An increase in the risk of injuries and illnesses at work has been associated with fatigue, stress, haste, distraction, emergency situations, excessive noise, complex procedures and anger, among other factors (6). A large part of these factors decreases attention from work in progress and may affect SA. This situation can be improved by training workers' attention and awareness during daily activities, since it would encourage a return to focus on the task at hand and the possible risks associated with it. Participants in a mindfulness training group significantly improved the aspect of attention known as *orienting* when compared to participants in a control group (7). In a review of brain regions and mindfulness training, the authors proposed the involvement of the anterior cingulate and striatum (attention control), prefrontal and limbic regions and striatum (emotional regulation), insula, medial prefrontal cortex and posterior cingulate cortex and precuneus (self-awareness) (8). In other words, mindfulness training presents repercussions not only in cognitive, but also in emotional control, and can be one of the factors which improves SA.

In the health care area, studies conducted with nursing teams suggest that mindfulness can be an effective and inexpensive way to reduce symptoms of anxiety, depression, psychological distress and burnout, improve well-being, increase quality of life and a provide a higher level of satisfaction with life (9–11).

SA is important for the safety of patient and health care team with improved clinical outcomes. The environment is complex and dynamic especially when high technology is involved, and complex human interactions change from moment to moment. Human factors are core in SA, therefore any team member should challenge another without fear. Mutual care demands that the team fell free to speak up if they notice anything which may compromise the quality of care or safety of team members (3).

On 25th May 2020, as a result of the COVID-19 pandemic, there were 5,370,375 confirmed cases in 216 countries and 344,454 confirmed deaths. Consequently, health care professionals are facing the most challenging situation in this century (12). In a meta-analysis about the mental health of health care workers (HCW), anxiety presented a prevalence of 23.2%, insomnia 38.9% and depression 22.8%. Female HCW and nurses showed higher rates of affective symptoms compared to male and medical staff. Training SA abilities became vital to ensure the safety and quality of care of HCW.

In 2019, before any sign of COVID-19 pandemic, an intervention to increase SA and mutual care (Focus con Consciousness—FoCo) was developed and tested in two units, an Emergency Care Unit and a Residential Facility for the Elderly in Sao Paulo, Brazil. As far as we know, after a search in PubMed, there were no other studies with similar interventions for health care professionals evaluated before and during an epidemic or pandemic. We hypothesized that FoCo would increase mindfulness, self-compassion, positive affect, sleep quality, and reduce stress perception, negative affect, and symptoms of mental diseases.

The objective of this study was to evaluate the effects of a training to increase situational awareness and mutual care designed for HCW in their working hours. We also investigated the perception of the FoCo training for the COVID-19 pandemic moment, in May 2020, almost 6 months after we finished the data collection at the Emergency Care Unit, which became a COVID-19 treatment reference for the care of a population depending on the public health system, in Sao Paulo, Brazil.

MATERIALS AND METHODS

Participants

Health care professionals (nurses, nursing technicians, physical therapists and caregivers of the elderly) of both genders, ages from 18 to 60 years old, working in two units, 41 from an Emergency Care Unit (ECU) and 29 from a Residential Facility for the Elderly (RE), participated in the study. All 74 professionals from the ECU and RE working during daytime where invited to participate in the study (**Figure 1**).

Inclusion criteria: being available to participate in the training and carry out evaluations before and after it.

Exclusion criteria: being away or on vacation in the research project period, or under psychiatric treatment.

This study is registered in clinicaltrials.gov NCT04362397 and has the Ethical Committee approval number 14788419.1.0000.0071.

Questionnaire and scales

a) Socio-demographic and clinical data: data that characterize the participants in the socioeconomic, educational, mental and physical health status.
b) Mindful Awareness Attention Scale (MAAS): Using scales from 1 to 6, the individual classifies how he/she experiences everyday situations, answering 15 questions about their level of attention or awareness (13).
c) Self-Compassion Scale (SCS). This is a 26-item scale that measures how someone typically acts toward themselves in difficult times. The subject has to choose from 1 to 6 points on a Likert scale (14).
d) Positive and Negative Affect Scale (PANAS): scale composed of a list of 20 affects (10 positive and 10 negative) in which the participants respond on five-point Likert scales (15).
e) Self-Report Questionnaire (SQR-20): An inventory for the detection of psychiatric symptoms with 20 questions about mental health (16).
f) Perceived stress scale (PSS) This scale measures the degree to which individuals perceive situations as stressful. The items were designed to assess how unpredictable, uncontrollable, and overburdened the people evaluated consider their lives. PSS is a general scale and can be used in different age groups, as it does not contain specific contextual issues. It is composed of 10 items related to sensations (17).
g) Pittsburgh Sleep Quality Index (PSQI): this scale with 19 questions assesses the sleep quality of the interviewee in the last 30 days, through objective questions (18).

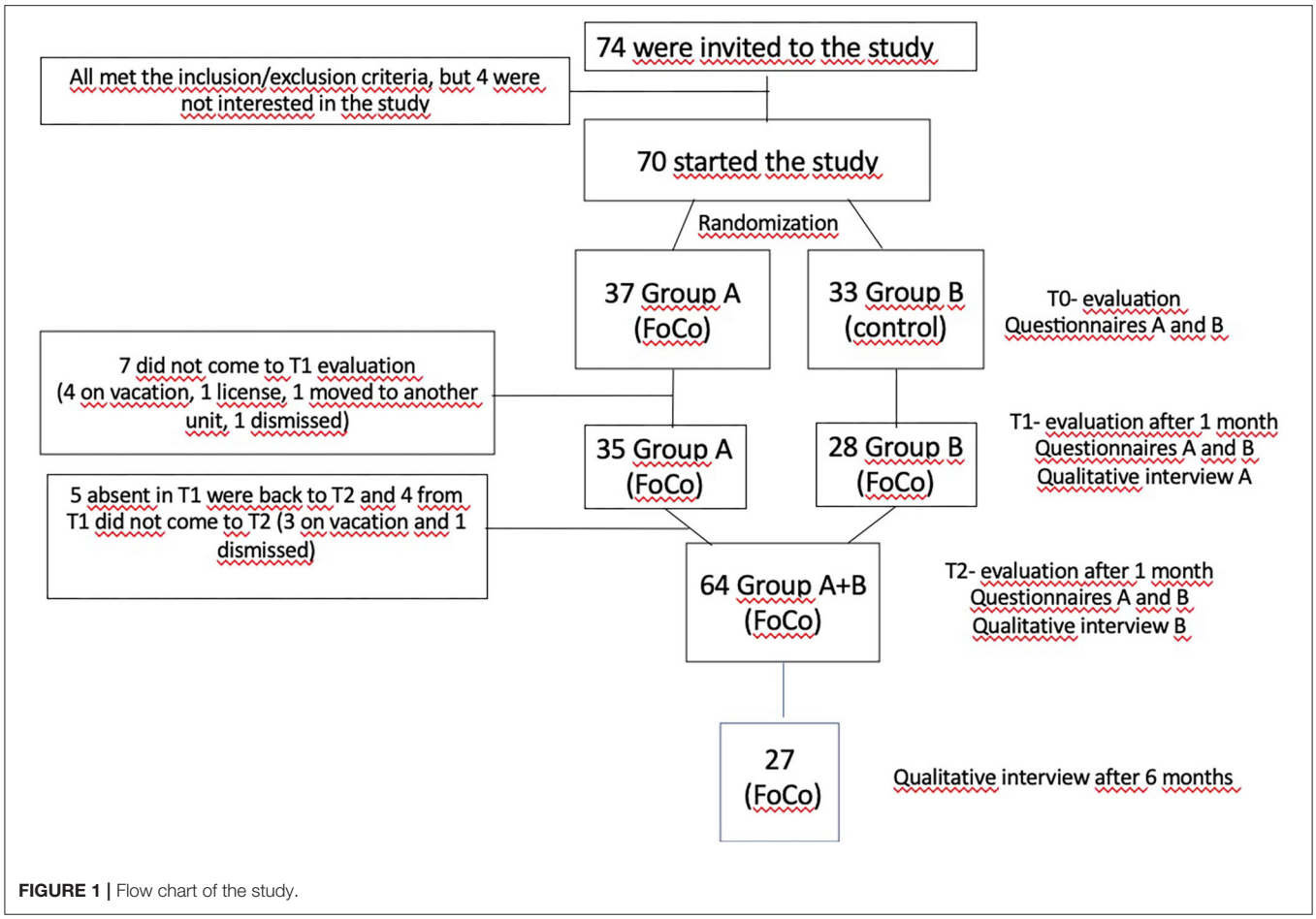


FIGURE 1 | Flow chart of the study.

Procedure

In T0, 74 participants were invited to the study and 70 agree to participate. The professionals were randomized in groups A and B in the second semester of 2019. From T0 to T1, 7 participants did not come to T1 evaluation (four on vacation, one license, one moved to another unit, one dismissed); five participants absent in T1 were back to T2 and four from T1 did not come to T2 (three on vacation and one dismissed) (more details in **Figure 1**–flow chart).

The researcher responsible for the statistical analysis randomized the participants inside each professional category (i.e., nurses, nursing technicians, physical therapists and caregivers of the elderly) generating a list of random numbers in excel and were blind to the intervention and control groups. Group A received training in the FoCo program and group B comprised a waiting list group. After a month, group B received the training and group A was encouraged to continue the intervention. Participants were assessed before intervention and 1 month thereafter therefore, it was not possible to blind participants to the groups. A follow-up was scheduled during the COVID-19 pandemic to evaluate its effects.

During all the study the safety department of the hospital were monitoring the participants to investigate possible harms or adverse effects.

FoCo Intervention

Initially the leaders of the health care departments attended a 1-h training and started to practice the intervention. The health care professionals, under the guidance of their leaders, were invited to participate in the study. They were categorized according to their profession and randomized to group A or B within their category. After signing the informed consent and filling the questionnaires, group A received the training, which lasted only 10–15 min.

The content of the training is based on the three pillars of FoCo:

- Becoming Aware (BA): everyday, before starting the routine, the participants in small groups closed their eyes and payed attention to their breathing; performed a relaxation exercise; remembered the main tasks of the day, that is, to be gentle with themselves and others; to speak clearly to the colleagues and patients, and to cultivate the inner and outer well-being. Additionally, they could practice Becoming Aware at any time of the day, including at home with their families.
- License to Care (LC): if the participant noticed that a colleague had forgotten to put on any equipment of personal protection, or perform an important procedure, he or she was to advise immediately; if the participant met someone during the

TABLE 1 | Comparison between groups at baseline.

	Group A ($n = 37$)	Group B ($n = 33$)	Sig.
Age Mean (sd)	33.30 (8.08)	35.94 (9.19)	0.205[t]
Gender *n* (%)			
Male	9 (24.32%)	4 (12.12%)	0.190[c]
Female	28 (75.68%)	29 (87.88%)	
Years of Schooling *n* (%) <8	1 (2.70%)	1 (3.03%)	0.739[c]
9–11	14 (37.84%)	10 (30.30%)	
12–16	11 (29.73%)	12 (36.36%)	
17 or more	11 (29.73%)	10 (30.30%)	
Ethnicity *n* (%)			
Caucasian	13 (35.14%)	10 (30.30%)	0.123[c]
African-Brazilian	8 (21.62%)	2 (6.06%)	
Brown	15 (40.54%)	21 (63.34%)	
Asian	1 (2.70%)	0 (0%)	
Marital Status *n* (%)			
Single	11 (29.73%)	14 (42.42%)	0.098[c]
Married	16 (43.24%)	9 (27.27%)	
Lives together	9 (24.32%)	4 (12.12%)	
Divorced	1 (2.70%)	4 (12.12%)	
Widowed	0 (0%)	2 (6.06%)	
Religion *n* (%)			
Atheist	1 (2.70%)	0 (0%)	0.558[c]
Without religion	4 (10.81%)	7 (21.21%)	
Catholic	15 (40.54%)	11 (33.33%)	
Protestant	2 (5.40%)	0 (0%)	
Evangelic	12 (32.43%)	12 (36.36%)	
Spiritualist	1 (2.70%)	2 (6.06%)	
Other	2 (5.40%)	1 (3.03%)	
Monthly income (minimum wages) *n* (%)			
<1	1 (2.70%)	3 (9.09%)	0.426[c]
1–3	14 (37.84%)	10 (30.30%)	
3–5	12 (32.43%)	10 (30.30%)	
5–8	10 (27.03%)	8 (24.24%)	
8 or more	0 (0%)	2 (6.06%)	
SRQ	3.41 (3.05)	2.85 (2.81)	0.431[t]
SCS	88.65 (17.44)	93.18 (11.56)	0.210[t]
MAAS	70.97 (9.73)	72.39 (10.08)	0.551[t]
PSS	15.97 (6.42)	16.68 (5.77)	0.638[t]
PANASP	33.32 (6.03)	34.97 (5.88)	0.253[t]
PANASN	15.24 (3.96)	15.36 (4.68)	0.908[t]
PSQI	6.16 (3.40)	6.18 (3.62)	0.981[t]

[t]*Student t test;* [c]*Chi-squared test. SRQ, Self-Report Questionnaire; SCS, Self-Compassion Scale; MAAS, Mindful Attention Awareness Scale; PSS, Perceived Stress Scale; PANAS-P, Positive and Negative Affect Schedule—Positive Affects; PANAS-N, Positive and Negative Affect Schedule—Negative Affects; PSQI,Pittsburgh Sleep Quality Index.*

routine who did not look well, whether a patient or a colleague, he or she was expected to ask if the person needed any help.

- Observation and Behavioral Approach (OBA): an observer who is trained in OBA would approach a professional and tell him or her if they agreed to be observed during their routine tasks. If they agreed, the observer would stay there for a while and after that would give constructive feedback about their behavior, especially focused in safety. This approach was already implemented in the institution before the entire FoCo intervention.

Statistical Analysis

The data collected were analyzed using the JASP program. Categorical data were expressed as percentage and the frequency distributions between groups were analyzed using Chi-square tests. For numerical data, analyses were carried out regarding the distribution of data, whereas for data with parametric distribution, the *t*-test was used, and for those with non-parametric distribution, the Wilcoxon test. Subsequently, Analysis of Variance for repeated measures were used to evaluate the effects of the intervention over time between groups. Pearson correlation and Linear Regression analyses were also performed.

Qualitative Analysis

Thirteen participants of different professional categories (nurses, nursing technicians, physical therapists, and caregivers of the elderly) from the ECU and RE, representative of the sample recruited to the study, with a good narrative, were invited for interviews. Participants of both groups, A and B, were included in these interviews 1 month after receiving the FoCo training. For the 1 month interview, at least one representative of each professional category was selected, those who had a good narrative and communication skills to enrich the qualitative assessment. The interviews ended when finding theoretical data saturation by through the identification of the absence of new elements in each thematic group.

The interviews were recorded, transcribed and submitted to content analysis as described by Bardin (19). The most emblematic speeches of each category were presented in the results. The full content analysis report is presented as **Supplementary Materials 1**, **2**.

Guiding Questions

- What is your perception of the training in Becoming Aware?
- What is your perception of the License to Care? How do you feel about undergoing Behavioral Observation and Approach training?
- How do you perceive your attention and awareness regarding your work activities in the last month?

For the 6 months interviews, during the COVID-19 pandemics all the 27 professionals who were at the Emergency Care Unit on the day of the interviewer's visit participated in the evaluation. We would like to have included the questionnaires and scales in this evaluation, however, due to the pandemic, the ICU professionals had a short time to answer questions and were dressed with all personal protective equipment's, therefore the interviewer were allowed only to record the interviews.

Questions asked to the Emergency Care Unit health care professionals during COVID-19 (almost 6 months after we finished the FoCo study in 2019):

TABLE 2 | Comparison between baseline and 1 month.

	Group A ($n = 35$)		Group B ($n = 28$)		Time effect	Group effect	Time*Group effect
	Baseline	1 month	Baseline	1 month			
	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)	Mean (s.d.)			
SRQ	3.31 (3.11)	2.46 (2.78)	3.04 (2.99)	2.61 (3.41)	0.031*	0.929	0.466
SCS	88.60 (15.61)	95.46 (16.43)	93.89 (11.01)	96.79 (13.65)	0.007**	0.313	0.257
MAAS	71.09 (9.99)	72.03 (11.09)	72.18 (10.35)	71.71 (10.95)	0.803	0.877	0.464
PSS	16.09 (6.48)	13.80 (5.87)	16.68 (5.61)	14.93 (5.65)	0.008**	0.515	0.718
PANAS-P	33.60 (5.99)	34.23 (6.81)	34.82 (6.21)	35.22 (6.68)	0.438	0.467	0.868
PANAS-N	15.26 (4.01)	13.69 (4.09)	15.30 (3.94)	15.48 (6.33)	0.260	0.369	0.155
PSQI	6.03 (3.43)	5.71 (3.15)	6.29 (3.67)	6.25 (3.49)	0.584	0.625	0.663

*$p < 0.05$; **$p < 0.01$. SRQ, Self-Report Questionnaire; SCS, Self-Compassion Scale; MAAS, Mindful Attention Awareness Scale; PSS, Perceived Stress Scale; PANAS-P, Positive and Negative Affect Schedule—Positive Affects; PANAS-N, Positive and Negative Affect Schedule—Negative Affects; PSQI, Pittsburgh Sleep Quality Index.*

- What is your perception of FoCo training, in which you participated, regarding this moment of COVID-19?
- What training did you use during the pandemic? And in what situations?

RESULTS

There were no differences between ECU and RE in the questionnaires at baseline them, therefore we decided to perform the statistical analysis grouping the units. Groups A and B there showed no differences in gender, age, years of education, socioeconomic status and mental health, neither regarding psychiatric symptoms, self-compassion, mindfulness, perceived stress, positive and negative affect and sleep quality at baseline (**Table 1**). The safety department of the hospital which was monitoring the participants during all months of the study did not detect any harm or adverse effect due to the FoCo intervention.

In the comparison of both groups before and after 1 month of intervention in group A, both groups improved concerning psychiatric symptoms, self-compassion, and perceived stress (**Table 2**). After 1-month evaluation, group B also received the intervention. Since both groups improved from baseline to 1 month similarly, we decided to cluster A and B in one group in the comparison of the training from baseline to 2 months, when we found improvements in perceived stress and quality of sleep (**Table 3**).

As PSS showed significant differences from baseline to 1 month and 2 months, we decided to explore a correlation analysis. PSS is correlated with all variables at baseline ($p < 0.05$), except PANASP. Therefore, to evaluate the effect of MAAS, SCS, SRQ, PANAS-N, and PSQI on PSS, multiple linear regression models were built using the stepwise method. The linear regression model was significant for the variables MAAS, SRQ and PANAS-N ($p < 0.001$), with the SRQ ($\beta = 0.676$; $p < 0.001$). PANAS-N ($\beta = 0.560$; $p = 0.007$) proved to be positive predictors for PSS, while MAAS ($\beta = -0.124$; $p = 0.033$) was a negative predictor for PSS (**Table 4**).

TABLE 3 | Comparison between baseline and 2 months.

	All participants ($n = 64$)		Time effect
	Baseline	2 months	
	Mean (s.d.)	Mean (s.d.)	
SRQ	2.83 (2.75)	2.43 (3.09)	0.231
SCS	90.25 (14.63)	93.41 (16.94)	0.095
MAAS	72.31 (9.91)	73.47 (12.24)	0.246
PSS	16.13 (6.14)	13.92 (6.69)	0.004**
PANAS-P	34.25 (5.90)	34.14 (7.67)	0.900
PANAS-N	15.31 (4.40)	15.23 (6.40)	0.909
PSQI	5.83 (3.23)	5.02 (3.20)	0.048*

*$p < 0.05$; **$p < 0.01$. SRQ, Self-Report Questionnaire; SCS, Self-Compassion Scale; MAAS, Mindful Attention Awareness Scale; PSS, Perceived Stress Scale; PANAS-P, Positive and Negative Affect Schedule—Positive Affects; PANAS-N, Positive and Negative Affect Schedule—Negative Affects; PSQI, Pittsburgh Sleep Quality Index.*

Qualitative analysis revealed the following categories after 1 month of training FoCo (detailed reports are in **Supplementary Material 1**). HCW of groups A and B participated in the interviews:

1) **Becoming Aware**

a) **Greater Self-Awareness**

- Ah! I think this perception that we sometimes do things automatically (RIAE01)
- ... made us aware, because sometimes you are so stressed, and you stop, you breathe, you think, you relax, you do the exercise, then you come back to yourself and you can continue (UPA37)
- It is sometimes you already come a little stressed from the street, I don't know, maybe because I was stuck in traffic. And then you arrive, you already find a patient already nervous. Then the patient's nervousness added to that stress, right?... it's time for you to stop, make that reflection and become aware... (UPA15)

TABLE 4 | Linear regression model for PSS as the dependent variable.

R^2	F (3,66)	p	Covariates	ß	SE	t	p
0.540	25.794	<0.001	PANAS-N	0.676	0.131	5.153	<0.001**
			SRQ	0.560	0.202	2.776	0.007**
			MAAS	−0.124	0.057	−2.175	0.033*

*R^2, 0.540; *p < 0.05; **p < 0.01. PSS, Perceived Stress Scale; SRQ, Self-Report Questionnaire; MAAS, Mindful Attention Awareness Scale; PANAS-N, Positive and Negative Affect Schedule—Negative Affects.*

b) **Situational Awareness**

b.1) **Greater attention to tasks**

- ... before doing the procedure, I already plan in my head what I have to do, and then at the time of execution I can do everything calmly, without that rush,... take a breath and go! (RIAE15)
- ... I think it increased my attention on tasks, I also tried to leave the phone in silent mode, to not even vibrate, because I realized that when it vibrated, I was distracted, so... when I am going to do some activity that I know I need more attention I... leave it silent. (RIAE01)
- ... now we start paying more attention, right, with the question of putting a medication, or a movement that you do wrong, it all can harm, so we start to pay more attention (UPA25)
- ... we are able to focus on exactly what we are doing there at the moment, what you have to think, what you think later, the important thing is that moment you are doing something (UPA25)

b.2) **Identification of risks and errors**

- ... sometimes you break that paradigm, everyone doing the same thing wrong, sometimes a simple thing,... why doesn't someone always do that part at this moment? (UPA37)
- sometimes we are on the run, right, the person doesn't look sometimes, forgets to put on a PPE, then you warn, calm down, let's put on the PPE first, let's wear the glasses, the gloves, so I always think about orientation and aiming... (UPA40)
- Especially in relation to the use of alcohol gel, before and after,... we are not doing it, these are small things that make a lot, a lot of difference, right? (UPA15)

b.3) **Decision making**

- so we didn't make a decision when feeling angry, we used it (the training) even on a daily basis. (UPA25)
- and helped me like that, in decision-making actually... In the stress of everyday life, even during patients screening, when something happened... before making a certain rash decision, I used this technique. (UPA35)

b.4) **Attitude**

- ... when you do it, you turn on this "key," and then you propose to yourself... become aware of what you are doing, of your actions... let's assume a moment of aggression, a moment of the patient's nervousness, you kind of prepare both to respond, and to embrace this patient, you know, embracing... it gets easier. (UPA08)
- Using the techniques, with the guidelines, I found that I can develop my work better,... you can calm down, have the correct behavior for that situation, so I thought it was very important, that it was... was good. (UPA35)

c) **Well-Being Doing "Becoming Aware"**

- ... we come back relaxed, do something good like that, you come back with another disposition, with spirit and it's being very good (RIAE48)
- ... I, I felt relaxed like this, I felt at peace, I felt like I don't know, it's invigorating (UPA37)
- I'm less stressed because of the awareness, less stressed. (UPA09)

2) **License to Care**

a) **Self-Care**

- why the patient always comes first and sometimes we put ourselves last too... so this awareness-raising course was for us to see ourselves, as a professional, as a person (RIAE19)
- try to be generous, with us I have an extremely difficult time with this... and then, be generous with myself,... wow, I needed this. (RIAE01)
- Sometimes you are not cool or sometimes, I don't know, or there is a patient... destabilized you and you went out of focus a little bit, go to the bathroom and breathe and come back more, you come back more relaxed, to give... that breath? That unburdened.... you get a little out of that focus so you can go to that "Becoming Aware," you come back lighter, you come back calmer. (UPA15)

b) **Caring For The Other**

- that we have to pay attention from day to day and have more, have attention, I think for the care, not only for us, but also for our patients. (RIAE48)
- This possibility of helping the colleague, right? Often the person is in a moment of stress, is going through some kind of problem and he can't even... and you have this freedom to get to him and… and guide, know if you're going through some kind of problem,... this really happened during the shift with a colleague... I believe it helped her a lot... (UPA35)

- The person is there learning, is nervous... and... you arrive and pass a security there to the colleague, right? Transmitting security there to him... and you can arrive and pass it on to your colleague safely... (UPA15)

c) **License to Care is Gratifying**

- ... I think that being able to help the patient in need, being able to do a little for them, I think this is very rewarding for us. (RIAE48)
- It was done, that was the feeling. Why, as much as the person doesn't want to talk, at least you're willing, and even if she doesn't want to talk at that moment, she knows she can come back and talk... and sometimes our colleague just needs one, a support, someone to hear what you want to say, that's good! (RIAE19)
- ahhhhh, it's gratifying right? You can help a colleague who is going through a certain type of problem, sometimes that person cannot see that she is going through this. (UPA35)

d) **Incomprehension about the Training License to Care**

- ... at no point during the training of the focus did I notice a freedom to do this with the people who were around me and there was also nothing specific for that. (RIAE01)
- License to care? (UPA-44)
- I think there could be more training in this... license to take care, maybe some way that we could be trained to do it … in a kind way with people, (RIAE01)

3) **Post-end Analysis of Training**

a) **A New Habit**

- I think it's really important to make a habit of it, to make it something more automatic to do every day. (RIAE01)
- Look, I have done it, sometimes with our manager here, and I have also done it sometimes at home (RIAE15)
- I used it on several days, right, when you get caught in the same routine, in the daily rush, then I caught myself, stopping, doing my 5 min there, breathing and becoming aware of the daily planning. (UPA40)

b) **Extension of the Practice to Other Places**

- at your home, with your friends, your family, … you arrive, you arrive a little more stressed, because it is not easy, right, the hospital environment is not easy, but then you arrive a little more stressed, then you don't wait, let me breathe, let me center, let me breathe, inhale (UPA37)
- ... I used it, both in my work environment, as it was proposed, and also before I get home I do it too. (UPA08)
- ... what I tried to pass on to them from what I learned, … although they are small eight and 12 (kids), they have a certain awareness, so the 12 1 day he said "I'll do it too."(RIAE12)

c) **Positive Evaluation of the Focus Project**

- I wanted to say that I liked it a lot, it's very good, whoever has the opportunity to do it, has to do it, because it helped me, and I'm sure it helped many colleagues who did it from the beginning, (UPA25)
- Ah! I found it super interesting, because that training gave us an awareness of how we get centralized, of how you get back to the axis, (UPA37)
- I believe that nothing is in vain, you know, that everything is to improve, it is if this was proposed to us, growth, you know, individual growth, of the group and finally, of the department. (UPA08)

Almost 6 months after receiving FoCo training, 27 participants of the study belonging to the Emergency Care Unit, which became a COVID-19 treatment reference, taking care of a population that depends on the public health system, were interviewed again, for us to investigate their perception of the FoCo training for the COVID-19 pandemic moment. They had to change their working schedule from daily 6 h (their original one) to 12-h shifts (1 day at work, 1 day off) when the pandemic started, and the unit was full of patients. During one of the shifts, which concentrated most of the participants of last year's study, we performed the interviews. One of the participants received COVID-19 treatment and presented post-traumatic stress disorder symptoms and was not able to answer the questions. Another one we had to exclude from the study because she reported that she had answered the questionnaires but had not received the training directly from the instructor. Therefore, we had 25 valid interviewees (detailed reports are in **Supplementary Material 2**). The following categories were identified:

1) **The Impact of Covid-19**

- I was leaving my house with tachycardia... arriving here sincerely with a pain in the belly, you know, just thinking that I was going to a place, … where everything was going to be COVID (UCL08)
- it's a lot of intubation, the whole routine has changed (UCL24)
- there are many moments when we feel exhausted... there are many moments that we don't seem to be able to… that will not work… we think about giving up …

because it is not easy! (UCL16)

- we are afraid to take the coronavirus to our family (UCL36)

2) **Importance of FoCo at this Time of COVID-19**

a) **To myself**

It seems that they were predicting something (the pandemic) … giving the FoCo training... we even comment about it in all shifts... how important it is to be maintaining the emotional psychological balance, So I see... the FoCo training is extremely important at this moment (UCL29)

- At the time it was done (the training) we didn't really give it much importance, even though we thought it would be important. Today we see here that it really felt right for us to do it (UCL32)

- I think it is extremely important due to the stress that we are going through in our daily routine. (UCL39)

I think it was important just as we are treating a patient with COVID, it affects us a lot, our psychological, I think it was important for us to work better on this side of us, from the nervousness of the fear of being contaminated, we have to work even with emotions (UCL34)

Wow !!! in my point of view, especially at this moment, it is being well-used, I believe not only for me, but a lot for the other colleagues who are using this method. . . (UCL16)

b) **To the work**

- At this moment when the demand is greater, we are managing to concentrate more on what we are doing, on the patients that are reaching . . . the most critical patients, so we are managing to have the perception and this focus on the patient (UCL20)
- . . . and we were going to receive these patients... and it's been very useful for me, it's helping a lot in my day to day, in my work! (UCL08)
- It is what I am managing to do: to take a step backwards in the face of the chaos that sets at times. So, I have to leave the scene and try to visualize what is happening from the outside in order to enter and have a different attitude. (UCL27)
- . . . try to stay calm, pay attention to what I'm doing, the procedures (UCL34)

3) **Becoming Aware to Recover Balance**

- . . . because we go through several moments during the shift . . . when you really have to stop, go somewhere, take a breath and get balanced and come back to the fight again. (UCL29)

I do it several times a day. . . there is some extreme moment when I need to stop 5 min, breathe, drink water, think about what is important now, because there are many things happening at the same time and we end up losing track. (UCL30)

- . . . before dealing with the most critical patients intubated. . . stopping, breathing, trying to keep calm in order to continue (UCL39)
- Ah sometimes the stress... emotional stress, right? Sometimes I get a little more reclusive, I try to leave, I've done this a few times, I leave the place, it's quieter, I sit for about 5 min waiting a little bit, and then I can put the ideas in place, then I'll be back again (UCL10)

Right now it's being important because the unit is very full there... when we stop, take a deep breath, I at least understand why I am here, what is my importance at this moment, I feel I feel calmer to be able to perform my duties.

(UCL36)

So at this moment, especially at this moment, it's being really cool for us to use... we need to stop to repeat breathing and come back, right at a point that we can start again, but more peaceful..., that's where you stop, breathe, think, get a grip of yourself and come back! That is exactly what I have been doing many times. I have needed to make the "Becoming Aware."(UCL16)

Sometimes we faced situations, then you remember "Becoming Aware" and you take a step away, breathe, . . . wait, be calm (UCL07).

4) **Integrating Self-Care With the Care for Others**

- . . . because I often perceive a sad colleague, crying, crestfallen and then I usually try to get him, get him out of the sector a bit, go up to the kitchen to have water, have coffee... so I think that in addition to taking care of myself I'm looking at the next one too (UCL29)

I particularly wear all the PPE that is available and I try to wear it in the best possible way because apart from the patients I care for here, I have a family that I have to care for at home. . . we have an . . . openness among all colleagues to be able to call attention, showing what is wrong . . . we talk regardless of the level of education, no matter if you are a technician. we always have an opening with everyone. (UCL32)

I wear PPE all the time, I went into the shock room or in the observation room I already have glasses on, my mask I don't take off even to drink water, and gloves are on all the time . . . yes if I see a colleague at risk of infection without wearing glasses or a mask I always give an alert (UCL09).

- My perception was that my care increased, . . . both with me and with the patient to whom I provide this care (UCL14)
- . . . after we took the course so we can pay more attention to help colleagues. . . raise awareness of colleagues . . . we see something that may cause some risk and raising awareness to try to keep calm. . . (UCL34)
- I think the care of the team in general is three times more than before, right, because of the fear of contamination, of contaminating a colleague, of contaminating oneself, of not taking it home, I think it was having an impact... you know, it ends up generating self-care, you have to be careful with others, whoever is there with you then automatically because of everything we have been through in this training, in the past, I think it fits well (this moment) (UCL10)
- we are always alerting the next colleague, right... what I don't want for myself I don't want him to go through, right? (UCL43)
- We know that we have to take care of the other, but before taking care of the other??? (UCL24)

5) **Someone Taking Care of Myself**

The "License to Care" . . . I find it extremely important because I often feel someone is taking care of me (UCL29)

Yes, there was even a day when I was not emotionally well, you know, and one of the people noticed, he gave me a helping hand, so he called me, we talked a lot, I managed to keep my shift very calm, you know... it had an effect. (UCL10)

yes, in fact I ended up receiving this guidance from my colleagues, because I ended up being contaminated with COVID-19, so I ended up receiving more than passing. (UCL18)

6) **Caring for Others**

I observe the colleagues and whenever possible I do it: to remind the colleague to do it (the practice) (UCL08)

we are watching each other a lot … helping the other … giving a nudge at the other, like… come here colleague let's … stop, … sometimes the colleague in that rush is stressed and you get there, "wait a minute, stay a little bit here… I go there to help the colleague to do the work … so he can take a breath … we are helping each other a lot! (UCL04)

I have used the care I do the OAC (Observation and Behavioral Approach) I have applied with colleagues. (UCL19)

it is at the moment when I saw a colleague, right, having a difficulty, I called him, asked him if he needed anything, if everything was fine with him, and I had that moment of conversation. I believe it improved the situation he was experiencing at the time! (UCL17)

we end up looking more at the team, right? I'll look more closely at people's behavior, … realizing who is not well, I call to talk,... but we end up helping each other more (UCL07)

7) **Difficulty in Applying "Becoming Aware," in Spite of Realizing the Importance of It**

- I think it would be excellent if we were able to actually apply it because … it is very busy due to the demand … we do not have time to apply the training, but I remember that when I did it, it was very relaxing, very wonderful (UCL19)
- …it is during working hours I haven't been able to do it, but before leaving home I always stop for a while, I think, I try to breathe, calm down in order to have a more peaceful journey (UCL34)
- … in the beginning I practiced a lot, it was really good, it works, but now at this moment it's so busy, that there's no time for us to stop a little bit, …now there's no time for even drinking water, I practiced a lot but now it's all over, but it was very good. (UCL15)

8) **FoCo for Life**

- I would say that I even became a better person, because from the moment you take things more clearly, more calmly, you become a better person, so it has helped a lot, not only at work, in life. (UCL24)
- My perception is that it helps a lot in our life, I even put it here in my room I always do it in the morning before leaving home (UCL07)

DISCUSSION

The aim of this study was to evaluate the effects of a short training to increase situational awareness and mutual care designed for HCW. We also investigated the perception of this training for the COVID-19 pandemic moment, in May 2020, almost 6 months after we finished the data collection at the Emergency Care Unit which became a COVID-19 treatment reference.

Before and after 1 month, both groups had improved in psychiatric symptoms, perceived stress and self-compassion (**Table 2**). Group A received the intervention and practiced 5 days a week with their leaders during this period of time. Group B participants belonged to the same health care units and despite having not received the FoCo training, they worked under the same leadership (who received the training before the research intervention started), with the colleagues of group A and possibly having some kind of interaction about the training with them. We instructed group A to avoid sharing the FoCo intervention with group B, however it could have happened. It may explain why group B also improved in their symptoms. Although we expected differences between groups, the literature has shown the impact of leadership on the work environment (20). Leadership can affect the workforce as well as the delivery of healthcare. In an article about nursing leaders, they are identified as playing an important role in retention of nurses, producing quality outcomes for staff nurses and patients, therefore affecting the whole health care environment (21). In a review about social and behavioral science to give support to COVID response, the authors mention the importance of leaders as representative members of the team (22). In FoCo, leaders practice with the team and this can be one of the explanations for its effectiveness. Improved psychiatric symptoms, perceived stress and self-compassion are also in line with the qualitative analysis, in which participants reported increased well-being doing "Becoming Aware" (feeling calm, relaxed, less stressed), greater self-awareness (increased perception and ability to deal with nervousness, tension) and self-care (doing well to take care of others, being generous to themselves) and an increase in risk perception.

After 2 months (groups A and B clustered in one), the evaluation results indicated improvements in perceived stress and quality of sleep (**Table 3**). Stress reduction seems to be the main response to the intervention, lasting from 1 to 2 months after baseline evaluation. In the linear regression model, SRQ and PANAS-N proved to be positive predictors for PSS, and MAAS was a negative predictor for PSS. MAAS is the scale to measure mindfulness. Mindfulness is a component of SA and classically related to stress reduction and associated variables such as cardiovascular improvement and sleep (23–25). It is also an important factor for mental health, and moderates the effects of perceived stress on depression, emotional exhaustion, anxiety, positive affect and negative affect (26). On the other hand, there were no differences in the scores of mindfulness along the study. The absence of differences in MAAS scores could be explained by the high scores in this scale of the HCW who participated in the study. Before the intervention, the mean score was 71.6 $\pm$ 9.85. In the validation study of MAAS in a Brazilian sample, the mean was 64.44 $\pm$ 7.73 in a group of meditators and 61.77 $\pm$ 10.48 in a sample of non-meditators (27). In another study evaluating a group of participants who have been practicing meditation for more than 1 year, their mean before a meditation retreat was 55.7 $\pm$ 11.08 and after that 63.6

± 8.27 (28). An explanation for the high scores of mindfulness of this sample is the high level of training in this ability by health care professionals. The ECU and the RE are administered by the 38o. best hospital in the world and receive high quality training to deal with the daily activities (29). Despite MAAS scores having not changed through the study, qualitative analysis suggested increased perception of self-awareness, attention to the tasks, and decision making. In this analysis, just after 1 month of FoCo training, the categories related to awareness were more emphasized, which means were more frequently mentioned by the interviewees.

Increasing SA and mutual care (the aims of FoCo) allows participants to feel supported by colleagues, as we can see in qualitative analysis in the categories "license to care is gratifying," "caring for others," "identification of risks and errors" and "well-being doing Becoming Aware," "greater self-awareness" and reduced stress symptoms.

Some participants reported difficulty to implement "License to Care," not feeling comfortable to talk to the colleagues to "correct" their behavior or ask whether they needed help. This is a feedback that we gave to the units involved in the project and the others where FoCo was implemented to reinforce the importance of "License to Care" training. Risk perception workshops in addition to Leaders talks and BA reinforcement sections were part of the "License to Care" augmentation process.

COVID-19 pandemic is really challenging for the clinical staff. In a study comparing administrative and clinical staff, fear, anxiety and depression were significantly increased in the latter. Front line medical staff, including working in the critical departments such as respiratory, emergency, infectious disease, and ICU, showed higher scores on the scale of fear, anxiety and depression (30). The interviews for the data collection, performed at the ECU (a reference in treatment of COVID-19) on a day when it was full of patients, showed the importance of the training before the pandemic and its incorporation into the routine.

It is interesting that all participants from the 25 valid interviews have been using FoCo training during the pandemic, some of them doing part of it such as "License to Care," and many of them keeping it a regular practice. Participants recognized the importance of this previous training last year for enabling them to deal with the stress of the pandemic, giving them the capacity to calm down when necessary, utilizing "Becoming Aware" and "License to Care." The initial difficulty reported to apply "License to Care" last year, that is, taking care of the colleagues, especially related to equipment of personal protection use, and being able to offer support when someone was probably not feeling well, was not present during the pandemic. The team was really committed to taking care of themselves and the group. The category "Integrating self-care and the care of other" appeared during the pandemic, and the reports emphasized the mutual care that they were exercising at the ECU. Other changes reported were the reduction of hierarchal gradients, so that everyone at the HCW would feel comfortable to challenge each other without fear of consequences; mutual respect within the members, assuring the mutual care and everybody's right to speak up, if they noticed anything wrong or inefficient. It prevented turning a blind eye, improved patient and team safety (3). Basically, they were grateful for having received the training last year and understood that it promoted the culture of mutual care and increased situational awareness.

There are other hospitals implementing mental health protection and well-being promotion interventions for HCW (31). However, to the best of our knowledge, this is the first study that evaluates the effects of an intervention and its effects during the present pandemic. This study has limitations such as the control group working in the same environment of the intervention group and having leaders who were already trained in the intervention. A future study should guarantee that the control group work in another unit with similar characteristics. Nevertheless, the randomized control study with additional qualitative analysis brought a wealth of information, and we recommend keeping this approach in further projects.

Considering this combined approach, we conclude that FoCo training can be an important instrument for health care professionals both in times of pandemic and "normal times," to increase situational awareness, the culture of mutual care and decrease the possibility of occupational injuries and illnesses.

DATA AVAILABILITY STATEMENT

The original contributions generated for this study are included in the article/**Supplementary Materials**, further inquiries can be directed to the corresponding author/s.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Ethics committee of the Hospital Israelita Albert Einstein. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

EK: designed the study, analyzed the data, wrote the manuscript, and revised the manuscript. SL: analyzed the data and revised the manuscript. MP, RC, and GF: collected data and revised the manuscript. PC: designed the study and revised the manuscript. EL: analyzed qualitative data and revised the manuscript. All authors contributed to the article and approved the submitted version.

FUNDING

We would like to thank the Safety Department of Hospital Israelita Albert Einstein and Instituto

Israelita de Ensino e Pesquisa Albert Einstein for the financial support.

ACKNOWLEDGMENTS

We thank Fabiana Cristina Costa de Oliveira, Israel Szajnbok, Joao Luiz Miraglia, Isabel Maria Silva de Oliveira, Nivia Pires, Carla Patricia Grossi Palacio Alves, Eduardo Santos Conceicao, Edison Daniel Junior e Waleria de Sá, Bruna Rienzo e Priscila Lopes for their support in this research.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyt.2020.570786/full#supplementary-material

REFERENCES

1. Schulz CM, Endsley MR, Kochs EF, Gelb AW, Wagner KJ. Situation awareness in anesthesia: concept and research. *Anesthesiology.* (2013) 118:729–42. doi: 10.1097/ALN.0b013e318280a40f
2. Jones DG, Endsley MR. Sources of situation awareness errors in aviation. *Aviat Space Environ Med.* (1996) 67:507–512.
3. Green B, Parry D, Oeppen RS, Plint S, Dale T, Brennan PA. Situational awareness - what it means for clinicians, its recognition and importance in patient safety. *Oral Dis.* (2017) 23:721–5. doi: 10.1111/odi.12547
4. Bhui KS, Dinos S, Stansfeld SA, White PD. A synthesis of the evidence for managing stress at work: a review of the reviews reporting on anxiety, depression, and absenteeism. *J Environ Public Health.* (2012) 2012:515874. doi: 10.1155/2012/515874
5. Henderson C, Williams P, Little K, Thornicroft G. Mental health problems in the workplace: changes in employers' knowledge, attitudes and practices in England 2006-2010. *Br J Psychiatry Suppl.* (2013) 55:s70–6. doi: 10.1192/bjp.bp.112.112938
6. Valent F, Mariuz M, Liva G, Bellomo F, De Corti D, Degan S, et al. A case-crossover study of sleep, fatigue, and other transient exposures at workplace and the risk of non-fatal occupational injuries among the employees of an Italian academic hospital. *Int J Occup Med Environ Health.* (2016) 29:1001–9. doi: 10.13075/ijomeh.1896.00695
7. Jha AP, Krompinger J, Baime MJ. Mindfulness training modifies subsystems of attention. *Cogn Affect Behav Neurosci.* (2007) 7:109–19. doi: 10.3758/CABN.7.2.109
8. Tang Y-Y, Hölzel BK, Posner MI. The neuroscience of mindfulness meditation. *Nat Rev Neurosci.* (2015) 16:213–25. doi: 10.1038/nrn3916
9. Spinelli C, Wisener M, Khoury B. Mindfulness training for healthcare professionals and trainees: A meta-analysis of randomized controlled trials. *J Psychosom Res.* (2019) 120:29–38. doi: 10.1016/j.jpsychores.2019.03.003
10. Cohen-Katz J, Wiley SD, Capuano T, Baker DM, Shapiro S. The effects of mindfulness-based stress reduction on nurse stress and burnout: a quantitative and qualitative study. *Holist Nurs Pract.* (2004) 18:302–8. doi: 10.1097/00004650-200411000-00006
11. Dos Santos TM, Kozasa EH, Carmagnani IS, Tanaka LH, Lacerda SS, Nogueira-Martins LA. Positive effects of a stress reduction program based on mindfulness meditation in brazilian nursing professionals: Qualitative and quantitative evaluation. *Explor J Sci Heal.* (2016) 12:90–9. doi: 10.1016/j.explore.2015.12.005
12. World Health Organization. Coronavirus Disease (Covid-19) Outbreak Situation (2020). Available online at: https://www.who.int/emergencies/diseases/novel-coronavirus-2019 (accessed May 25, 2020).
13. Brown KW, Ryan RM. The benefits of being present: mindfulness and its role in psychological well-being. *J Pers Soc Psychol.* (2003) 84:822–48. doi: 10.1037/0022-3514.84.4.822
14. Neff KD. The development and validation of a scale to measure self-compassion. *Self Identity.* (2003) 2:223–50. doi: 10.1080/15298860309027
15. Watson D, Clark LA, Tellegen A. Development and validation of brief measures of positive and negative affect: the PANAS scales. *J Pers Soc Psychol.* (1988) 54:1063. doi: 10.1037/0022-3514.54.6.1063
16. Mari JDJ, Williams P. A comparison of the validity of two psychiatric screening questionnaires (GHQ-12 and SRQ-20) in Brazil, using Relative Operating Characteristic (ROC) analysis. *Psychol Med.* (1985) 15:651–9. doi: 10.1017/S0033291700031500
17. Cohen S, Kamarck T, Mermelstein R. A global measure of perceived stress. *J Health Soc Behav.* (1983) 24:385–396. doi: 10.2307/2136404
18. Buysse DJ, Reynolds CF, Monk TH, Berman SR, Kupfer DJ. The Pittsburgh Sleep Quality Index: a new instrument for psychiatric practice and research. *Psychiatry Res.* (1989) 28:193–213. doi: 10.1016/0165-1781(89)90047-4
19. Bardin L. *L'analyse de contenu [Content analysis]. Paris: Fr PUF* (1977).
20. Balsanelli AP, Cunha ICKO. The work environment and leadership in nursing: an integrative review. *Rev da Esc Enferm da USP.* (2014) 48:938–43. doi: 10.1590/S0080-6234201400005000022
21. Shirey MR. Authentic leaders creating healthy work environments for nursing practice. *Am J Crit Care.* (2006) 15:256–67. doi: 10.4037/ajcc2006.15.3.256
22. Bavel JJ Van, Baicker K, Boggio PS, Capraro V, Cichocka A, Cikara M, et al. Using social and behavioural science to support COVID-19 pandemic response. *Nat Hum Behav.* (2020) 4:460–71. doi: 10.1038/s41562-020-0884-z
23. Intarakamhang U, Macaskill A, Prasittichok P. Mindfulness interventions reduce blood pressure in patients with non-communicable diseases: a systematic review and meta-analysis. *Heliyon.* (2020) 6:e03834. doi: 10.1016/j.heliyon.2020.e03834
24. Worthen M, Cash E. Stress management. *StatPearls.* StatPearls Publishing (2019).
25. Garcia MC, Kozasa EH, Tufik S, Mello LEAM, Hachul H. The effects of mindfulness and relaxation training for insomnia (MRTI) on postmenopausal women. *Menopause.* (2018) 25:992–1003. doi: 10.1097/GME.0000000000001118
26. Lu F, Xu Y, Yu Y, Peng L, Wu T, Wang T, et al. Moderating effect of mindfulness on the relationships between perceived stress and mental health outcomes among chinese intensive care nurses. *Front Psychiatry.* (2019) 10:260. doi: 10.3389/fpsyt.2019.00260
27. De Barros VV, Kozasa EH, De Souza ICW, Ronzani TM. Validity evidence of the Brazilian version of the mindful attention awareness scale (MAAS). *Psicol Reflex e Crit.* (2015) 28:87–95. doi: 10.1590/1678-7153.201528110
28. Kozasa EH, Lacerda SS, Menezes C, Wallace BA, Radvany J, Mello LEAM, et al. Effects of a 9-day Shamatha Buddhist meditation retreat on attention, mindfulness and self-compassion in participants with a broad range of meditation experience. *Mindfulness (NY).* (2015) 6:1235–41. doi: 10.1007/s12671-015-0385-8
29. Cooper N. *Newsweek.* (2020). Available online at: https://www.newsweek.com/best-hospitals-2020 (accessed May 25, 2020).
30. Lu W, Wang H, Lin Y, Li L. Psychological status of medical workforce during the COVID-19 pandemic: a cross-sectional study. *Psychiatry Res.* (2020) 288:112936. doi: 10.1016/j.psychres.2020.112936
31. Ripp J, Peccoralo L, Charney D. Attending to the emotional well-being of the health care workforce in a New York city health system during the COVID-19 pandemic. *Acad Med.* (2020) 95:1136–9. doi: 10.1097/ACM.0000000000003414

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Public Health

ORIGINAL RESEARCH
published: 10 December 2020
doi: 10.3389/fpubh.2020.585302

Knowledge, Attitudes, and Practices Among the General Population During COVID-19 Outbreak in Iran: A National Cross-Sectional Online Survey

Edris Kakemam[1†], Djavad Ghoddoosi-Nejad[2†], Zahra Chegini[3†], Khalil Momeni[4†], Hamid Salehiniya[5†], Soheil Hassanipour[6†], Hosein Ameri[7†] and Morteza Arab-Zozani[8†]*

[1] Department of Health Management and Economics, School of Public Health, Tehran University of Medical Sciences, Tehran, Iran, [2] Department of Public Health, School of Health, Birjand University of Medical Sciences, Birjand, Iran, [3] Social Determinants of Health Research Center, Qazvin University of Medical Sciences, Qazvin, Iran, [4] Department of Public Health, School of Health, Ilam University of Medical Sciences, Ilam, Iran, [5] Department of Public Health, School of Health, Birjand University of Medical Sciences, Birjand, Iran, [6] Gastrointestinal and Liver Diseases Research Center, Guilan University of Medical Sciences, Rasht, Iran, [7] Health Policy and Management Research Center, Department of Health Services Management, School of Public Health, Shahid Sadoughi University of Medical Sciences, Yazd, Iran, [8] Social Determinants of Health Research Center, Birjand University of Medical Sciences, Birjand, Iran

Background: Emerged in December 2019, coronavirus disease 2019 (COVID-19) is one of the largest pandemics ever. During the early phase, little was known about public knowledge, attitudes, and practices (KAP) relating to coronavirus disease. This study was designed to determine KAP of Iranians toward COVID-19.

Methods: A cross-sectional online survey was carried out in Iran from February 25 to April 25 using a self-administered questionnaire on 1,480 people. COVID-19-related KAP questions were adapted from other internationally validated questionnaires specific for infectious diseases.

Results: All participants were aware of COVID-19. When asked unprompted, 80% of respondents could correctly cite fever, difficulty in breathing, and cough as signs/symptoms of COVID-19. Most of our sample population knew that staying at home and isolated (95.3%) as well as constant handwashing and using disinfectants (92.5%) could prevent COVID-19. However, there were also widespread misconceptions such as the belief that COVID-19 can be transmitted by wild animals (58%) and by air (48.3%). Unprompted, self-reported actions taken to avoid COVID-19 infection included handwashing with soap and water (95.4%), avoiding crowded places (93%), cleansing hands with other disinfectants (80.), and covering mouth and nose when coughing or sneezing (76.1%). The Internet and social media (94.5%) were the main coronavirus information sources. However, the most trusted information sources on coronavirus were health and medical professionals (79.3%). The majority of participants (77.0%) wanted more information about coronavirus to be available.

Conclusion: Our findings suggest that people's knowledge and attitude toward COVID-19 at the time of its outbreak was at a high level.

Keywords: knowledge, attitudes, practices, COVID-19, online survey, Iran

OPEN ACCESS

Edited by:
Manasi Kumar,
University of Nairobi, Kenya

Reviewed by:
David Ayuku,
Moi University, Kenya
Caleb Joseph Othieno,
University of Botswana, Botswana

***Correspondence:**
Morteza Arab-Zozani
morteza.arab.zozani@gmail.com

†ORCID:
Edris Kakemam
orcid.org/0000-0001-7721-6924
Djavad Ghoddoosi-Nejad
orcid.org/0000-0003-2534-5155
Zahra Chegini
orcid.org/0000-0001-9125-9453
Khalil Momeni
orcid.org/0000-0002-8374-8721
Hamid Salehiniya
orcid.org/0000-0001-7642-5214
Soheil Hassanipour
orcid.org/0000-0002-6661-4908
Hosein Ameri
orcid.org/0000-0002-9914-034X
Morteza Arab-Zozani
orcid.org/0000-0001-7223-6707

Specialty section:
This article was submitted to Public Health Policy, a section of the journal Frontiers in Public Health

Received: *20 July 2020*
Accepted: *11 November 2020*
Published: *10 December 2020*

Citation:
Kakemam E, Ghoddoosi-Nejad D, Chegini Z, Momeni K, Salehiniya H, Hassanipour S, Ameri H and Arab-Zozani M (2020) Knowledge, Attitudes, and Practices Among the General Population During COVID-19 Outbreak in Iran: A National Cross-Sectional Online Survey. Front. Public Health 8:585302. doi: 10.3389/fpubh.2020.585302

INTRODUCTION

Having emerged in the last months of 2019, coronavirus disease 2019 (COVID-19) spread beyond an unimaginable rate, imposing a heavy burden on worldwide healthcare systems forcing almost all countries to apply quarantine rules which were unprecedented over the last century (1, 2).

Because of the characteristics of viral diseases and their transmission ways affecting a huge number of people, COVID-19 received urgent attention globally. Characteristics such as high transmission rates, long incubation period, and global spread, infecting millions of people, resulted in the fact that the virus needed to be tackled with careful design and planning, especially as in some cases a phobia began to emerge about this new virus (3).

Signs and symptoms associated with COVID-19 include fever, dry coughs, and shortness of breath. Having all three together, patients are advised to refer to healthcare facilities immediately, so that diagnosis could be quick and effective. However, because of lack of an appropriate vaccine or cure for treating and managing these patients, the best way in current situation is paying special attention to disease prevention and breaking the transmission chain of the virus (4–6).

Prevention of the disease requires public health and social measures including personal and respiratory hygiene. This includes washing hands with soap for at least 20 s, reducing interactions with other people, quarantining people who have come into contact with anyone infected, as well as quarantining infected residents. Actions like these need social awareness from both the authorities and the population at a large scale to handle the situation quickly and safely (1, 7, 8).

To protect the public in Iran, it is vital to understand the knowledge, attitude, and practice (KAP) of people so that the authorities know which areas of KAP need enhancing (9). Therefore, having these statements in mind, it seems necessary to design and implement research activities in this area. In this regard, this study, aims to assess the KAP of society about COVID-19. The results and evidence extracted from such surveys could immediately help public health planners and other health sector authorities fight this virus most effectively.

MATERIALS AND METHODS

Study Design

This cross-sectional survey was conducted from February 25 to April 25, to assess the public knowledge, attitudes, and practices regarding the coronavirus outbreak in Iran.

Population and Sample Size

Convenient sampling was employed in this study. The estimation of the sample size was done by assuming a minimum disease prevalence of 15%, confidence level = 95%, and d (margin of error) = 0.02. The calculated sample size of this study was 1,233 participants, by design effect = 1.2 reaching a sample size of nearly 1,480 participants.

Measures

The survey questionnaire included both prompt direct questions as well as unprompted open-ended questions that allowed for multiple responses. Coronavirus KAP domains in the questionnaire included sources of information, knowledge about coronavirus, behavioral intentions, prevention practices, and attitudes toward survivors. The indicators used to assess coronavirus KAP were informed by lessons learned from similar KAP studies on other communicable diseases, especially MERS, SARS, HIV/AIDS, and Ebola (10–13). Before the final survey was completed, changes were made as required to enable a better understanding of the questions by the participants, and the arrangement of the questions was looked into to ensure its efficiency. A translate re-translate approach was used for increasing the validity of the questionnaire. Also, the CVR (73%) and CVI (81%) were calculated for the questionnaire with a sample of 10 experts.

Data Collection

Due to maintaining social distance, the survey was done online in all provinces of the country. The questionnaire was designed on Porsline (similar to SurveyMonkey) shared on social media such as Telegram, WhatsApp, LinkedIn, and Facebook. We also tried to distribute this questionnaire on social media channels related to all provinces and cities to increase the response rate. People who were of Iranian nationality, aged 10 years or more, and agreed to participate in the survey were directed to complete the questionnaire via clicking the link (https://survey.porsline.ir/#/). The survey started with a sentence that "completing the questionnaire by the participants is considered voluntary participation." After confirmation that participants understood this, people were guided to complete the self-report questionnaire. On average, questionnaires took ∼10–15 min to complete. The ethics committee of Birjand University of Medical Sciences (BUMS) approved this study before starting the formal survey (ethical code: IR.BUMS.REC.1398.391).

Data Analysis

Once data were collected, all questionnaires were then entered into a customized Excel-based system. All data were subsequently imported into and analyzed via SPSS v. 23.0 (SPSS Inc., Chicago, Illinois, USA). Descriptive statistics were then generated for national-level estimates (proportions) and their 95% CIs.

RESULTS

A total of 1,480 people responded to the questionnaire, yielding a response rate of 70.2%. This response rate is based on the number of views by participants and the number that fulfilled the survey. The mean age of participants was 31.29 years. Among the respondents, 797 (57.2%) were female. Moreover, 782 (53.1%)

TABLE 1 | Sociodemographic characteristics of respondents ($n = 1,480$).

Characteristic		*N*	Percent[+]
Sex*	Male	597	42.8
	Female	797	57.2
Age[†]	≤20	150	10.3
	21–30	612	41.9
	31–40	461	31.6
	41–50	166	11.4
	>50	70	4.8
Marital status[‡]	Single	692	46.9
	Married	782	53.1
Educational level[§]	Lower diploma	51	3.5
	Diploma	200	13.6
	Associate degree	115	7.8
	Bachelors	595	40.3
	Master	395	26.8
	PhD	120	8.0
Region**	South	144	9.8
	North	412	28.0
	West	411	27.9
	East	288	19.6
	Center	217	14.7

*Missing values for sex = 86.
[†]Missing values for age = 21.
[‡]Missing values for marital status = 6.
[§]Missing values for education = 4.
**Missing values for region = 8.
[+]Valid percent.

were married. Of all respondents, 41.9% were between the ages of 20–31 years. Also, above 80% of respondents hold degrees of higher education (**Table 1**).

Awareness and Risk Perception

The majority of respondents (84.5%) had heard of coronavirus disease 2019 (COVID-19) before the interview. Overall, 84.5% of respondents were aware that it is possible to survive and recover from COVID-19. Approximately 60% of respondents (59.6%) perceived themselves to be at some risk of contracting COVID-19.

Knowledge of Coronavirus Cause, Transmission, Signs, and Symptoms

In an open-ended question, the most common perceived cause/origin of coronavirus was "virus" (94.4%); only 31.7% linked coronavirus to a "bats, monkeys, and wild animals." Very few respondents mentioned that coronavirus is caused by "Bacteria" (6.7%), "Evildoing/Sin" (4.1%), or "Parasites" (3.7%).

In response to an unprompted open-ended question, the most frequently cited modes of transmission were shaking hands with an infected person (91.9%), kissing and hugging (90.1%), and being in contact with the saliva of an infected person (87.2%) (**Table 2**).

Overall, 80% of respondents could state, without prompting, three key signs/symptoms of Coronavirus: "difficulty breathing" (97.7%), "fever" (97.6), and "cough" (94.3%) (**Figure 1**).

Knowledge of Coronavirus Prevention and Treatment

Knowledge of coronavirus prevention and treatment was high among respondents in that nearly everyone knew that coronavirus can be prevented by staying at home and reducing contact with people (95.3%) as well as constant hand washing and using disinfectants (92.5%).

Furthermore, 75.1% of respondents expressed that early treatment of coronavirus could increase survival and reduce the chance of transmission within the household (**Table 3**).

Misconceptions of Coronavirus Transmission, Prevention, and Treatment

There were widespread misconceptions about coronavirus transmission, prevention, and treatment. Nearly half (47%) of respondents said they could protect themselves from coronavirus by washing hands with salt and hot water solution and nearly half again (48.3%) said coronavirus is transmitted by air while 58% of the respondents expressed that coronavirus is transmitted by wild animals. Moreover, 15.1% of respondents perceived that traditional healers could successfully treat coronavirus (**Table 3**).

Health-Seeking Behavioral Intentions and Self-Reported Prevention Practices

Most of the respondents (75.2%) reported that they would go to a health facility if experiencing a high fever. Nearly all respondents (97%) reported taking some preventive action since learning about coronavirus. Handwashing with soap and water was the most prevalent behavior reported in unprompted response (95.4%), followed by avoiding crowded places (93%), cleaning my hands with other disinfectants (80.9 %), and covering mouth and nose when coughing and sneezing (76.1%).

Attitudes Toward Coronavirus Survivors

Only 10.6% reported that they would not welcome back a coronavirus survivor into the community through 49.5% would refuse to buy fresh vegetables from a shopkeeper who survived coronavirus.

Perceptions of Coronavirus Vaccine and Experimental Treatment

Of respondents, 73.2% reported they would accept an approved coronavirus vaccine if it were to become available, while, only 26.1% said they would accept experimental treatments that have not been trialed (**Table 4**).

Sources of Receiving Coronavirus-Related Information

The Internet and social media (94.5%) is the primary coronavirus information channel mentioned by respondents in an open-ended question, followed by television (70.7%), relatives and

TABLE 2 | Coronavirus-related awareness, risk perceptions, and knowledge ($n = 1,480$).

	Indicator	Percent	95% CI
Awareness and risk perception	Heard of coronavirus	84.5	82.6–86.34
	Expressed that coronavirus existed in Iran	98.1	97.4–98.8
	One of your family or relatives of friends infected by coronavirus	84.5	82.6–86.3
	Aware of possibility to have coronavirus without showing signs/symptoms	79.5	77.4–81.5
	Aware of possibility to survive and recover from coronavirus	84.5	82.6–86.3
	Aware of coronavirus call center to report sick persons and deaths	52.8	50.2–55.3
	Perceived some risk of contracting coronavirus	59.6	57.1–62.1
Knowledge of coronavirus cause	Virus	94.4	93.2–95.5
	Bats/cats/other wild animals	31.7	29.3–34.1
	Parasites	3.7	2.7–4.6
	Bacteria	6.7	5.4–7.9
	Evildoing/sin	4.1	3.1–5.1
	I don't know/ not sure	5.5	4.3–6.6
Knowledge of coronavirus modes of transmission	Air	44.6	42.1–47.1
	Eating "animal meat"	31.9	29.5–34.2
	Eating infected fruits and vegetable	24.2	22.1–26.3
	Saliva of an infected person	87.2	85.5–88.9
	Urine and feces of an infected person	37.3	34.8–39.7
	Breast milk of an infected person	18.1	16.1–20.1
	Shaking hands with an infected person	91.9	90.5–93.3
	Kissing and hugging	90.1	88.6–91.6
	Others	27.2	24.9–29.4

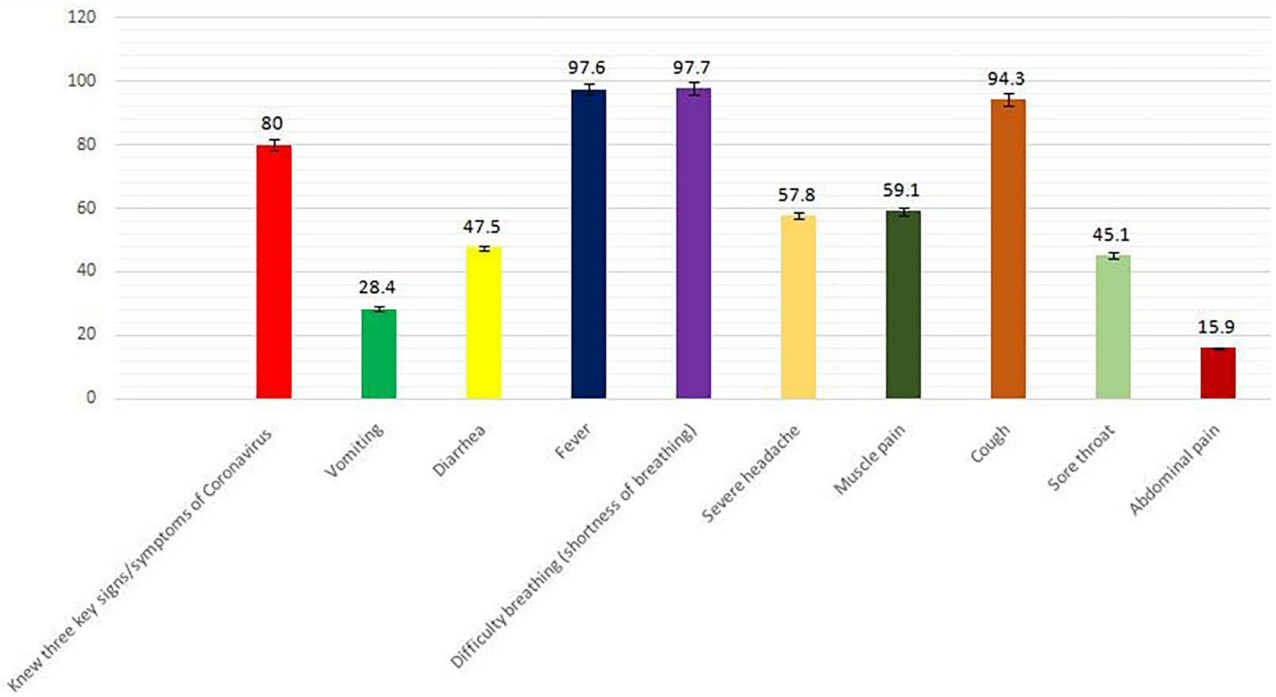


FIGURE 1 | Knowledge of coronavirus signs/symptoms.

TABLE 3 | Coronavirus-related knowledge, behavioral intentions, and practices.

Indicator		Percent	95% CI
Knowledge of coronavirus prevention and treatment	Coronavirus can be prevented by avoiding contact with blood and body fluids	39.8	37.3–42.3
	Coronavirus can be prevented by not touching anyone else	84.3	82.4–86.1
	Early treatment increases chance of surviving coronavirus	75.1	72.9–77.3
	Early treatment reduces further coronavirus spread within household	72.8	70.5–75.1
	Coronavirus can be prevented by regular washing hands with soap and water, and also using disinfectants	92.5	91.1–93.8
	Coronavirus can be prevented by stay at home and maintaining social distance	95.3	94.2–96.3
	Coronavirus can be prevented by using a face mask	69.8	67.4–72.1
Misconceptions of coronavirus transmission, prevention and treatment	Coronavirus can be prevented by bathing with salt and hot water	47.6	45.1–50.1
	Coronavirus can be transmitted through the air	48.3	45.7–50.8
	Coronavirus can transmitted by wild animals	58.0	55.5–60.5
	Coronavirus can be treated successfully by traditional healers	15.1	13.2–16.9
	Coronavirus can be treated successfully by spiritual healers	4.2	3.1–5.2
Perceptions of health facilities	Health facility will take care of sick person	76.8	74.6–78.9
	Health facility will definitely cure sick person from coronavirus	74.5	72.3–76.7
	Health facility will not be able to do anything for sick person	12.0	10.3–13.6
Perceptions of coronavirus treatment center and quarantine measures	Persons diagnosed with coronavirus must be admitted in coronavirus treatment center	86.7	84.5–88.4
	Direct contacts of patient diagnosed with coronavirus must be quarantined for 2 weeks	94.7	93.5–95.4
Health-seeking behavioral intentions	Would go to health facility if coronavirus suspected	65.4	62.9–67.8
	Would go to health facility if had a high fever	75.2	73.0–77.4
Behavioral intentions if family member suspected of coronavirus	Call the hospital/coronavirus hotline	54.7	52.1–57.2
	Take the person to the hospital	49.5	46.9–52.1
	Avoid all physical contact and bodily fluids of that person	74.6	72.3–76.8
	Help care for the person at home	40.1	37.6–42.6
	I do not know/not sure	4.5	3.4–5.5

TABLE 4 | Attitudes toward coronavirus survivors and perceptions of coronavirus vaccine and experimental treatment.

Indicator		Percent	95% CI
Attitudes toward coronavirus survivors	Student who survived coronavirus puts others in class at risk of infection	45.9	43.3–48.4
	Would not buy from shopkeeper who survived coronavirus	49.5	46.9–52.1
	Would not welcome coronavirus survivor into community	10.6	9.1–12.1
Perceptions of coronavirus vaccine and experimental treatment	Would accept an approved coronavirus vaccine for self	73.2	70.9–75.4
	Would accept an approved coronavirus vaccine for children	73.8	71.5–76.1
	Would accept experimental coronavirus treatment for self	26.1	23.8–28.3
	Would accept experimental coronavirus treatment for relative	19.1	17.1–21.1

friends (40.7%), and house visits by health workers (35.3%) (**Figure 2**).

The most trusted information sources on coronavirus were health and medical professionals (79.3%), the Government/Ministry of Health (55.7%), and the Internet and social media (44.6%) (**Figure 3**).

Coronavirus Information Gaps

The majority of participants (77.0%; 95% CI, 74.8–79.1) wanted more information about coronavirus and specifically mentioned wanting to know more about providing medical care and treatment for infected people (75.5%; 95% CI, 73.3–77.7) as well as how to prevent the disease (62.2%; 95% CI, 59.7–64.6), while about half of the respondents wanted more information on coronavirus' signs/symptoms and its cause/origin (54.3%; 95% CI, 51.7–56.8 and 47.2 95% CI, 44.6–49.7, respectively).

DISCUSSION

This study aimed to investigate the level of KAPs of the general population around COVID-19 in Iran. In this regard, the KAP findings suggest that while during the outbreak, awareness and preventive behaviors related to COVID-19 were promoted well in Iran, misconceptions and discriminatory attitudes to those who survived coronavirus were common.

The study also highlighted the gap between the perceived susceptibility of catching the virus and reality. For example, while almost all adults were at risk of catching coronavirus,

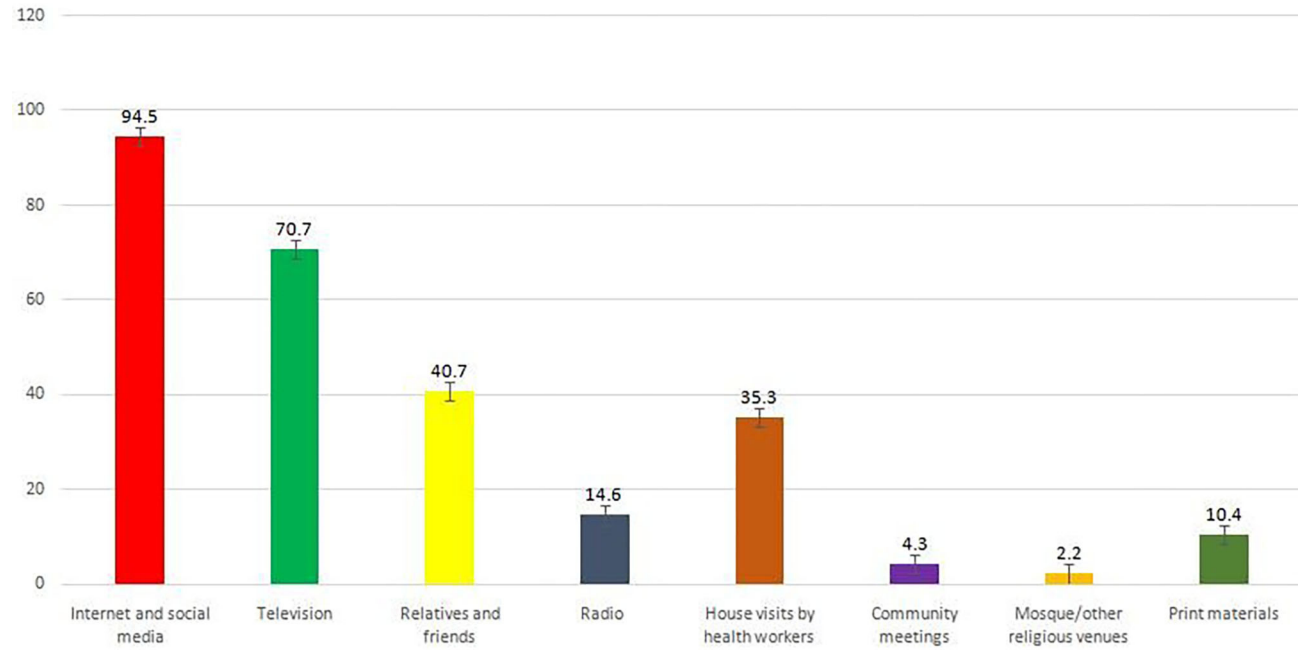


FIGURE 2 | Sources of receiving coronavirus-related information.

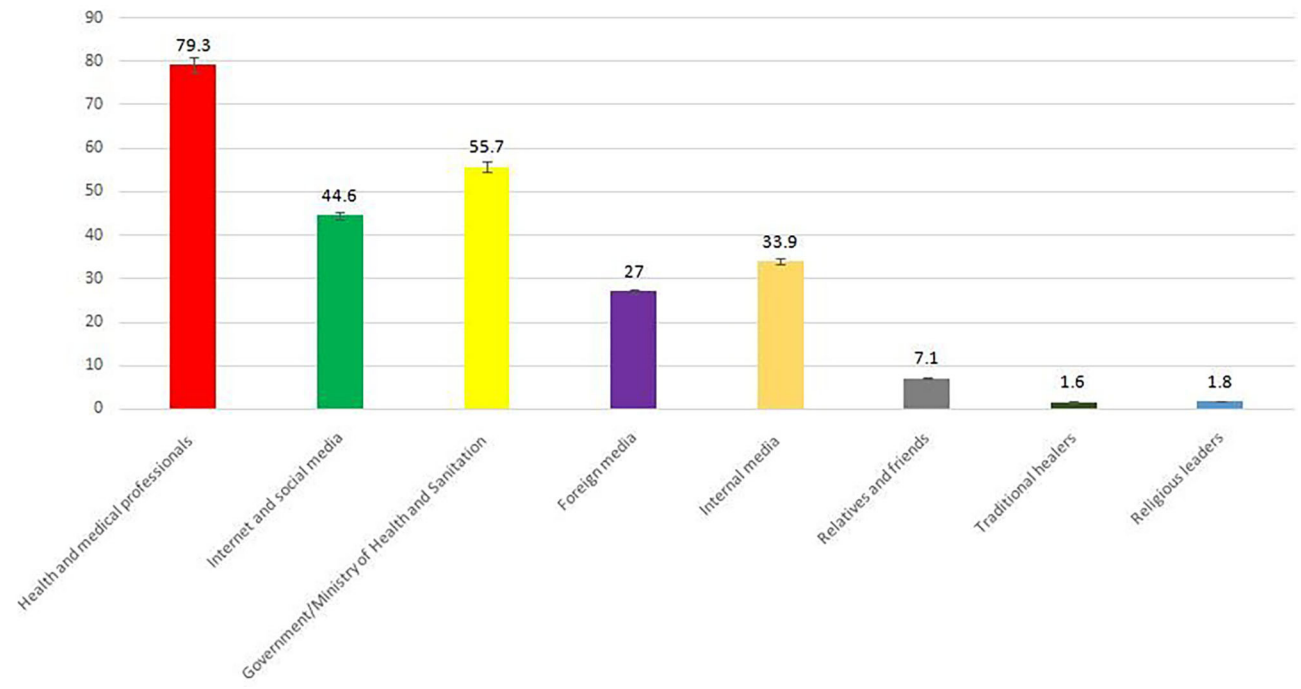


FIGURE 3 | Trusted sources of coronavirus-related information.

only 60% of people considered themselves at risk (14). Therefore, proper training about the susceptibility of all people and the possibility of getting the virus can increase awareness among individuals and help prevent infection. It is clear that each epidemic has its unique characteristics; hence training in various areas of the disease, including susceptibility, is essential to prevent the spread of coronavirus (15).

Knowledge about the signs and symptoms of coronavirus disease was at a high level among people with over 80% providing correct answers. This compares with studies in various countries, including China (16), USA (17), and India (18), revealing that people are highly aware of coronavirus, due to information in the mass media, including radio, television, social media, and official authorities' efforts like the Ministry of Health programs.

Moreover, according to the results, 95% of people have stated that staying at home and obeying health protocols will prevent them from being infected. In this regard, studies have also illustrated that staying at home and maintaining social distance has a positive effect on reducing disease transmission (16). Countries that did not enforce traffic regulations or imposed them later are suffering from a higher prevalence (19). To maintain social distancing, several measures have been taken into account in Iran, including the prohibition of commuting on intercity routes, avoiding crowded places, and discontinuation of high-risk jobs. However, despite the numerous warnings of the government and the Ministry of Health, and also owing to the lack of effective laws, some people did not follow these measures.

In line with this, some misconceptions about the disease persisted. For instance, 47% of people believe the virus is killed by the saline solution, and 58% believe that the virus is transmitted through wild animals (20). Any misconceptions about the disease and ways to prevent it could lead to a drastic increase in the incidence rate. Therefore, more detailed comprehensive training and information may need to be disseminated through the media, health practitioners, researchers, and other stakeholders.

However, positive key findings show that 75% of people stated they would go to a health facility if they had a fever, and 90% of people say they have taken preventive measures since the onset of coronavirus such as washing their hands with soap and water and avoiding crowded areas.

One area of concern revealed by the study is the stigma of coronavirus survivors. Some 10% of people said they would not welcome a survivor of coronavirus into the community while 49.5% stated they would refuse to buy fresh vegetables from shopkeepers who had survived coronavirus. This may raise main concerns about the stigma attached to patients who have the disease among their community. Therefore, measures should be taken to increase awareness at the community level to reduce stigma (18, 21).

From the publicly available information sources, the most important source for acquiring knowledge for most people is social media. Therefore, it is necessary to provide accurate, precise, and timely information to the public (22, 23). Of course, the production and presentation of appropriate content through virtual networks should be under the supervision of relevant organizations such as the Ministry of Health. Also, those in charge of training in virtual networks should be identified so that they can be held accountable in case of discrepancies between the trainings and the correct evidence.

Finally, more than 50% of people stated a need for more information and knowledge about the treatment and diagnosis of the virus. Since this is a new epidemic, it is important to have reliable and up-to-date information on all aspects of the disease; from prevention to diagnosis and treatment to acquire coherence and cohesion in people's behavior using scientific protocols, not gossip or fake news in social media and on the Internet.

Strength and Limitation

This study is the first to be conducted nationally in Iran about the KAPs of the general population regarding coronavirus and has a high sample size. Since the study was conducted online only and people who have access to social media networks have been included in the study, it would not be prudent to generalize the results to the whole community (people without smartphones and less literate).

CONCLUSION

In conclusion, people's knowledge, attitudes, and performances about the disease are at a high level, but there are misconceptions about the disease. Also, the fear of dealing with recovered patients and the lack of communication and knowledge around recovered patients are at a high level. However, the disease is unlikely to be transmitted to a person after recovery, so training and information via the media can help reduce misconceptions and the stigma around recovered patients in the community.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Birjand University of Medical Sciences, Ethical Committee (Ethical code: IR.BUMS.REC.1398.391). Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin.

AUTHOR CONTRIBUTIONS

MA-Z and EK: idea, design, and editing. MA-Z, EK, DG-N, KM, and ZC: preparing the questionnaire. KM, ZC, HA, SH, and HS: data collection. SH, EK, and HS: analyses. All authors: writing draft and approval of final draft.

ACKNOWLEDGMENTS

This manuscript has been released as a pre-print at MedRxiv (24).

REFERENCES

1. Signorelli C, Fara G. COVID-19: hygiene and public health to the front. *Acta Bio-medica*. (2020) 91:7–8. doi: 10.23750/abm.v91i3-S.9507
2. Arab-Zozani M, Hassanipour S. Features and limitations of litcovid hub for quick access to literature about COVID-19. *Balkan Med J.* (2020) 37:231–2. doi: 10.4274/balkanmedj.galenos.2020.2020.4.67
3. Lipsitch M, Swerdlow DL, Finelli L. Defining the epidemiology of covid-19—studies needed. *N Engl J Med.* (2020) 382:1194–6. doi: 10.1056/NEJMp2002125
4. Gostic K, Gomez AC, Mummah RO, Kucharski AJ, Lloyd-Smith JO. Estimated effectiveness of symptom and risk screening to prevent the spread of COVID-19. *eLife*. (2020) 9:e55570. doi: 10.7554/eLife.55570
5. Zu ZY, Jiang MD, Xu PP, Chen W, Ni QQ, Lu MI, et al. Coronavirus disease 2019 (COVID-19): a perspective from China. *Radiology*. (2020) 296:E15–25. doi: 10.1148/radiol.2020200490
6. Arab-Zozani M, Hassanipour S, Ghoddoosi-Nejad D. Favipiravir for treating patients with novel coronavirus (COVID-19): protocol for a systematic review and meta-analysis of randomised clinical trials. *BMJ Open.* (2020) 10:e039730. doi: 10.1136/bmjopen-2020-039730
7. Abdelhafiz AS, Mohammed Z, Ibrahim ME, Alorabi M, Ziady HH, Ayyad M, et al. Knowledge, perceptions, and attitude of Egyptians towards the novel coronavirus disease (COVID-19). *J Commun Health.* (2020) 45:881–90. doi: 10.1007/s10900-020-00827-7
8. Arab-Zozani M, Ghoddoosi-Nejad D. Covid-19 in Iran: the good, the bad and the ugly strategies for preparedness – a report from the field. *Disaster Med Public Health Prep*. (2020) 261:1–3. doi: 10.1017/dmp.2020.261
9. Moftakhar L, Seif M. The exponentially increasing rate of patients infected with COVID-19 in Iran. *Arch Iran Med.* (2020) 23:235. doi: 10.34172/aim.2020.03
10. Jalloh MF, Sengeh P, Monasch R, Jalloh MB, deLuca N, Dyson M, et al. National survey of Ebola-related knowledge, attitudes and practices before the outbreak peak in Sierra Leone: August 2014. *BMJ Global Health.* (2017) 2:e000285. doi: 10.1136/bmjgh-2017-000285
11. Shokoohi M, Karamouzian M, Mirzazadeh A, Haghdoost A, Rafierad AA, Sedaghat A, et al. HIV knowledge, attitudes, and practices of young people in Iran: findings of a National population-based survey in 2013. *PLoS ONE.* (2016) 11:e0161849. doi: 10.1371/journal.pone.0161849
12. He N, Zhang J, Yao J, Tian X, Zhao G, Jiang Q, et al. Knowledge, attitudes, and practices of voluntary HIV counseling and testing among rural migrants in Shanghai, China. *AIDS Educ Prevent.* (2009) 21:570–81. doi: 10.1521/aeap.2009.21.6.570
13. ALdowyan N, Abdallah AS, El-Gharabawy R. Knowledge attitude and practice (KAP) Study about Middle East respiratory syndrome coronavirus (MERS-CoV) among population in Saudi Arabia. *Int Arch Med.* (2017) 10:217. doi: 10.3823/2524
14. Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72 314 cases from the Chinese center for disease control and prevention. *JAMA*. (2020) 323:1239–42. doi: 10.1001/jama.2020.2648
15. Johnson EJ, Hariharan S. Public health awareness: knowledge, attitude and behaviour of the general public on health risks during the H1N1 influenza pandemic. *J Public Health.* (2017) 25:333–7. doi: 10.1007/s10389-017-0790-7
16. Zhong B-L, Luo W, Li HM, Zhang QQ, Liu XG, Li WT, et al. Knowledge, attitudes, and practices towards COVID-19 among Chinese residents during the rapid rise period of the COVID-19 outbreak: a quick online cross-sectional survey. *Int J Biol Sci.* (2020) 16:1745–52. doi: 10.7150/ijbs.45221
17. Clements JM. Knowledge and behaviors toward COVID-19 among US residents during the early days of the pandemic. *medRxiv*. (2020). doi: 10.1101/2020.03.31.2004896
18. Roy D, Tripathy S, Kar SK, Sharma N, Verma SK, Kaushal V. Study of knowledge, attitude, anxiety & perceived mental healthcare need in Indian population during COVID-19 pandemic. *Asian J Psychiatry.* (2020) 51:102083. doi: 10.1016/j.ajp.2020.102083
19. McCloskey B, Zumla A, Ippolito G, Blumberg L, Arbon P, Cicero A, et al. Mass gathering events and reducing further global spread of COVID-19: a political and public health dilemma. *Lancet*. (2020) 395:1096–9. doi: 10.1016/S0140-6736(20)30681-4
20. Zhou M, Tang F, Wang Y, Nie H, Zhang L, You G, et al. Knowledge, attitude and practice regarding COVID-19 among health care workers in Henan, China. *J Hosp Infect.* (2020) 105:183–7. doi: 10.1016/j.jhin.2020.04.012
21. World Health Organization. *Rolling Updates on Coronavirus Disease (COVID-19).* (2020). Available online at: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen (accessed April 14, 2020).
22. Almutairi KM, Moussa M, Boshaiqah AE, Saleh Alajilan A, Vinluan JM, Almutairi A, et al. Awareness, attitudes, and practices related to coronavirus pandemic among public in Saudi Arabia. *Family Commun Health.* (2015) 38:332–40. doi: 10.1097/FCH.0000000000000082
23. Kharma MY, Alalwani MS, Amer MF, Tarakji B, Aws G. Assessment of the awareness level of dental students toward Middle East respiratory syndrome-coronavirus. (2015) 5:163–9. doi: 10.4103/2231-0762.159951
24. Kakemam E, Ghoddoosi-Nejad D, Chegini Z, Momeni K, Salehinia H, Hassanipour S, et al. Knowledge, attitudes, and practices among the general population during COVID-19 outbreak in Iran: A national cross-sectional survey. *medRxiv*. (2020). doi: 10.1101/2020.06.10.20127258

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Public Health

ORIGINAL RESEARCH
published: 10 December 2020
doi: 10.3389/fpubh.2020.573431

Epidemic Spread and Its Management Through Governance and Leadership Response Influencing the Arising Challenges Around COVID-19 in Pakistan—A Lesson Learnt for Low Income Countries With Limited Resource

Ahsan Nawaz[1], Xing Su[1]*, Muhammad Qasim Barkat[2], Sana Asghar[3], Ali Asad[4], Farwa Basit[5], Shahid Iqbal[6], Hafiz Zahoor[7] and Syyed Adnan Raheel Shah[8]*

[1] College of Civil Engineering and Architecture, Institute of Construction Project Management, Zhejiang University, Hangzhou, China, [2] Key Laboratory of China Food and Drug Administration (CFDA) for Respiratory Drug Research, Department of Pharmacology, School of Medicine, Zhejiang University, Hangzhou, China, [3] School of Life Sciences, Zhejiang University, Hangzhou, China, [4] School of Management, Shenzhen University, Shenzhen, China, [5] School of Agriculture and Biotechnology, Zhejiang University, Hangzhou, China, [6] Management Studies Department, Bahria University, Islamabad, Pakistan, [7] Construction Engineering and Management Department, National University of Sciences and Technology, Risalpur, Pakistan, [8] Department of Civil Engineering, Pakistan Institute of Engineering and Technology, Multan, Pakistan

The coronavirus disease (COVID-19) was first reported in China (Wuhan) at the end of 2019. It has rapidly spread over 216 countries, including the USA, UK, Europe, Russia, and many Asian countries. It has affected more than 4.5 million people, and around 0.3 million deaths have been reported globally. Many preventive measures have been adopted worldwide to mitigate its spread. The government of Pakistan has also taken many preventive measures to combat the COVID-19 outbreak, such as rapid response by governance, continuous monitoring of the pandemic spread in the affected areas, and integration of resources from multiple sectors, including health, education, defense, and media. According to global statistics, the number of COVID-19 cases in the country remained remarkably lower than the expected number for the first 169 days, as compared to other countries. A total of 286,674 confirmed cases, including 16,475 active, 6,139 deaths, and 264,060 (92%) recoveries were reported. The study finds that strict adherence to national policies, effective governance, and unity at the national level resulted in better outcomes. Hence, the preventive measures, rapid responses, and strategies adopted for combating the challenges could be adopted as a learning tool for other countries having similar work environments and financial constraints. This paper can help and guide governance/public actions in response to the possible rebound of coronavirus this fall/winter.

Keywords: COVID-19, preventive measures, current status, governance quick response, 169 days survey

OPEN ACCESS

Edited by:
Manasi Kumar,
University of Nairobi, Kenya

Reviewed by:
Caleb Joseph Othieno,
University of Botswana, Botswana
Siham Sikander,
Health Services Academy, Pakistan

****Correspondence:***
Xing Su
xsu@zju.edu.cn
Ahsan Nawaz
ahsanklasra@zju.edu.cn;
ahsanklasra@gmail.com

Specialty section:
This article was submitted to Infectious Diseases - Surveillance, Prevention and Treatment, a section of the journal Frontiers in Public Health

Received: *17 June 2020*
Accepted: *02 November 2020*
Published: *10 December 2020*

Citation:
Nawaz A, Su X, Barkat MQ, Asghar S, Asad A, Basit F, Iqbal S, Zahoor H and Raheel Shah SA (2020) Epidemic Spread and Its Management Through Governance and Leadership Response Influencing the Arising Challenges Around COVID-19 in Pakistan—A Lesson Learnt for Low Income Countries With Limited Resource. Front. Public Health 8:573431. doi: 10.3389/fpubh.2020.573431

INTRODUCTION

Coronavirus disease (COVID-19) is considered to be the third epidemic disease that affected more than 216 countries in the world. According to the World Health Organization (WHO), 4,589,526 cases and 310,391 deaths have been reported worldwide. To date, the highest number of positive cases are reported in the United States followed by Russia, Italy, India, the UK, and Spain (1). COVID-19 has affected the gross domestic product (GDP) of almost all countries. According to a recent study, a fall of 2% is observed in the world GDP, while the GDP of developing and industrial countries dropped by 2.5 and 1.8%, respectively. The Chinese GDP observed an overall drop of 3.7%, while their exports, imports, and households suffered a drop of 3.5, 3.2, and 7.2%, respectively. East Asia and Pacific countries are expected to have a significant loss in their trade, for example, 3.2% loss in Cambodia, 2.1% in Singapore, 2.3% in China, 3% in Thailand, and 2.7% in Vietnam (2). The most significant GDP loss of 4.6% is observed in Japan, followed by 3.4% in the United States and the European Union (3.4%), and 3.2% in Canada. Moreover, output services such as tourism declined by 8.8%, while agriculture and manufacturing industries suffered a 3% loss (3). In the same way, the GDP of Pakistan is deleteriously affected by the current epidemic spread; in the year 2019–2020, the GDP level has declined by 1.6%, and it may achieve a growth rate of only 2.9% in the year 2020–2021. It is also estimated that the currency may fall from Rs. 116.8 to Rs. 178.5 per one US dollar during 2020–2024, while unemployment may rise from 3.9 to 14.7% (4).

The travel restriction in Wuhan started on 23 January 2020, which had coercively reduced the spread of the COVID-19 outbreak by 80%, whereas travel restrictions from and to mainland China could only reduce the spread of the COVID-19 outbreak by 50%. The early screening, detection, isolation, self-quarantines, and frequent hand washing proved to be more effective preventive measures than the travel restriction (5). Shim et al. reported that the first case in South Korea was declared on 20 January 2020, but the number of cases gradually increased, as 6,284 cases with 42 mortalities were reported until 6 March 2020. It was concluded that social distancing is an effective preventive measure to slow the spread of the coronavirus outbreak (6).

The border of Taiwan and mainland China is very close, and it was thought that Taiwan would be severely affected due to frequent flight operations between them. However, using the good experiences from the 2003 SARS, the Taiwan government had effectively controlled the COVID-19 outbreak through their well-trained official teams who quickly recognized the crises, sent health messages, arranged daily briefings to the public, and strictly implemented the preventive measures, thus setting an example of how a responsible society can quickly respond to an epidemic disease (7). In Vietnam, the first case was reported on 23 January 2020, and the total number of 240 cases was reported until 4 April 2020. The government of Vietnam had implemented preventive measures such as rapid response by clear leadership, the role of media, and the provision of medical services. Therefore, no death was reported until 4 April 2020 (8).

In Nigeria, the first COVID-19 case was reported on 27 February 2020, while 318 total confirmed cases with 10 mortalities were reported on 11 April 2020. Collectively, a total of 13,814 cases with 747 deaths were reported in Africa on 11 April 2020. It was thought that COVID-19 would bring the most adverse effects in African countries compared with Europe. However, despite limited resources, the Nigerian government controlled the COVID-19 outbreak by implementing preventive measures such as area lockdown or movement restriction (9).

In Italy, there were only three cases in the first half of February 2020, but only a month later, a total of 22,512 cases with 1,625 deaths were reported on 17 March. Italy became the second most affected country after China with the highest number of cases and deaths by the time. The age of patients affected by COVID-19 is mostly 70–80 years in Italy, and 23% of the population is over 65 years old. Most of the patients who died were either of old age or had already suffered from other diseases; that is why the mortality rate was high in Italy (10). In Iran, the first death was announced on 19 February 2020, and as of 16 March, 991 cases with 853 mortalities had been reported (11). Iran is facing many difficulties regarding the ongoing COVID-19 outbreak due to the restriction imposed by the USA for the last 4 years. The lack of medical supplies, such as personal protective equipment (PPE), life-saving medicines, and laboratory equipment, scaled up the burden of COVID-19 mortalities. It was urged to the USA and UN Security Council to temporarily lift or ease Iran's restrictions (12).

The Government of Spain announced the COVID-19 emergency and completely locked down the country on 14 March. A total of 13,716 confirmed cases with 598 mortalities had been reported. Spain was the second country in Europe after Italy that was severely affected by COVID-19. A shortage of medical supplies had been reported, such as PPE, gloves, face masks, ventilators, and intensive care beds, due to the increasing number of admitted patients each day. Besides, dozens of healthcare workers were affected by corona, and the doctors gave priority to the older patients and started to provide guidance on the telephone (13).

The USA was the most adversely affected country in the world. According to the WHO, 1,966,932 confirmed cases and 85,860 deaths had been reported in the USA until 17 May 2020 (14). The total number of infected cases and deaths and the preventive measures adopted by different countries to combat the COVID-19 are summarized in **Table 1**.

The first COVID-19 case was reported in Pakistan on 26 February 2020, and the second case was reported by the federal health ministry on the same day (20). They both came from Iran (21). On 9 March 2020, COVID-19 cases gradually increased to 16 (22). These cases quickly jumped to 461 on 19 March 2020, with the first two confirmed deaths on 18 March 2020. On 31 March 2020, the total number of cases was counted as 2,039, with 82 recoveries and 26 deaths. Moreover, on 22 April 2020, 10,000 cases were reported with 212 deaths. Comparing the performance of Pakistan with Italy and Spain, the main difference was the early implementation of lockdown (to maintain social distancing) and closing of borders (to stop the inclusion of external potential virus carriers), which contributed to the reduction of case fatality rate (CFR).

TABLE 1 | Total cases, deaths, and preventive measures adopted by different countries.

Country	Total cases	Deaths	CFR	Preventive measures	Sources
Pakistan	286,674	6,139	2.1%	Organized team under NAP; lockdowns; social distancing; hand washing with soap or sanitizer; wearing mask; emphasizing on preventive measures through media; fulfilling essential medical needs such as PPEs, masks, gloves, and ventilators; and enhancing the capacity of existing hospitals and labs.	(1, 14)
South Korea	14,714	305	2%	Social distancing was implemented as a major preventive measure by the government.	(6)
Kuwait	73,068	486	0.6%	Lockdown, social distancing, tracing the contacts of infected person, and providing awareness to public regarding COVID-19 preventive measures.	(15)
Japan	50,210	1,059	2.1%	Lockdown, closing schools and public places, and increasing testing capacity for large population.	(13)
India	2,329,638	46,091	2.0%	Banned flight operations and closed shopping malls, schools, and movie theaters.	(13)
Bangladesh	263,503	3,471	1.3%	Lockdown, ban on travel, maintaining social distancing, limited working hours, and establishing remote sanitization at public places.	(16)
Iran	331,189	18,800	5.6%	Washing hand with soap or alcohol-based compound, maintaining social distancing, closing schools and markets, and banning public traffic and gatherings.	(17)
China	89,444	4,699	5.2%	Strict lockdown, early detection and reporting of suspected patients, maintaining social distancing, improving personnel hygiene, and taking rest by COVID-19 patients.	(18)
Italy	251,237	32,215	12.8%	Banned flight operation, early identification and isolation of suspected COVID-19 patients, and established quarantine centers and hospitals for disease patients.	(19)
Spain	326,612	28,579	8.7%	Lockdown and banned local places. The government ensured to provide basic facilities to hospitals.	(13)

CFR = Number of Death / Number of Cases × 100.

All the confirmed cases had recently traveled from Iran, Syria, and London, which adversely affected the situation (23). On 12 August 2020, the total number of confirmed cases in the country was 286,674, with a death toll of 6,139 and 264,060 recoveries. The current scenario of COVID-19 in the country has been presented province-wise in **Table 2** and **Figure 1**. According to this scenario, Sindh has the highest number of positive and active cases, while the highest deaths happened in Khyber Pakhtunkhwa (KPK). Likewise, a higher number of recovered cases were reported in Punjab province, and the CFR was 2.1% in the whole country. The CFR was 3.54% in KPK, 1.85% in Sindh, 2.34% in Punjab, 1.12% in Islamabad, 2.40% in Gilgit-Baltistan, 2.74% in Azad Jammu and Kashmir (AJK), and 1.16% in Baluchistan, as shown in **Figure 2** (24). It was noticed that the overall recovery rate was 92% in the country, as shown in **Figure 7**.

The number of COVID-19 cases is increasing gradually throughout the country; hence, there is a need to make effective strategies and chalk out the planes at the highest level to curtail the transmission. Moreover, Pakistan is a developing country having limited resources and budgets against any viral disease, particularly the highly contagious ones like COVID-19. Nevertheless, the Ministry of National Health Services, Regulation & Coordination (M/O NHSRC)

TABLE 2 | The current scenario of COVID-19 cases.

Sr. No.	Province	Confirmed cases	Deaths	Recovered
1	Punjab	94,865	2,179	86,389
2	Sindh	124,929	2,297	117,972
3	KPK	34,947	1,235	32,248
4	Baluchistan	12,044	138	10,458
5	Islamabad Capital Territory	15,323	173	13,020
6	Gilgit-Baltistan	2,402	58	2,002
7	Azad Jammu and Kashmir	2,164	59	1,971

COVID-19 cases—country-based survey from 26 Feb to 12 Aug (169 days).

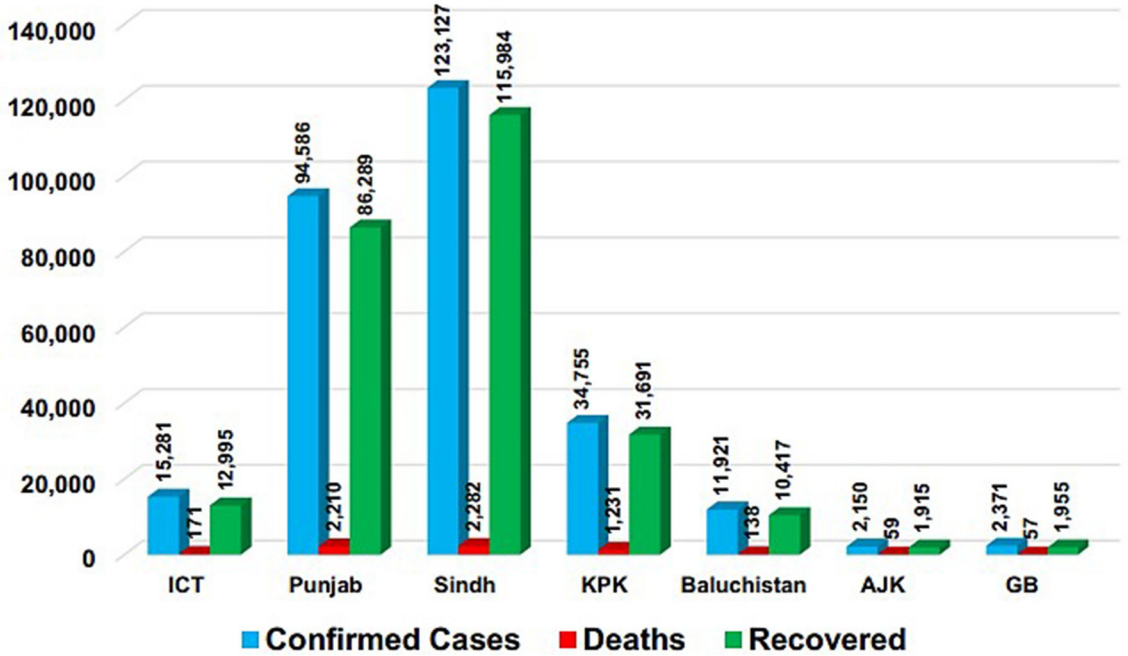


FIGURE 1 | COVID-19 confirmed, recovered, and death cases.

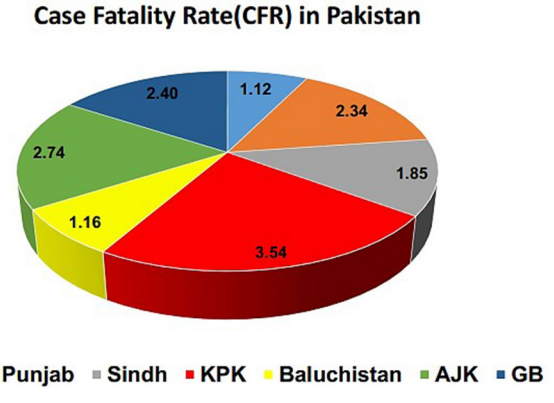


FIGURE 2 | Case fatality rate (CFR).

introduced a National Action Plan (NAP), on 12 February 2020, for "preparedness & response for the governance, status, and situation of COVID-19 in the country."

The central government implemented the NAP all over the country to counter the pandemic spread. The medical staff provided clinical care and health education to the public with remarkable assistance from the government. A relief package was announced for the needy and poor people. Besides, the government enforced lockdown across the country to control the spread of the pandemic. Additionally, media broadcasted daily cases and helped in disseminating critical preventive health measures through audio and video messages across the country. The National Institute of Health (NIH), National Disaster Management Authority (NDMA), and Punjab Disaster Management Authority (PDMA) were also maintaining the data of daily COVID-19 cases. As the government is endeavoring to control the pandemic spread according to WHO guidelines, this study analyzes the adopted methods/measures for their effectiveness in combating the COVID-19 pandemic spread. For evaluating the risk, the data were collected from different sources in the country.

The main objectives of the abovementioned action plan and preventive measure are to stop the spread of COVID-19 and to provide quick response challenges for governance, status, and the situation at each level (federal, provincial, and district) to make the ability for detection, prevention, and expressing responses against COVID-19 outbreak or other novel pandemic disease in the country. The epidemic COVID-19 might have a significant effect on the health status, safety, and culture of the public (25). If the government policies are strictly followed, there would be no difficulty to overtake the pandemic throughout the country.

The study was divided into four sections. The first section defines and gives an insightful picture of the origin of COVID-19 and its background. It is followed by explaining the current scenario and status of COVID-19 in developing countries, with a focus on Pakistan in the *MATERIALS AND METHODS* section.

The *RESULTS* section elaborates on the results of the COVID-19 survey from 26 February to 12 August 2020 (169 days) and explains the impact of quick government response on public health and safety. The last section describes the scope of work, discussion, and conclusion.

MATERIALS AND METHODS

The following three types of data have been used in this study to analyze and predict the results.

The first type is the data collected by the WHO from 26 February to 12 August (1, 14), accessed through open sources of the WHO website. The second source of data was the local administration (district, provincial, and central level). This data was verified by the National Institute of Health (NIH), National Disaster Management Authority (NDMA), Punjab Disaster Management Authority (PDMA), and National Command and Operation Centre (NCOC). They were actively working as the leading sources to gather and eradicate the outbreak data (23, 26). NCOC contains representatives from all provinces, AJK, Gilgit-Baltistan (GB), and ICT under the supervision of the prime minister. The NDMA never had a meeting in the last 2 years that is why the NCOC was established. The third source of data was the collection of information through social media, newspapers, and electronic media. Some of the raw data was collected from the national guidelines (i.e., NAP, presentations, articles, meetings, necessary documents, and other confidential sources). The quality and criteria level were adjusted, such that the data would be collected from the national sources (NIH, Pakistan). Likewise, data collected from other sources were refined and verified through respective authorities such as the NIH, NDMA PDMA, and NCOC.

This research has reported and analyzed the data regarding the methods and policies adopted by the local and central government for quick response to mitigate the effects of COVID-19. Origin 19 and SigmaPlot 12 have been used as data analysis and graphing tools (27, 28). The study has provided a real picture of the number of identified COVID-19 cases. It has evaluated the effectiveness of the government's quick response for public health safety by mitigating the effects of pandemic spread (**Figure 3**). The study is narrative by its nature, and a thematic approach was adopted to analyze and identify the emerging lessons and guidelines.

RESULTS

The central government is endeavoring to take all immediate measures to stop the spread of COVID-19 among the masses. Since 26 February 2020, when the first COVID-19 case was reported in Karachi (Sindh), all available resources were utilized to ensure the safety of the public. Meanwhile, the travel history data of all suspected cases were collected and mitigation strategies

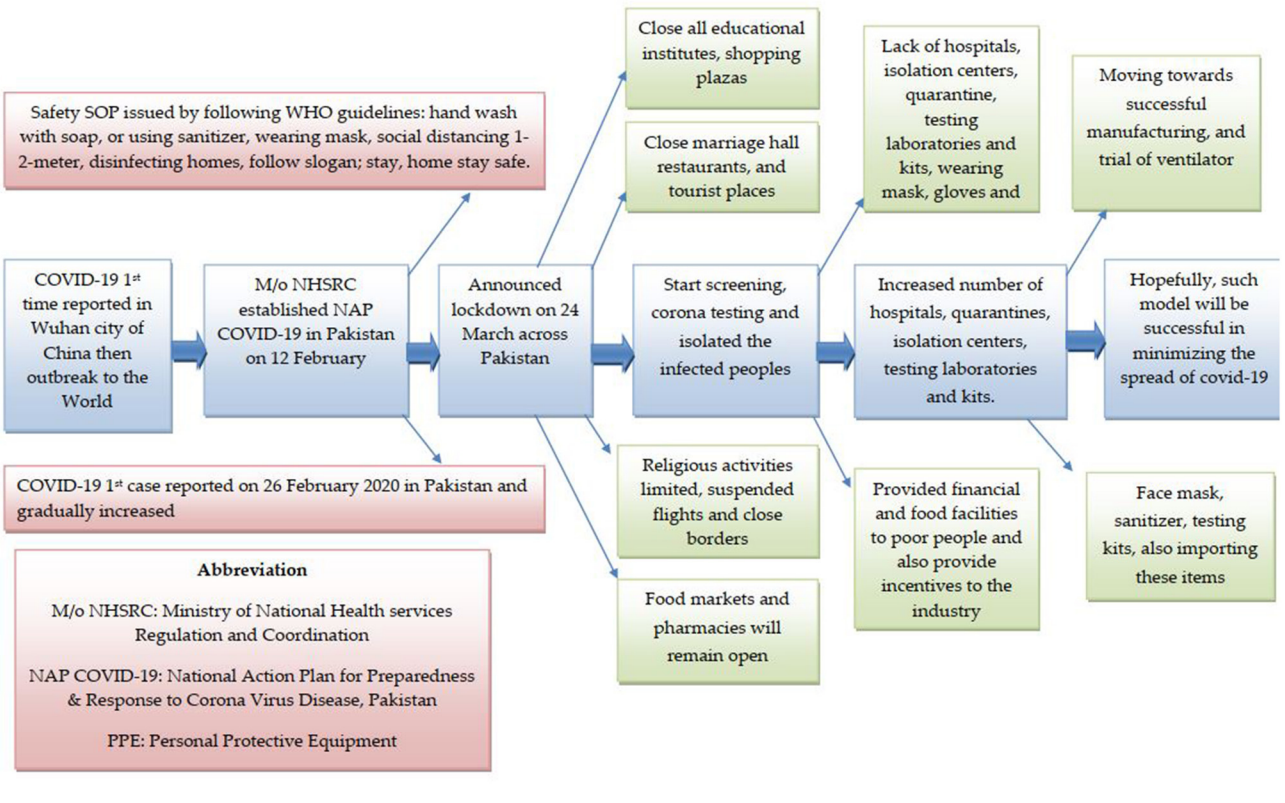


FIGURE 3 | COVID-19 measures taken by the central government.

with all services and measures against COVID-19 were shared with the public. It was followed by collecting the contacts' history for early detection of suspected cases, promoting social distancing and isolation, and establishing quarantine facilities. **Figure 3** shows that many effective measures have been taken by the government against COVID-19 transmission in the country.

Preventive Measures and Rapid Response by Leadership

The NIH arranged an awareness lecture on coronavirus for health professionals and conducted training for doctors and paramedics on infection prevention and control with a particular focus on COVID-19 (23, 29). The government has suspended the international flight operation with China from 26 January to 30 January 2020 in response to the COVID-19 outbreak. The Civil Aviation Authority (CAA) started the screening on Karachi, Islamabad, Lahore, and Peshawar airports for every passenger who came from China (30). The president advised the people in a special media conference to not participate in social gatherings, stop handshaking or hugging, and follow prescribed precautions if any COVID-19 symptoms appear (31). The government suspended all flight operations except Lahore, Islamabad, and Karachi on 13 March 2020 to stop the coronavirus spread. It was decided in the National Security meeting on 13 March 2020 to close all schools, colleges, and universities until 5 April, but it was decided again on 27 March that all academic campuses will remain closed until 31 May due to the increasing number of COVID-19 cases and the teacher will arrange online classes. The government also decided to close all land borders from 16 March and all flights will remain closed from 21 March to the end of April. The railway minister suspended 42 train operations (32, 33). The National Day, 23 March, was celebrated without public gathering and military parade. The president and prime minister requested the nation to defeat the coronavirus with unity, passion, patience, and discipline (31). The military was given orders to assist the medical facilities by using all resources in fighting the coronavirus (34). The Chinese government was also approached to assist in fighting the coronavirus. Accordingly, a team of Chinese health experts arrived in the country. The NIH welcomed the Chinese team; arranged seminars; and made effective discussion on COVID-19 about how to treat, diagnose, control, and manage COVID-19 (35). The State Bank ordered all banks to ensure that cash collected from all clinics and hospitals would be disinfected, sealed, and quarantined before making it available to the public in the market (36).

Provision of Medical Services and Emergency Public Health Response

The NDMA chairman stated that the government was working on making personal protective equipment (PPE) and other resources for healthcare staff. The Health Ministry briefed that 14 metric tons PPE, thermometers, facemasks, gloves, and gowns had been dispatched by the federal government to provinces (33). It was announced that if any person or medical staff dies during the treatment of COVID-19, he/she would be considered as a martyr, and a health relief package would be given to the bereaved family (24, 32, 33). A guard of honor was presented to doctors and paramedic staff as a mark of respect by the army and police on 27–29 March, because they are fighting as frontline soldiers against COVID-19 across the country. The citizens together with celebrities raised white flags from their roofs and balconies on 27 March across the country to express their love and passion for healthcare staff who are selflessly fighting against COVID-19 (37). The federal government also decided to provide a 1-month additional salary package to healthcare staff regarding their services against COVID-19 (38). Moreover, the NIH is playing an important role in the COVID-19 outbreak. Before the COVID-19 outbreak in the country, the NIH had already raised radical steps to stop the COVID-19 disease transmission. On 22 January 2020, the NIH arranged an awareness lecture about COVID-19 disease for healthcare professionals on a priority basis. On 10 February 2020, there was a training session on strengthening chemical and biological waste management, while on 18 February 2020, the NIH conducted a training on infection prevention and control for doctors and paramedics. On 26 February, the Health Ministry introduced NAP for preparedness and response for COVID-19. According to this plan, standard operating procedures (SOP) and guidelines are given to control and prevent the COVID-19 through epidemiological action such as how to early detect, observe, and isolate the suspected and confirmed COVID-19 cases. Such epidemiological action became compulsory for everyone who entered the country from 26 February onwards, once the first case was reposted in the country. A helpline 1166 was established for reporting COVID-19 cases across the country. Total confirmed and active cases as well as death and recovered cases were broadcasted daily on every moment by almost all national channels. The designated hospitals, isolation and quarantine centers, and testing laboratories for COVID-19 are established in the country in collaboration with the NIH. The frontline soldiers such as healthcare staff played a critical role against COVID-19. They facilitated the public by providing health education and preventive services. They helped in identifying and separating the people who had come recently from the epidemic areas or remained in contact with COVID-19 patients and guided them through NIH guidelines. They also identified the local isolation centers, provided physical monitoring such as fever, and referred the suspected cases to designated places if necessary (24, 26).

Designated Hospitals for COVID-19 in the Country

The government has implemented many policies and preventive measures for improving the governance system, situation, and status of the COVID-19 outbreak in the country. Many hospitals are fighting against COVID-19 for public health. Moreover, the government has approved specific hospitals for suspected and confirmed COVID-19 patients. Such hospitals are equipped with PPE, diagnostic laboratory, and other necessary equipment. The nominated focal person of infection prevention and control (IPC) is responsible to make sure that the IPC guidelines are followed. The guideline/SOP for waste management at airports,

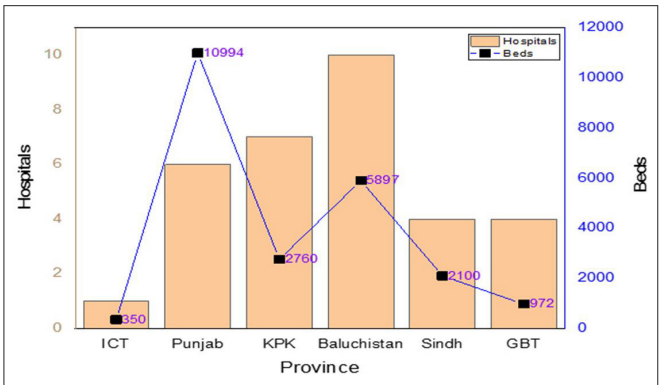


FIGURE 4 | Designated hospitals to treat COVID-19 patients.

hospitals, and other places has been implemented; likewise, SOP was also introduced for disinfection and environmental decontamination. In Islamabad, there is only one hospital with 350 beds, while Baluchistan has 10 hospitals with 5,897 beds, Khyber Pakhtunkhwa (KPK) has seven hospitals with 2,760 beds, Punjab has six hospitals with 10,948 beds, Sindh has four hospitals with 2,100 beds, Gilgit-Baltistan has four hospitals with 972 beds, and Azad Jammu and Kashmir (AJK) has three hospitals with 530 beds as shown in **Figure 4** (39).

Province-Wise Hospitals With Isolation Facilities for COVID-19

To mitigate the transmission of infections, infected patients are separated from other patients. The designated hospitals for isolation were distributed district wise. Only one isolation center is available in Islamabad containing 10 beds. Baluchistan has 11 districts and 14 medical services with 534 beds, whereas 33 districts and 110 medical facilities are available with 856 beds in KPK. Punjab has 34 districts, and 50 medical facilities are functional with 955 beds. Sindh has four districts, and four medical facilities are functional with 151 beds. Gilgit-Baltistan (GB) has 10 districts and 21 medical units with 126 beds, while the Azad Jammu and Kashmir have nine districts and 15 medical units with 310 beds. The number of patients and beds depends on the active cases of COVID-19 (24, 39).

Province-Wise Quarantine Facilities for COVID-19

Quarantine was implemented to separate or restrict routine activities of suspected patients in non-medical care unit. The symptoms of such suspected patients have not been exposed yet but might get exposed after some days. The primary objective is to monitor the symptoms and early detection of contagious disease such as coronavirus. The total number of quarantine centers are 23,557 in 139 districts throughout the country. Islamabad holds two quarantine centers with 350 beds. Sindh has two with 2,100 beds, Azad Jammu and Kashmir has four with 530 beds, Punjab has six with 10,948 beds, Baluchistan has 10 with 5,897 beds, KPK has 52 with 5,760 beds, while Gilgit-Baltistan has 63 with 972 beds (23, 39).

Testing Facilities in the Country

The polymerase chain reaction (PCR) is being used globally as a reliable method for COVID-19 detection. The government implemented the PCR protocol. There were 15 laboratories since the COVID-19 outbreak started. To expand the testing capacity on a daily basis, the NDMA is collaborating with the NIH to increase the number of laboratories. Now, 57 laboratories are working throughout the country, such as Islamabad-04, Baluchistan-03, KPK-06, Punjab-18, Sindh-09, AJK-03, Gilgit-Baltistan-02, and Armed Forces-12. These laboratories are equipped with a PCR system, providing free test facilities for the public for COVID-19 detection. Such laboratories are doing 30,000 tests per day. The government has increased testing capacity from 30,000 to 280,000 and probably would be further enhanced to 900,000. A training program for medical staff was arranged, as well as the NDMA would increase the number of technicians and experts in a molecular biology lab. Some of the updated statistics about the tests are shown in **Table 3** (23).

Impact of Lockdown/Smart Lockdown

The lockdown started on 24 March 2020 throughout the country (32, 33, 40). On 2 April, it was further extended until 30 April. However, on 24 April, the government again decided to continue the lockdown until 9 May (30, 32, 41). After 9 May, the lockdown was lifted, but all shopping malls were closed except medicine stores; pharmacy; supermarkets; and vegetable and fruit, meat, and chicken shops. Permission was granted to only one family member to buy food items. On 18 June, smart lockdown was announced with the instructions to keep the markets open on Saturday and Sunday, while remaining closed during other weekdays. It was lifted on 3 August (**Figure 5**). During the period, the number of cases decreased very quickly, and the economy started to rise again. Social distancing was compulsory to anywhere, and the use of hand sanitizer and wearing a mask were made essential (37).

Public Relief Package and Financial Assistance

The federal government issued $10 million from the World Bank to the Sindh province, and Sindh Governor Imran Ismail appreciated these steps and stated that the federal government played the central role in fighting the coronavirus and also provided the ration (food) to the families of COVID-19 patients (23, 24). The government decided on 26 March 2020 to get $3.7 billion supplementary funding from three mutual creditors and additional finance of $1.4 billion from the International Monetary Fund (IMF) to manage the COVID-19 outbreak. Besides, the country will get the extension for the $1 billion and $1.25 billion loans from the World and the Asian Development Bank. On 27 March, the prime minister announced the force designated as the Corona Relief Tiger Force (CRTF) to help the government across the cities impede the COVID-19 outbreak. This tiger force's primary objective is to supply food items sharply in a more secure or arranged way to the needy and poor people affected by COVID-19 (37, 42). The prime minister also announced Rs. 1.2 trillion relief packages on 24 March. Rs. 150 billion was allotted to laborers or low-income groups

TABLE 3 | Province-wise COVID-19 lab and hospitalized records.

Province	Lab Status		Hospitalized				Isolation	Recovered	Deaths
	Tested	Positive	Stable	On low-flow oxygen	On high-flow oxygen	On vent.			
AJK	29,049	2,150	11	04	01	00	161	1,915	59
Baluchistan	64,716	11,921	00	01	06	00	1,359	10,417	138
GB	16,909	2,371	70	19	01	00	269	1,955	57
Islamabad	207,700	15,281	15	20	02	22	2,056	12,995	171
KPK	223,922	34,755	34	29	65	16	1,689	31,691	1,231
Punjab	788,860	94,586	299	114	166	72	5,472	86,389	2,174
Sindh	834,655	124,127	156	69	137	36	5,463	115,984	2,282

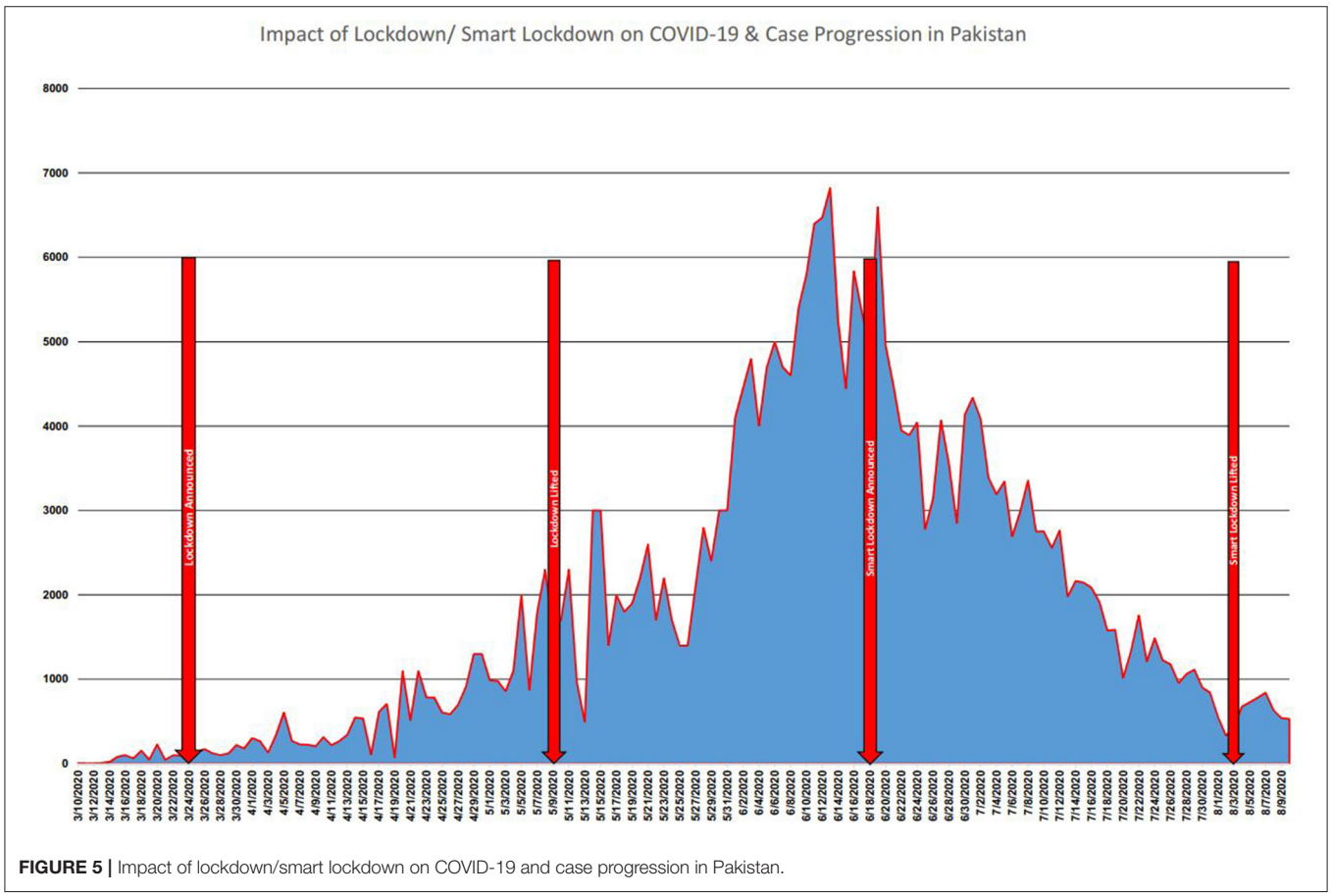


FIGURE 5 | Impact of lockdown/smart lockdown on COVID-19 and case progression in Pakistan.

while Rs. 280 billion for wheat procurement (43). A package of Rs. 100 billion was announced to support small industries and agriculture. A Rs. 5.2-million package was fixed for the Benazir Income Support Program (BISP), and the monthly stipend of BISP has also been increased from Rs. 2,000 to Rs. 3,000 under this program. It was decided that the needy people would be selected based on local administration authority data (44). The economic relief package was approved by the Federal Cabinet on 31 March and a supplementary Rs. 100 billion emergency relief fund to mitigate the COVID-19 outbreak was issued. Another special relief package was released under the Ehsaas Program for the 12 million poor families, where cash assistance was provided to every needy person under the Kafalat Program (24). The government fund was distributed after biometric verification through the banks, as a one-time allowance for 4 months (Rs. 12,000) or in two installments of Rs. 6,000. By mid-April 2020, 1.77 million poor people received Rs. 22.466 billion as a mark of assistance (37).

Multi-Sectoral Approach

The national media acted as a powerful weapon to educate the public and reduce hopelessness, depression, and anxiety during the COVID-19 outbreak. From the 1st day of the coronavirus outbreak, the media houses supported the NIH in disseminating the information to control COVID-19. The NIH and government's website, official newspapers, and open TV channels aired the NIH health message to the public for the eradication of COVID-19. Also, daily COVID-19 cases across the country and globally were updated. Media was allowed to trace high-risk groups of COVID-19 patients across the country and broadcast their epidemiological information at the end of March 2020, when the number of COVID-19 cases increased gradually, as many people started returning to the country. The national media invited many doctors and health experts to guide the people regarding COVID-19 diseases on daily bases. They arranged many talk shows and informative programs in which they discussed and corrected the misinformation regarding the COVID-19 outbreak. They also launched 24/7 COVID-19 hotline numbers for providing help and for reporting COVID-19 cases in case of emergency. Besides, the Aga Khan University Hospital launched a mobile app "Corona Check" for the public where they can easily monitor their symptoms and get awareness regarding COVID-19 (45). The repeated promotion of social campaigns in video messages (30 s to 1 min), such as frequent washing of hands with soap, use of hand sanitizer, wearing a face mask, and social distancing on social and electronic media, proved very fruitful in changing the public behavior toward COVID-19 pandemic. Transparent COVID-19 updates are a clear representation of government policies against COVID-19 disease. Additionally, the NIH and NDMA produced a social media account where messages are delivered to everyone on their mobile phones to give notice of COVID-19 preventive measures (25, 37).

Impact on Country

The COVID-19 pandemic has affected the country's economy suffering a loss of Rs. 2.5 trillion (46). Yet, the government hired 60,000 people to maintain the "Plant Restoration Program," thus reducing the unemployment rate across the country during the pandemic crisis (23). Health Minister Dr. Zafar Mirza has also requested India to lift the lockdown in Indian-occupied Kashmir and allow them to take preventive measures during the video conference of the South Asian Association for Regional Cooperation (SAARC) (30). Prime Minister Imran Khan requested the USA president to lift or ease the restriction on Iran until the COVID-19 outbreak is ended (43). The Cricket Board has postponed the Super League (47). On 16 March, it was announced that the Football League has been postponed (33, 37). Tablighi Jamaat conducted a religious gathering that has potentially stimulated the pandemic crisis in public (48). Cardinal Joseph Coutts of the Catholic Church urged his followers to strictly act upon preventive measures to reduce the transmission of coronavirus and emphasized for interfaith unity during the pandemic period. He also stated that there is no need to come to church, mosque, or other religious places for worship and requested to pray at home to save the public from the current pandemic disease (49).

The Aga Khan University (AKU) has conducted a seroprevalence survey on COVID-19 pandemic in different parts of Karachi with a low and high transmission rate in April and June. About 2,000 participants have participated in the current survey. The faculty of AKU investigated and found that 95% of people positive for COVID-19 in their blood tests were without reported symptoms such as fever, sore throat, and cough and designated as asymptomatic. According to the researcher, the ratio of asymptomatic cases in Pakistan is much more than the developed countries. The outcomes of COVID-19 seroprevalence survey showed that the pandemic virus equally spreads to adults, adolescence, and children or to men and women. Moreover, COVID-19 cases sharply rose during April and June from 0.2 to 8.7% in low transmission sites such as the Ibrahim Hyderi area, whereas it rose from 0.4 to 15.1% in high community transmission sites such as Dalmia/Shanti Nagar, Faisal Cantonment, Pehlwan Goth, and Safoora Goth. According to the federal government seroprevalence study, overall, 11% of people had been infected with the disease in Pakistan. The sharp increase in the antibody level in areas with low reported cases indicates free and continuous transmission of the virus in such a community where antibody testing rates are sub-optimal. Seroprevalence survey of antibody testing represents a clear image of the COVID-19 pandemic as they investigated asymptomatic patients that are designated as silent virus carriers of the disease. Hence, there is a need to establish effective and preventive measures to control and break the chains of COVID-19 transmission across the country (50).

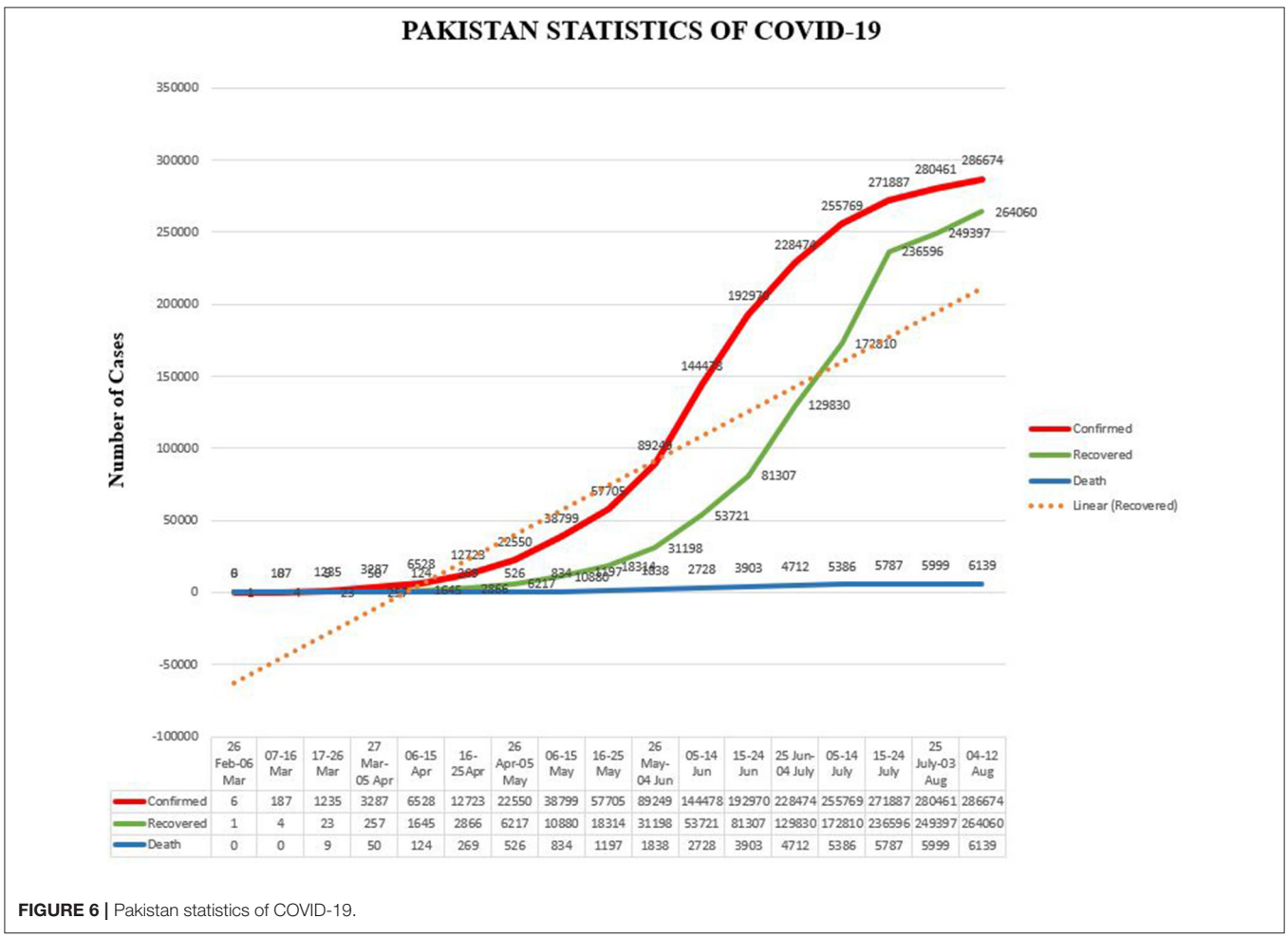
Challenge

Despite the preliminary achievement in curtailing the transmission of COVID-19 disease throughout the country, many challenges are yet to be tackled with limited resources. There is a shortage of PPE, facemasks, gloves, and medical equipment in hospitals (24, 32). The total number of designated hospitals, isolation wards in hospitals, quarantine centers, number of testing laboratories, and testing kits are not enough to cater to the public needs, due to the decline in the country's GDP and limited funds. The government is trying to look at the best suppliers from different sources to ensure sufficient medical staff according to the needs of hospitals and also increasing the number of hospitals and testing laboratories by releasing more funds. Alarmingly, the government has no exact data about those people who recently entered the country and they might be risking the whole country. Moreover, people are not well-educated; lack of awareness exists about the COVID-19 pandemic, and some people are spreading fake news. The biggest problem in the country is economic constraints. Although the government is trying to fulfill the needs of the public according to limited resources, people get panic about their food and business during the lockdown scenario. Some people are getting infected with the coronavirus across the country because they ignore the preventive measures mentioned by the NIH.

Governance Success on Public Safety and Effective Management

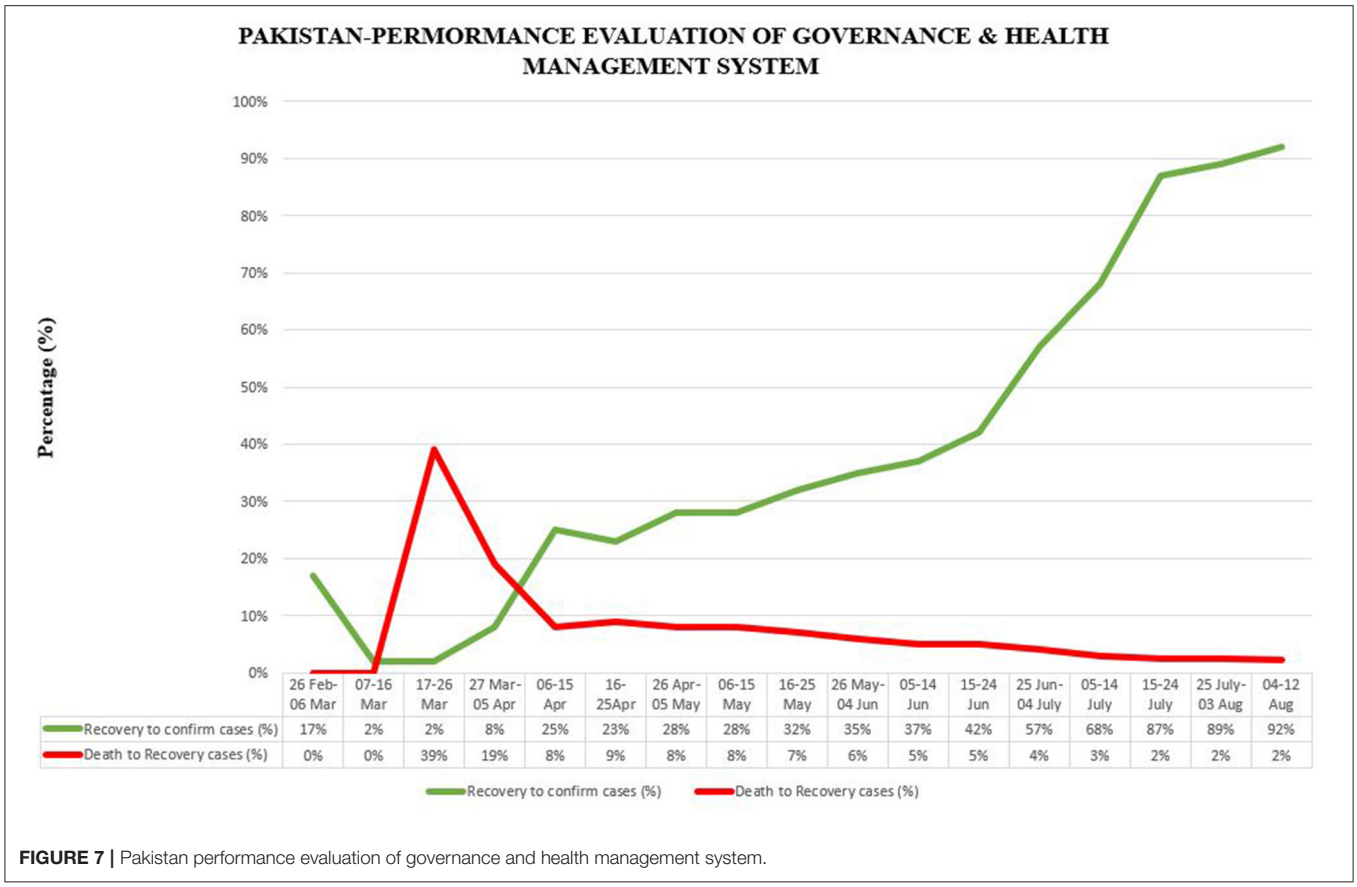
It was expected that COVID-19 would adversely affect the public health and economy of the country. Hence, the government implemented many governance policies along with imposing complete lockdown and taking preventive measures. However, the number of COVID-19 cases increased rapidly in May 2020. Being a developing country, Pakistan could not bear a complete lockdown for a long time, so Prime Minister Imran Khan decided to change it into a smart lockdown. The Bill Gates and Nobel Prize-winning scientist Michael Levitt appreciated the smart lockdown policy of the prime minister and stated that complete lockdown is not good for people's health (23). The WHO praised Pakistan's policies against the coronavirus and the head of WHO was happy to see the reduction in the number of COVID-19 cases since the end of June (14). Seven major hospitals in Lahore were cleared from COVID-19 patients, and 75–80% of COVID-19-infected patients recovered. A reduction of 28% was observed in the use of oxygen cylinders and ventilators by COVID-19 patients. Moreover, smart lockdown, coupled with an anti-corona campaign and home isolation policy for infected people, resulted in a drop of <3,000 active COVID-19 cases across the country (23, 51). A few weeks ago, the daily COVID-19 infection ratio was between 22 and 23%, but this ratio has declined to 12 and 13% per 100 patients currently, as shown in **Figure 6**. Due to the implementation of smart lockdown, SOPs, governance policies, and preventive measures, the number of newly reported cases of COVID-19 and deaths significantly reduced. Likewise, the number of recoveries increased after 10 July. Thus, government strategies, such as organized task force, complete lockdown, public relief funds, efficient role of health experts, social distancing, using hand sanitizer or soap to disinfect hands, wearing face mask, and especially imposing the smart lockdown, has successfully mitigated the COVID-19 outbreak. Pakistan has almost countered the COVID-19 spread, and the number of reported cases has declined up to minimum.

Further, a clear impact of effective government responses (health management system) and the implementation of an efficient emergency system can be observed, as the ratio of confirmed and reported cases started to reduce, as displayed in **Figure 6**. Another major concern was to reduce the conversion of confirmed cases to deaths, which also started to reduce after implementing an efficient management system. It can be observed in **Figure 7** where green lines show improvement in



	26 Feb-06 Mar	07-16 Mar	17-26 Mar	27 Mar-05 Apr	06-15 Apr	16-25Apr	26 Apr-05 May	06-15 May	16-25 May	26 May-04 Jun	05-14 Jun	15-24 Jun	25 Jun-04 July	05-14 July	15-24 July	25 July-03 Aug	04-12 Aug
Confirmed	6	187	1235	3287	6528	12723	22550	38799	57705	89249	144478	192970	228474	255769	271887	280461	286674
Recovered	1	4	23	257	1645	2866	6217	10880	18314	31198	53721	81307	129830	172810	236596	249397	264060
Death	0	0	9	50	124	269	526	834	1197	1838	2728	3903	4712	5386	5787	5999	6139

FIGURE 6 | Pakistan statistics of COVID-19.



	26 Feb-06 Mar	07-16 Mar	17-26 Mar	27 Mar-05 Apr	06-15 Apr	16-25Apr	26 Apr-05 May	06-15 May	16-25 May	26 May-04 Jun	05-14 Jun	15-24 Jun	25 Jun-04 July	05-14 July	15-24 July	25 July-03 Aug	04-12 Aug
Recovery to confirm cases (%)	17%	2%	2%	8%	25%	23%	28%	28%	32%	35%	37%	42%	57%	68%	87%	89%	92%
Death to Recovery cases (%)	0%	0%	39%	19%	8%	9%	8%	8%	7%	6%	5%	5%	4%	3%	2%	2%	2%

FIGURE 7 | Pakistan performance evaluation of governance and health management system.

patients and red lines, trending downside, show a decrease in the number of deaths.

During the COVID-19 outbreak, Pakistan has successfully overcome the COVID-19 pandemic with limited resources as compared to other developed countries. Dr. Zafar Mirza has shared his experiences and designed some strategies to control the pandemic disaster during an interview with the News Channel. He has performed his duties as special assistant to the prime minister of Pakistan for the National Health Services, Regulation and Coordination Program from April 2019 to July 2020. He has organized some rules for the improvement of COVID-19 mitigation or future pandemic disaster (52).

(a) There is no legal basis to declaring a health emergency, yet. Although such a draft bill has already been prepared and sent to the cabinet, there is a need to peruse it for future challenges.
(b) There should be a strong collaboration between government, armed forces, and civilian department, but such collaboration is too difficult between provincial and federal government for the sake of rehabilitation at each level.
(c) The NDMA was established before NCOC, but recently, the NCOC has played an effective role during the COVID-19 pandemic and needs improvements for future challenges.
(d) According to the evaluation of the International Health Regulation (2005) and Joint External Evaluation by WHO (2016), there were reforms and comprehensive recommendations initialized regarding health threats. Now, there is a need to implement the reforms and recommendations.
(e) During the COVID-19 pandemic, the Central Health Establishment has organized quarantine and screening centers at airports (19 points of entry) across the country to control the spread of coronavirus, but there is a need for more strict measures for future challenges.
(f) There is a lack of digital national disease surveillance systems and epidemiologists. It is necessary to have epidemiologists and digital disease surveillance system at each district level to control the spread of COVID-19 and any other pandemic disaster. Moreover, epidemiologists should be in the driving seat for the control of pandemic disaster.
(g) The NCOC has been transparent in updating information among people during the pandemic period, but information sharing of detailed case data is lacking, which should be improved in the future.
(h) There was a shortage of critical care experts and ICU beds (<50), but the NCOC has maintained 2,608 ICU beds across the country until 31st July. There was also an organized training program in critical care but it needs more ramp-up planning for future challenges.

(i) The houses of COVID-19 patients were marked for testing. Some people have discriminated the patients, so there is a need to change people's perception regarding diseased people.
(j) Taken together, electronic media has sent text messages to and changed the COVID-19 ring tone of 167 million mobile phone users for awareness, but some people have shared wrong information on social and electronic media. There is a need to establish strict rules for such actions.

Immunity Level

Pakistan is located in the Asian Continent where sunlight is easily available to the public throughout the year and the duration of the winter season is very short. It is believed that the winter season is the most favorable for the transmission of epidemic diseases, such as pneumonia, typhoid fever, dengue fever, and other respiratory diseases. A hypothesis exists about sunlight and its effects that exposure to sunlight produces melatonin pigment and vitamin D. Similarly, vitamin D reduces acute respiratory tract infection (53). However, this medical stance of sunlight exposure and serum Vit-D levels of Pakistani people is still to be investigated by medical researchers. Deficiency of vitamin D causes many problems like bone problem and compromised immune system. We should maintain the optimum level of vitamin D with the required daily dose in case of deficiency because vitamin D acts as an immune modulator (46, 54). When seasonal factors change according to weather periods or region conditions, new levels of susceptibility appear among the population. Consequently, recurrent episodes of epidemic diseases may be produced each year at the same time like the current epidemic disease (55).

COVID-19 might be transmitting easily in the winter season than the summer season with an unknown mechanism like pandemic flu. It is believed that novel human coronavirus mostly attacks an immune-compromised patient, and it can still be transmitted outside of the winter period. Previously, it was believed that coronavirus does not affect children, but recent studies proved that it might be affecting children like adults (56). The optimum level of vitamin D acts as a defense against infection and can reduce viral load. Currently, there is no available standard treatment for COVID-19, but we can take vitamin D as a prophylactic measure to reduce the respiratory tract viral infection. Thus, there is a direct relationship between vitamin D and COVID-19 susceptibility and this could be used as an important element against the coronavirus pandemic (57, 58). Particularly, vitamin D is only a single source for immunity, but many other sources can provide immunity against any disease such as vitamins A, B, and C-containing plant; natural herbs; foods; magnesium; zinc; water; and micronutrients (59).

DISCUSSION

The COVID-19 pandemic has significantly affected the global health structure and become a colossal challenge to the world. The government of every country needs to implement effective measures and strengthen the policies for the governance system to control the COVID-19 cases in the region. The experience of dealing with COVID-19 cases necessitates implementing effective measures and strategies, not only for slowing down the spread of the COVID-19 outbreak but also for the early diagnosis, detection, prevention, and treatment SOP/guidelines. In preparation for the rapid spread of coronavirus throughout the world, the Government of Pakistan introduced many guidelines and SOPs to objectively reduce the COVID-19 transmission across the country. A task force has been established to help the public, with the strong support of law enforcement agencies, health experts, administrative staff, and policymakers. They are leaving no stone unturned to implement government policies, enforce preventive measures all over the provinces, strengthen their ability for early screening and detection of COVID-19 suspected persons, and provide timely response against COVID-19 and other pathogenic diseases. These strategies would help in eradicating and reducing the COVID-19 infection in the country. They could also be adopted as an effective prevention and control framework by other infected states who are experiencing a similar epidemic situation. The Ministry of Health has presented the NAP for Preparedness and Response to control the COVID-19. Many effective and preventive measures have been taken under this plan through collaboration with strong leadership. Keeping aside political gains, the leadership played a critical role in the implementation of preventive measures across the country at every level. During the forced lockdown throughout the country, all types of traffic and flight movements were frozen. Collective religious gatherings and social activities were banned, and even the National Day celebration (i.e., 23rd March parade, was canceled). All markets, shopping malls, mosques, and educational institutions were closed. Such strict actions were taken in the larger interest of the nation because there is only one proven treatment for such pandemic disease that is self-care and social distancing, which was rigorously enforced by the governments of South Korea, Japan, India, Bangladesh, Kuwait, Nigeria, Vietnam (1, 6, 13, 15–19), and other developing and non-developing countries.

The health system (NIH network, doctors, paramedics, and hospitals) played an important and effective role to control, prevent, and manage the spread of COVID-19. The health system provided medical facilities, courage, and patience to the whole nation as well as clear action in early diagnosing and detection of confirmed or suspected COVID-19 cases. Moreover, the isolation and quarantine SOPs were implemented strictly at each level to ensure a 14-days isolation period particularly for those who have travel histories. For morale boosting, the government decided to present tributes to the medical staff from 27 to 29 March, and the guard of honor was presented to the doctors and paramedics staff for their selfless services. Besides, white flags were raised on the roof of houses to express the love for medical practitioners who are working as frontline soldiers against the COVID-19 pandemic spread. The media also played a very supportive role in controlling the transmission of coronavirus. The social or electronic media broadcasted the repeated promotion of social campaigns in video messages (30 s to 1 min), such as frequently washing hands with soap and

using hand sanitizer, wearing a facemask, maintaining social distancing, and stay home stay safe. It proved to be very fruitful in changing the public perception toward COVID-19 transmission. Likewise, transparent and quick COVID-19 updates helped to present the clear image of government policies against COVID-19 disease. During the current epidemic spread, many developing countries are facing the major problem of the decline in their GDP rate, due to closed industries and businesses and lack of import/export. However, the current pandemic could not adversely affect Pakistan's economy due to the control of the spread of COVID-19, compared with other developing countries, as summarized in **Table 1**. Moreover, the AKU researchers have conducted a seroprevalence survey on the COVID-19 disaster on Sep 7, 2020. In this survey, AKU collaborated with the federal government and collected data when COVID-19 cases were rising in April and June, but Pakistan has successfully overcome the COVID-19 cases in July with the implementation of strict measures taken by the government (50). Recently, Dr. Zafar Mirza has shared his experience on Sep 19, 2020, in an interview, and pointed out the lack of strategies implemented during the COVID-19 pandemic. He emphasized that we should learn from the COVID-19 disaster and improve on the things that are lacking right now in future challenges. He has identified several facts which need to be addressed for the safe future of Pakistan. These facts include the lack of a legal basis to declare a medical emergency, missing vertical collaboration between federal and provincial governments, failure of the NDMA (they never had a meeting in the last 2 years that is why the NCOC was established), lack of core capacities to respond to health threats as per IHR regulations, Central Health Establishment (CHE)'s limited power to screen people from entry points in the country, the need for a robust and real-time digital national disease surveillance system and a resourceful rapid response team for data collection and management (to monitor significance of data transparency), shortage of ICU beds and critical care specialists, and the need for proper risk communication and community engagement via direct leadership interaction and media campaigns. By addressing these factors, many developing countries can improve their health infrastructure to respond to these types of pandemic (52).

COVID-19 mostly affects immune-compromised weak patients. The immune system can be boosted up by a continuous supply of vitamin D thereby eradicating respiratory tract infection (60). Vitamin D can be obtained at an excess rate under the sunlight. Recently, a fewer number of COVID-19 cases are observed in Pakistan than other countries (23). Hence, it was thought that the decreased number of reported COVID-19 cases in Pakistan might be due to the optimum level of vitamin D that strengthens the immune system and produces protection against COVID-19. Many factors have reduced the number of COVID-19 cases, but immunity might be one factor that can help in a pandemic disaster. Moreover, vitamin D is not only the single source that can provide immunity but there are also other sources such as green leafy vegetables; vitamin A, C, and D-containing foods; water; magnesium; and zinc; they all strengthen the immune system against infection, disease, or specifically the COVID-19 pandemic (58). The central management was established to develop trust between the public and the government. The government and health ministry strongly emphasized on the central governance and leadership to fight against COVID-19. It is of note that daily health reporting data (personal and family) should be kept transparent; otherwise, trust relationships between the government and public will fade away. The central and provincial governments have enforced rigorous policies and the above-stated practices to control the on-going COVID-19 outbreak, thus resulting in a limited number of COVID-19 cases and a few deaths, as compared to China and other developed and developing countries.

CONCLUSION

COVID-19 has rapidly spread worldwide in 216 countries including the USA, Spain, France, UK, Italy, and many developing countries. In this paper, on-going experiences and the current status and situation of COVID-19 cases in Pakistan are presented. Moreover, a well-tested method has been discussed to reduce the spread of the COVID-19 outbreak, which is expected to be implemented in other countries having similar financial constraints. The country's response to COVID-19 is characterized by enforcing preventive actions, rapid response by leadership, strict and smart lockdown scenarios, adequate provision of medical services and emergency public health response, as well as a multi-sectoral approach. The current situation in Pakistan regarding the COVID-19 outbreak is much satisfactory, and it needs more effectiveness in the government's performance to eradicate the impact of the outbreak. Being a developing country, financial constraints particularly falling down GDP have impeded the process of combating COVID-19, like other countries. There is a dire requirement of building new hospitals and establishing isolation centers and testing laboratories. As Pakistan successfully dealt with the current epidemic spread, despite being a developing country and having limited resources, the stated practices, policies, and experiences may be considered by other countries as "effective prevention strategies" to stop COVID-19 transmission. There is also a need to enhance public awareness to follow the preventive measures, maintain social distancing, stay at home, and not go outside without any emergency. If the public positively collaborates with the government, task force, and law enforcement agencies, the war against COVID-19 can easily be won. The government is endeavoring to develop a COVID-19 vaccine in collaboration with Sinopharm (a Chinese pharmaceutical company) since April 2020 (23). It is believed to be the best medical innovation project in the research history of Pakistan. The findings of this study will help the key stakeholders in the government to improve the health management system in the country during the fight toward COVID-19 eradication and also in preparation for the potential coronavirus rebound in the coming fall/winter. It also could be used as a tool for combating coronavirus in other countries having equal working performance and similar financial limitations.

DATA AVAILABILITY STATEMENT

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found at: https://pdma.punjab.gov.pk/covid19_pdma_reporting_detail, https://www.nih.org.pk/, https://covid19.who.int/.

AUTHOR CONTRIBUTIONS

AN conceived and designed the concept and wrote the paper. AN and MB performed the literature review. AN and AA contributed in the data collection. SA and FB helped to provide technical support to collect the data. AN and SI contributed in analysis tools. XS has supervised the work. HZ and SR reviewed the work to improve the outcomes. All authors have read and agreed to the published version of the manuscript.

FUNDING

This research is fully funded by the China Scholarship Council, the National Natural Science Foundation of China (71971196), and Zhejiang University, China.

ACKNOWLEDGMENTS

We are thankful to the representatives of central and provincial governments and senior officers of the NIH, PDMA, and NDMA who helped us in collecting this study's data and provided a real picture of the current situation of COVID-19 spread, governance public health policies, safety management system, and the upcoming endeavors of the government to eradicate the COVID-19 effect for our research work.

REFERENCES

1. WHO. *Corona Virus Disease (COVID-19) Pandemic, 2020*. (2020) Available online at: https://www.who.int/emergencies/diseases/novel-coronavirus-2019 (accessed May 1, 2020).
2. Lin Y, Hu Z, Alias H, Wong LP. Knowledge, attitudes, impact, and anxiety regarding COVID-19 infection among the public in China. *Front Public Heal.* (2020) 8:236. doi: 10.3389/fpubh.2020.00236
3. Maliszewska M, Mattoo A, Van Der Mensbrugghe D. The potential impact of COVID-19 on GDP and trade: a preliminary assessment. *Policy Research Working Paper;No. 9211*. World Bank: Washington, DC. © World Bank. (2020) Available online at: https://openknowledge.worldbank.org/handle/10986/33605 (accessed September 01, 2020).
4. Nawaz A, Su X, Iqbal S, Zahoor H, Asad A, Asghar S, et al. Validating a phenomenological mathematical model for public health and safety interventions influencing the evolutionary stages of recent outbreak for long-term and short-term domains in Pakistan. *Complexity*. (2020) 2020:8866071. doi: 10.1155/2020/8866071
5. Chinazzi M, Davis JT, Ajelli M, Gioannini C, Litvinova M, Merler S, et al. The effect of travel restrictions on the spread of the 2019 novel coronavirus (COVID-19) outbreak. *Science*. (2020) 368:395–400. doi: 10.1126/science.aba9757
6. Shim E, Tariq A, Choi W, Lee Y, Chowell G. Transmission potential and severity of COVID-19 in South Korea. *Int J Infect Dis*. (2020) 93:339–44. doi: 10.1101/2020.02.27.20028829
7. Wang CJ, Ng CY, Brook RH. Response to COVID-19 in Taiwan: big data analytics, new technology, and proactive testing. *JAMA*. (2020) 323:1341–2. doi: 10.1001/jama.2020.3151
8. Raboisson D, Lhermie G. Living with COVID-19: a systemic and multi-criteria approach to enact evidence-based health policy. *Front Public Heal.* (2020) 8:294. doi: 10.3389/fpubh.2020.00294
9. Adegboye OA, Adekunle AI, Gayawan E. Early transmission dynamics of novel coronavirus (COVID-19) in Nigeria. *Int J Environ Res Public Health.* (2020) 17:3054. doi: 10.3390/ijerph17093054
10. Onder G, Rezza G, Brusaferro S. Case-fatality rate and characteristics of patients dying in relation to COVID-19 in Italy. *JAMA*. (2020) 323:1775–6. doi: 10.1001/jama.2020.4683
11. Al-Hanawi MK, Angawi K, Alshareef N, Qattan AMN, Helmy HZ, Abudawood Y, et al. Knowledge, attitude and practice toward COVID-19 among the public in the Kingdom of Saudi Arabia: a cross-sectional study. *Front Public Heal.* (2020) 8:217. doi: 10.3389/fpubh.2020.00217
12. Mihaela Rus, Mihaela Lumini?a Sandu TT. A new decade for social changes. *Tech Sci J.* (2020) 6:69–87. doi: 10.47577/tssj.v9i1
13. Tanne JH, Hayasaki E, Zastrow M, Pulla P, Smith P, Rada AG. Covid-19: how doctors and healthcare systems are tackling coronavirus worldwide. *BMJ.* (2020) 368:m1090. doi: 10.1136/bmj.m1090
14. WHO. *WHO Coronavirus Disease (COVID-19)*. (2020) Available online at: https://covid19.who.int (accessed May 15, 2020).
15. Almeshal AM, Almazrouee AI, Alenizi MR, Alhajeri SN. Forecasting the spread of COVID-19 in Kuwait using compartmental and logistic regression models. *Appl Sci.* (2020) 10:3402. doi: 10.3390/app10103402
16. Anwar S, Nasrullah M, Hosen MJ. COVID-19 and Bangladesh: challenges and how to address them. *Front Public Heal.* (2020) 8:154. doi: 10.3389/fpubh.2020.00154
17. Abdi M. Coronavirus disease 2019 (COVID-19) outbreak in Iran: actions and problems. *Infect Control Hosp Epidemiol.* (2020) 41:754–5. doi: 10.1017/ice.2020.240
18. Sun P, Lu X, Xu C, Sun W, Pan B. Understanding of COVID-19 based on current evidence. *J Med Virol.* (2020) 92:548–51. doi: 10.1002/jmv.25722
19. Spina S, Marrazzo F, Migliari M, Stucchi R, Sforza A, Fumagalli R. The response of milan's emergency medical system to the COVID-19 outbreak in Italy. *Lancet.* (2020) 395:e49–e50. doi: 10.1016/S0140-6736(20)30493-1
20. Gew News. *Pakistan Confirms First Two Cases of Coronavirus, Govt Says no Need to Panic*. (2020) Available online at: geo.tv (accessed April 11, 2020)
21. Voice of America. *Pakistan Detects First Coronavirus Cases, Links to Iran Outbreak*. (2020) Available online at: www.voanews.com (accessed April 22, 2020).
22. Tribune TE. *Nine New Coronavirus Cases Emerge in Karachi as Pakistan's Tally Jumps to 16*. (2020) Available online at: www.tribune.com.pk (accessed April 24, 2020).
23. Health NI of. National Institute of Health,Islamabad,Pakistan. *NIOH Pakistan*. (2020) Available online at: www.nih.org.pk (accessed May 1, 2020).
24. Ministry of National Health Services. *National Action Plan for Preparedness & Response to Corona Virus Disease (Covid-19)*. (2020) Available online at: https//www.nih.org.pk (accessed May 4, 2020).
25. MNHS. *The Minitry of National Health Services*. (2020) Available online at: http://www.nhsrc.gov.pk/ (accessed April 25, 2020).
26. National Institute of Health P. *National Action Plan for Corona Virus Disease in Pakistan*. Islamabad: Ministry of National Health Services Regulation and Coordination (2020).
27. Origion Lab 2019. *Data Analysis and Graphing Tool*. (2019) Available online at: https://www.originlab.com (accessed April 27, 2020).
28. SP. Data analyzing and graphic. Available at: http://www.sigmaplot.co.uk/
29. National Institute of Health P. *NIH Arranged an Awareness Lecture Regarding-Cov-19 for Health Professionals*. (2020) Available online at: https://www.nih.org.pk/events/2020/01/nih-arranged-an-awareness-lecture-regarding-ncov-2019-for-health-professionals (accessed April 12, 2020).

30. Gulf News. *Pakistan on High Alert Amid Coronavirus Outbreak in China*. (2020) Available online at: gulfnews.com (accessed April 22, 2020).
31. Geo News. *President Alvi, PM Imran Urge Unity as Nation Marks Pakistan Day with Pledge to Fight Coronavirus*. Available online at: www.geo.tv (accessed April 29, 2020).
32. Newspaper TD. *Covid 19 Rapid Response*. (2020) Available online at: https://www.dawn.com/ (accessed April 30, 2020).
33. Dunia Newspaper. *Pakistan Response*. (2020) Available online at: https://e.dunya.com.pk/splash.php (accessed May 01, 2020).
34. Gulf News. *Pakistan Deploys Army to Assist in COVID-19 Measures*. (2020) Available online at: gulfnews.com (accessed May 4, 2020).
35. Nationnal Institute of Health. *A Chinese Delegation Comprising Health Experts arrived in Pakistan*. (2020) Available online at: https://www.nih.org.pk/events/2020/03/a-chinese-delegation-comprising-health-experts-arrived-in-pakistan-nih-team-received-the-delegation (accessed May 12, 2020).
36. News T. *SBP to Ensure Provision of "Disinfected Cash" Availability of ATMs Amid Virus Crisis*. (2020). Available online at: www.tribune.com.pk (accessed May 02, 2020).
37. Waris A, Khan AU, Ali M, Ali A, Baset A. COVID-19 outbreak: current scenario of Pakistan. *New Microbes New Infect.* (2020) 35:100681. doi: 10.1016/j.nmni.2020.100681
38. News D. *Multi-Billion Rupees Relief Package Approved*. (2020). Available online at: www.dawn.com (accessed May 04, 2020).
39. National Institute of Health P. *List of Province Wise Quarantine Facilities*. (2020) Available online at: https://www.nih.org.pk/wp-content/uploads/2020/03/List-of-Province-wise-COVID-19-Quarantine-Facilities-Pakistan.pdf (accessed May 24, 2020).
40. News N. *CM Punjab Usman Buzdar Announces Lockdown in Punjab*. (2020) Available online at: https://www.nih.org.pk/wp-content/uploads/2020/03/List-of-Province-wise-COVID-19-Hospital-Isolation-Wards-Pakistan.pdf%0A~%0A (accessed May 11, 2020).
41. Gulf News. *Pakistan-Extends-Covid-19-Lockdown-Until-May-9*. (2020) Available online at: gulfnews.com (accessed May 13, 2020).
42. NIHP. *Pakistan on High Alert Amid Coronavirus Outbreak in China*. Available online at: www.samaa.tv (accessed March 25, 2020).
43. Nationa News. *PM Announces Record Economic Relief Package*. (2020) Available online at: www.nation.com.pk (accessed May 15, 2020).
44. News T. *Rs22.466 Billion Disbursed Under Ehsaas Emergency Programme*. (2020) Available online at: www.tribune.com.pk (accessed May 18, 2020).
45. Pakistan G. *Self Screening Mobile App. Pakistan*. Karachi: The Agha Khan University Hospital (2020).
46. Riaz H, Finlayson AE, Bashir S, Hussain S, Mahmood S, Malik F, et al. Prevalence of vitamin D deficiency in Pakistan and implications for the future. *Expert Rev Clin Pharmacol.* (2016) 9:329–38. doi: 10.1586/17512433.2016.1122519
47. Geo Super. *PCB "Postpones" PSL 2020 Amid Coronavirus Outbreak*. (2020) Available online at: https://www.geosuper.tv/latest/4433-pcb-decides-to-call-off-psl-2020-amid-coronavirus-outbreak-report (accessed May 21, 2020).
48. The News. *Impact of COVID-19 Pandemic*. (2020) Available online at: https://www.thenews.com.pk/print/656244-impact-of-covid-19-pandemic-pak-gdp-to-contract-by-1-6pc-in-current-fiscal-economist-intelligence-unit (accessed June 10, 2020).
49. Geo News. *Pakistan Economy to Loose 2.5 Trillion Due to Coronavirus*. (2020) Available online at: www.geo.tv (accessed May 24, 2020).
50. University TAK. *Seroprevalence Study Sheds Light on Pakistan's Pandemic*. (2020) Available online at: https://www.aku.edu/news/Pages/News_Details.aspx?nid=NEWS-002322 (accessed September 24, 2020).
51. PBOS. *Paksitan Bureau of Statistics 2017*. (2017) Available online at: http://www.pbs.gov.pk/content/population-census (accessed June 1, 2020).
52. Mirza DZ. *Lessons from Covid-19*. (2020) Available online at: https://www.thenews.com.pk/print/716825-lessons-from-covid-19 (accessed September 26, 2020).
53. Reno C, Lenzi J, Navarra A, Barelli E, Gori D, Lanza A, et al. Forecasting COVID-19-associated hospitalizations under different levels of social distancing in lombardy and Emilia-Romagna, Northern Italy: results from an extended SEIR compartmental model. *J Clin Med.* (2020) 9:1492. doi: 10.3390/jcm9051492
54. Sheikh A, Saeed Z, Jafri SAD, Yazdani I, Hussain SA. Vitamin D levels in asymptomatic adults-a population survey in Karachi, Pakistan. *PLoS ONE.* (2012) 7:e33452. doi: 10.1371/journal.pone.0033452
55. Wu JT, Leung K, Leung GM. Nowcasting and forecasting the potential domestic and international spread of the 2019-nCoV outbreak originating in Wuhan, China: a modelling study. *Lancet.* (2020) 395:689–97. doi: 10.1016/S0140-6736(20)30260-9
56. Di Gennaro F, Pizzol D, Marotta C, Antunes M, Racalbuto V, Veronese N, et al. Coronavirus diseases (COVID-19) current status and future perspectives: a narrative review. *Int J Environ Res Public Health.* (2020) 17:2690. doi: 10.3390/ijerph17082690
57. Razdan K, Singh K, Singh D. Vitamin D levels and COVID-19 susceptibility: is there any correlation? *Med Drug Discov.* (2020) 7:100051. doi: 10.1016/j.medidd.2020.100051
58. Arshad MS, Khan U, Sadiq A, Khalid W, Hussain M, Yasmeen A, et al. Coronavirus disease (COVID-19) and immunity booster green foods: a mini review. *Food Sci Nutr.* (2020) 8:3971–6. doi: 10.1002/fsn3.1719
59. Sattar MF, Khanum S, Nawaz A, Ashfaq MM, Khan MA, Jawad M, et al. Covid-19 global, pandemic impact on world economy. *Tech Soc Sci J.* (2020) 11:165–79. doi: 10.47577/tssj.v11i1.1503
60. Dowell SF. Seasonal variation in host susceptibility and cycles of certain infectious diseases. *Emerg Infect Dis.* (2001) 7:369. doi: 10.3201/eid0703.017301

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychiatry

SYSTEMATIC REVIEW
published: 11 December 2020
doi: 10.3389/fpsyt.2020.588137

Policies to Improve the Mental Health of People Influenced by COVID-19 in China: A Scoping Review

*Dan Qiu[1], Yilu Li[1], Ling Li[1], Jun He[1], Feiyun Ouyang[1] and Shuiyuan Xiao[1,2]**

[1] *Department of Social Medicine and Health Management, Xiangya School of Public Health, Central South University, Changsha, China,* [2] *Hunan Provincial Key Laboratory of Clinical Epidemiology, Changsha, China*

Background: In response to the potentially concurrent mental health crisis due to the COVID-19 outbreak, there have been ongoing mental health policies put in place in China. This review aims to systematically synthesize the implemented national-level mental health policies released by the Chinese government during the COVID-19 outbreak, and summarize the implementation of those mental health policies.

Methods: Six databases and two websites were systematically searched, including published studies and gray literature published between December 1, 2019 and October 29, 2020.

Results: A total of 40 studies were included. Among them, 19 were national-level policies on mental health released by the Chinese government, and 21 studies reported data on the implementation of those mental health policies. Mental health policies were issued for COVID-19 patients, suspected cases, medical staff, the general population, patients with mental illness, and mental institutions. In the early stage of the COVID-19 epidemic, attention was paid to psychological crisis intervention. In the later stage of the epidemic, the government focused mainly on psychological rehabilitation. During the COVID-19 outbreak, more than 500 psychiatrists from all over China were sent to Wuhan, about 625 hotlines were notified in 31 provinces, several online psychological consultation platforms were established, social software such as TikTok, Weibo, and WeChat were used for psychological education, and many books on mental health were published. Responding quickly, maximizing the use of resources, and emphasizing the importance of policy evaluation and implementation quality were characteristics of the mental health policies developed during the COVID-19 outbreak. Challenges facing China include a low rate of mental health service utilization, a lack of evaluation data on policy effects, and no existing national-level emergency response system and designated workforce to provide psychological crisis interventions during a national emergency or disaster.

Conclusions: This review suggests that China has responded quickly and comprehensively to a possible mental health crisis during the COVID-19 outbreak, appropriate mental health policies were released for different members of the population.

OPEN ACCESS

Edited by:
Manasi Kumar,
University of Nairobi, Kenya

Reviewed by:
Richa Tripathi,
All India Institute of Medical Sciences Gorakhpur, India
Rahul Shidhaye,
Pravara Institute of Medical Sciences, India

***Correspondence:**
Shuiyuan Xiao
xiaosy@csu.edu.cn

Specialty section:
This article was submitted to Public Mental Health, a section of the journal Frontiers in Psychiatry

Received: *28 July 2020*
Accepted: *17 November 2020*
Published: *11 December 2020*

Citation:
Qiu D, Li Y, Li L, He J, Ouyang F and Xiao S (2020) Policies to Improve the Mental Health of People Influenced by COVID-19 in China: A Scoping Review. Front. Psychiatry 11:588137. doi: 10.3389/fpsyt.2020.588137

As the epidemic situation continues to change, the focus of mental health policies has been adjusted accordingly. However, we should note that there has been a lack of separate policies for specific mental health issues during the COVID-19 outbreak.

Keywords: policy implementation, China, mental health policy, COVID-19, scoping review

INTRODUCTION

Over the past two decades, novel viruses have continued to emerge, the number of reported outbreaks of highly pathogenic or highly transmitted infectious diseases (such as SARS in 2003, H1N1 in 2009, MERS-CoV in 2012, and Ebola in 2014) has increased. At the end of 2019, a new type of infectious disease emerged, known as COVID-19 (1). As of November 10, 2020, over 49.7 million reported cases of COVID-19 and ∼1.2 million deaths have been reported to the World Health Organization (WHO) (2). The outbreak of infectious diseases can spread rapidly, causing enormous losses to individual health, national economy, and social well-being (3).

The COVID-19 outbreak in China was shown to have a substantial negative impact on individuals' mental health, leading to clinical and sub-clinical disorders, such as acute stress disorder, depression, anxiety, post-traumatic stress disorder (PTSD), and other mental health symptoms (4–7). In response to the potentially concurrent mental health crisis, there have been ongoing mental health policies implemented in China, which has important ramifications for mental health systems and the patients they serve.

A mental health policy is a set of ideas or plans that are used as a basis for making decisions in mental health, it is a government statement that clarifies the values, principles, and goals of mental health (8). A mental health policy can be implemented at multiple levels, for example in the forms of mental health plans, programs, strategies, and legislation. If formulated and implemented properly, a mental health policy can become an important and powerful tool for countries to improve mental health and reduce the burden of mental disorders (8). Although some studies were conducted in the early stages of the COVID-19 epidemic, summarizing the mental health efforts of the Chinese government (9–11), many questions remain unanswered. This scoping review aims to present mental health policy developments during the COVID-19 outbreak in China and search for the answers to three questions that may be critical to policy making for other countries: (i) in different populations, is the focus of mental health policies different? (ii) what are the focuses of mental health policies at different stages of the epidemic? (iii) what is the implementation status of these mental health policies? To explore these questions, this review aims to systematically synthesize the national-level mental health policies released by the Chinese government during the COVID-19 outbreak through published research and gray literature, and summarize the implementation status of these mental health policies.

Abbreviations: COVID-19, coronavirus disease 2019; SARS, severe acute respiratory syndrome; MERS-CoV, Middle East respiratory syndrome; Ebola, Ebola virus disease; WHO, World Health Organization; H1N1, 2009 influenza A(H1N1); PTSD, post-traumatic stress disorder; SES, socioeconomic status.

METHODS

A scoping review methodology (12, 13) was performed in this study according to the checklist of the PRISMA extension for scoping reviews (PRISMA-ScR) (14) (see **Supplementary Table 1**, **Supplementary Material**) and a methodology framework described by Arksey et al. (12) consisting of seven stages. The stages of the methodology framework undertaken were: (1) identification of research objectives; (2) reviewing data sources and search strategies; (3) study selection; (4) data extraction; (5) quality assessment for the included studies; (6) collating, summarizing, and analyzing outcome evidence; and (7) describing implications for further research.

Research Objectives

- To identify the national-level mental health policies released by the Chinese government during the COVID-19 outbreak.
- To identify the focuses of mental health policies among different populations during the COVID-19 outbreak.
- To identify the focuses of mental health policies at different stages of the epidemic.
- To identify the implementation status of these mental health policies released by the Chinese government during the COVID-19 outbreak.

Data Sources and Search Strategies

A systematic search was conducted in six databases and two websites.

Specifically, three databases including Web of Science, Pubmed, and CNKI were searched for published research. We set a restriction on the publication date, only studies published between December 1, 2019 and October 29, 2020 were searched for. See Additional File 1 for the details. The following search terms were used: "mental health policy" (including health policy, mental health policy, national plan, national program, etc.); "COVID-19" (including COVID-19, SARS-CoV-2, Coronavirus disease 2019, etc.); China (including China and Chinese). See **Table 1** and the **Supplementary Material** for a full search strategy.

Three databases including the National Science and Technology Library of China, the State Council Policy Document Database of China (http://www.gov.cn/index.htm), and the National Library of China and two websites including the Chinese Association for Mental Health (http://www.camh.org.cn/) and the Chinese Psychological Society (https://www.cpsbeijing.org/) were searched for gray literature.

TABLE 1 | Search strategies for the published studies.

Search terms	
Mental health policy	"national plan" (Title/Abstract) OR "national program" (Title/Abstract) OR "national strategy" (Title/Abstract) OR "legislation" (Title/Abstract) OR "law" (Title/Abstract) OR "national reform" (Title/Abstract) OR "health system" (Title/Abstract) OR "Health Policy" (Title/Abstract) OR "Mental health" (Title/Abstract) OR "Mental Health Policy" (Title/Abstract) OR "Mental Health Policies" (Title/Abstract) OR "effect of Health Policy" (Title/Abstract) OR "Policy Implementation" (Title/Abstract) OR "policy assessment" (Title/Abstract) OR "sychological assistant" (Title/Abstract)
COVID-19	"COVID-19" (Title/Abstract) OR "Coronavirus disease 2019" (Title/Abstract) OR "Covid 19" (Title/Abstract) OR "severe acute respiratory syndrome coronavirus 2" (Title/Abstract) OR "SARS-CoV-2" (Title/Abstract) OR "SARS-CoV" (Title/Abstract) OR "novel coronavirus" (Title/Abstract) OR "coronavirus" (Title/Abstract) OR "CoV-2" (Title/Abstract) OR "2019-nCoV" (Title/Abstract) OR "SARS COV2" (Title/Abstract)
China	"China" (Title/Abstract) OR "Chinese" (Title/Abstract)

Keywords such as "policy," "national plan," "national program," "COVID-19," and "SARS-CoV-2" were combined with "mental health" in our search.

Selection Criteria

A national-level mental health policy is defined in this review as a mental health policy released by the State Council of China and its direct departments, aimed at improving the mental health of people who were influenced by COVID-19.

Inclusion criteria

We included studies that fulfilled all the following criteria:

a) For mental health policy documents issued by the government

- Participants: people who were influenced by COVID-19 and lived in China.
- Intervention: any national-level policy interventions delivered to people influenced by COVID-19 in China, aimed at improving their mental health.

b) For studies reporting data on the implementation of mental health policies

- Participants: people who were influenced by COVID-19 and lived in China.
- Intervention: any national-level policy interventions delivered to people influenced by COVID-19 in China, aimed at improving their mental health.
- Outcome: implementation status of mental policy interventions delivered to people influenced by COVID-19 in China, the quantity of mental health services provided in response to these mental health policies (such as how many psychiatrists were sent to provide psychological crisis intervention, how many hotlines were conducted, etc.).
- Study design: no restriction

Exclusion criteria

We excluded studies if:

- The study was not in English or Chinese.
- The study was a theoretical study, describing standards that mental health policies are expected to meet.
- The study was discussing the process of policy formulation.
- The report was a protocol.

Data Extraction

Identified records were first screened based on their titles and/or abstracts, and if they met the selection criteria, the full texts were obtained for further screening. The screening process was carried out independently by two authors (DQ and YLL). Data were extracted on date of publication, organizations, title of policy, and the main content of the policy independently by two reviewers (DQ and YLL).

Data Synthesis

The qualitative data of the included studies were combined in a synthesis (15, 16). The results were grouped, where possible, by two analytical themes: (i) policies to improve the mental health of people during the COVID-19 outbreak and (ii) the implementation of mental health policies developed during the COVID-19 outbreak. Consensus was reached on discrepancies in data extraction through discussion.

Quality Assessment

The methodological quality of the included studies was independently assessed by two reviewers (DQ and LL). Due to the varying study designs of included articles, checklists from The Joanna Briggs Institute (JBI) were utilized to assess content validity (17). See **Supplementary Table 2** for details on the quality assessment.

RESULTS

From the initially identified 991 records, 843 records were screened after duplicates were excluded. A total of 658 references were excluded based on the title or abstract, leaving 185 studies for further scrutiny. After screening the full texts, 145 studies were excluded. The 145 studies were excluded due to the following reasons: no data on mental health policies ($n = 130$); duplicate publications ($n = 5$); no full-text ($n = 3$); and not conducted in China ($n = 7$). Finally, 40 studies were included for analysis. See **Figure 1** for the details.

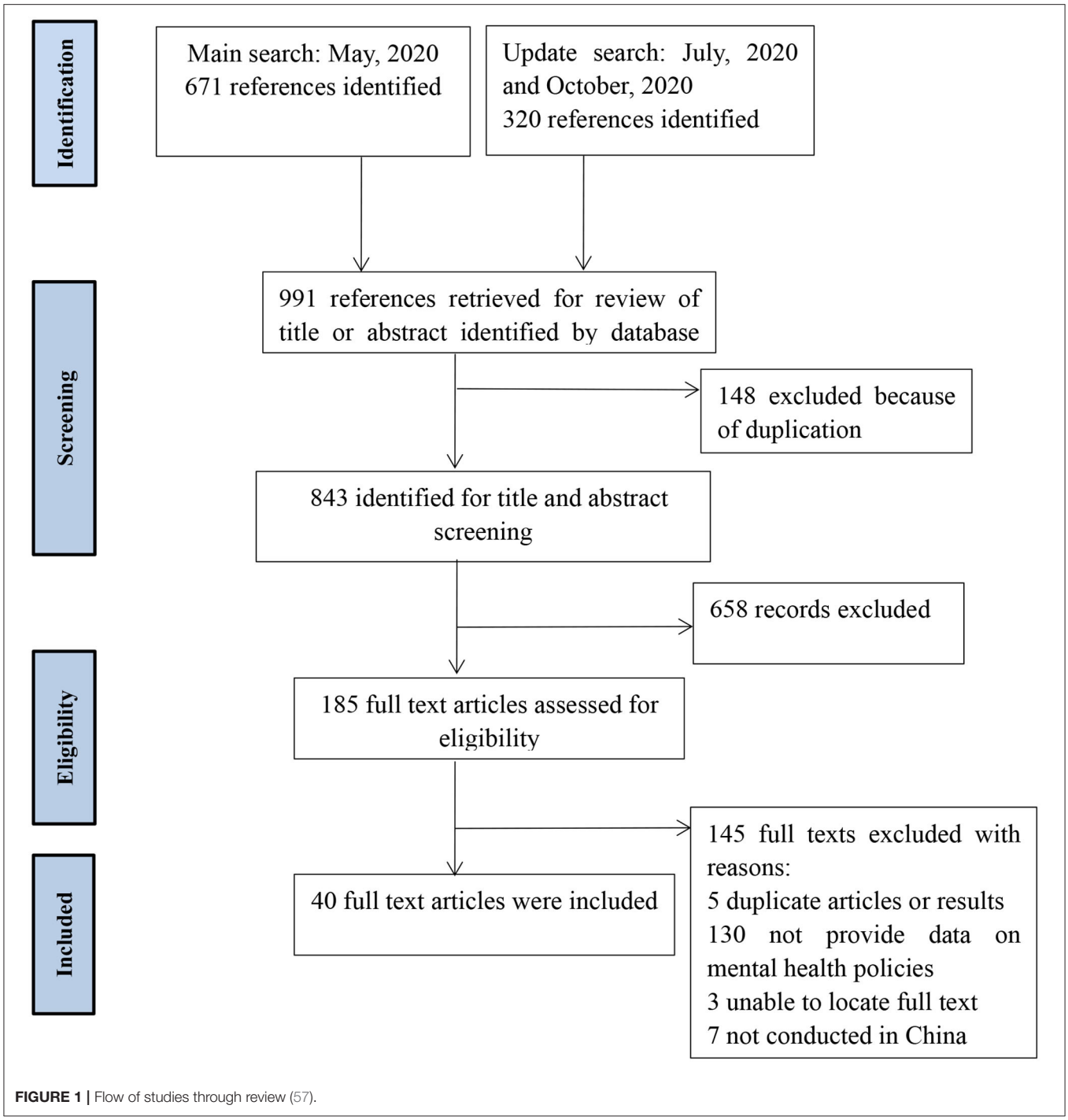


FIGURE 1 | Flow of studies through review (57).

Characteristics of the Included Studies

From January to July 2020, the Chinese government has issued a total of 19 national-level policies related to mental health (18–36). Among them, there were eight policies related to patients with COVID-19 or suspected cases (18, 25–30, 36), seven were related to medical staff (18, 21, 24–27, 29), five were related to the general population [18–20, 29, 32[, two were related to teachers and students (19, 35), one was related to patients with severe mental disorders (22), two were related to mental health institutions (23, 31) and one was related to inward personnel (33). Besides, 18 studies (9–11, 37–54) reported data on the implementation of mental health policies developed during the COVID-19 outbreak. Of the 21 studies, 17 were of sound methodological quality, while the remaining articles were reported to

have indeterminate quality, see **Supplementary Table 3** for the details.

Policies to Improve the Mental Health of People During the COVID-19 Outbreak

For patients with COVID-19 or suspected cases, the first guideline document was released on January 26, 2020. In this document (18), the National Health Commission of China suggested that all provinces in China invite psychologists and psychiatrists to organize psychological assistance teams and conduct psychological crisis interventions for patients in need. On March 5, three guideline documents for patients with COVID-19 or suspected cases were released by the Chinese government (25–27). Different psychological assistance programs were proposed for patients with different conditions. New psychological counseling work proposals were released on March 18 and April 7. Besides patients, these proposals paid more attention to the mental health of their family, friends, and colleagues (29, 30). Also, measures were taken to promote internet and psychosocial services, helping patients return to normal life. On March 4, the first version of the rehabilitation treatment proposal for discharged patients was released (28). All provinces in China were required to provide psychological rehabilitation intervention to discharged patients in need. The second version of the rehabilitation treatment proposal for COVID-19 patients was released on May 13, a more detailed psychological intervention plan was proposed for different types of mental health problems (36). Additionally, it was recommended that local governments organize social workers to conduct health education, eliminate community discrimination, and reduce patients' stigma.

For medical staff, the Chinese government proposed six related policies from January 26 to March 18. In January, the point of the policy was to provide emergency psychological crisis intervention for medical staff in need (18). In February, the list of online psychological assistance institutions for medical staff was released. The main target was to improve the protection measures of medical staff, improve their working environment, provide psychological assistance, and relieve their anxiety and stress (21, 24). Providing psychological education and skills training, organizing psychological support and emotional counseling services, and improving the self-help skills of medical staff were the main targets in March (25–27).

For the general population, the Chinese government released a total of six related policies from January 26 to April 14. Between January and March, the main targets of those policies were to provide internet/telephone-based emergency psychological crisis intervention or face-to-face psychological assistance for those people in need (18–20, 29). In April, the main targets changed to guiding people in medium-risk and high-risk areas to adapt to a closed life (32). For teachers and students, the Chinese government proposed a total of two related policies from January 28 to May 8. On January 28, the Ministry of Education required psychiatrists and psychologists in the education system to open psychological support hotlines and online counseling services, and provide online psychological crisis intervention services for teachers and students (19). In May, primary schools, secondary schools, and kindergartens in most areas reopened, the main targets changed to carrying out psychological education, psychological consultation, and creating psychological help hotlines for teachers and students (35). As the overseas epidemic become more serious, the Chinese government proposed measures against inward personnel in April, trying to provide psychological counseling and psychological intervention for inward personnel in need (33).

In order to prevent the spread of COVID-19 in mental health institutions and patients with severe mental disorders, the Chinese government proposed a total of three policies (22, 23, 31). Mental health institutions were suggested to strengthen hospital infection management, reserve protective equipment (such as masks) and disinfection materials, monitor the health status of staff and patients, and set up quarantine wards, etc. In addition, the proposal for "Building a National Psychosocial Service System-Key Tasks in 2020" was released (34). The government established specific evaluation criteria, added Wuhan as a new experimental city, and tried to comprehensively improve the mental health service level in Wuhan in a year. See **Table 2** for the details.

The Implementation of Mental Health Policies Developed During the COVID-19 Outbreak

In response to the first guideline document published on January 26, the Chinese Psychological Society and other psychological institutions organized the first round of personnel training on January 28 and released serval guidelines for hotline services between January 31 to February 6 (9, 20, 38, 50, 53). On February 7, the National Health Commission of China published a psychological adjustment guideline for the general public (49, 52). Between January and March, several books associated with COVID-19 and mental health were published (10, 40, 43). Such as "Guidelines for Public Psychological Self-Help of 2019-nCoV Pneumonia" and the "Handbook of Psychological Intervention for Government Departments, Enterprises, and Organizations." Also, several platforms for psychological support were developed, those platforms developed online psychological self-help intervention systems, including interventions such as online cognitive behavioral therapy (41, 46, 47). Additionally, the Chinese Psychological Society published five lists of recommended hotline organizations, conducted three national surveys to investigate the mental health status of the general population, and provided references for the government to adjust its mental health policy in time (51).

At the end of February, more than 500 psychiatrists from all over China had been sent to Wuhan by several provinces to provide on-site psychological assistance for front-line medical staff and critically ill patients with COVID-19 (42, 45, 54). As of March 27, a total of 625 hotlines were notified in 31 provinces across China, with over 200,000 calls answered (39). A series of online mental health education programs on social media platforms, such as WeChat, Weibo, and Douyin (TikTok), have been developed and widely used for patients, medical staff, and

TABLE 2 | Summary of policies to improve the mental health of people during the COVID-19 outbreak.

Date	Organizations	Policies/guidelines	Target population/institution	Main content on mental health
January 26, 2020 (18)	National Health Commission of China Bureau of Disease Prevention and Control	"Principles of the Emergency Psychological Crisis Interventions for the New Coronavirus Pneumonia" was released	Patients with COVID-19; suspected cases; medical staff; relatives/friends of patients; the general population	All provinces in China were required to invite psychologists and psychiatrists to organize psychological assistance teams, and conduct psychological crisis interventions.
January 28, 2020 (19)	Ministry of Education	"Principles of Opening Psychological Support Hotlines and Network Counseling Services for the New Coronavirus Pneumonia in the Education System" was released	Teachers and students; the general population	Psychiatrists and psychologists in the education system were required to open psychological support hotlines and online counseling services, and provide online psychological crisis intervention services.
February 2, 2020 (20)	National Health Commission of China Bureau of Disease Prevention and Control	"Notice on Establishing Psychological Assistance Hotlines for the COVID-19 Outbreak" was released	The general public	All provinces in China were required to establish new hotlines, provide psychological support, psychological counseling, crisis intervention, and other services for different groups of people.
February 15, 2020 (21)	The State Council of China	"Measures to Improve the Working Conditions of First-Line Medical Staff and to Care for Their Physical and Mental Health" was released	Medical staff	All provinces in China were required to provide medical staff with online psychological support.
February 18, 2020 (22)	National Health Commission of China	"Notice on Strengthening the Treatment and Management of Patients with Severe Mental Disorders During the New Coronary Pneumonia Epidemic" was released	Patients with severe mental disorders	All provinces in China were required to strengthen the management and treatment of patients with severe mental disorders in hospitals and homes, preventing nosocomial infections in mental hospitals, and reducing the risk of accidents among patients.
February 25, 2020 (23)	National Health Commission of China	"Technical Proposal for the Prevention of New Coronary Pneumonia Outbreaks in Mental Health Institutions" was released	Mental health institutions	Mental health institutions in China were required to develop an emergency work plan, strengthen hospital infection management, reserve protective equipment (such as masks) and disinfection materials, monitor the health status of staff and patients, and set up quarantine wards, etc.
February 27, 2020 (24)	National Health Commission of China	"Guidelines for Psychological Assistance Hotline During the Prevention and Control of New Coronavirus Pneumonia" was released	Hotline staff	All provinces in China were required to conduct personnel training and provide hotline services in accordance with the guidelines.
March 4, 2020 (28)	National Health Commission of China	"Rehabilitation Proposal for Discharged Patients with New Coronary Pneumonia (draft)" was released	Discharged patients with COVID-19	All provinces in China were required to provide psychological rehabilitation intervention to discharged patients in need.
March 5, 2020 (25)	National Health Commission of China; Ministry of Civil Affairs	"Proposal for Psychological Assistance and Social Work Services in Cabin Hospitals" was released	Patients with COVID-19; medical staff	The psychological assistance team were required to provide psychological assistance in the cabin hospital according to this proposal.
March 5, 2020 (26)	National Health Commission of China; Ministry of Civil Affairs	"Proposal for Psychological Assistance and Social Work Services in Designate Hospitals" was released	Patients with COVID-19; medical staff	The psychological assistance team were required to provide psychological assistance in the designated hospital according to this proposal.
March 5, 2020 (27)	National Health Commission of China; Ministry of Civil Affairs	"Proposal for Psychological Assistance and Social Work Services for People in Quarantine" was released	Patients with COVID-19; medical staff	The psychological assistance team were required to provide psychological assistance for people in quarantine according to this proposal.

(Continued)

TABLE 2 | Continued

Date	Organizations	Policies/guidelines	Target population/institution	Main content on mental health
March 18, 2020 (29)	National Health Commission of China;	"Psychological Counseling Work Proposal for the New Coronavirus Pneumonia" was released	Patients with COVID-19; Suspected cases; medical staff / other related staff; relatives/friends of patients; the general population	All provinces in China were required to provide psychological counseling, psychological intervention, and other psychological services for key groups such as patients and their families, family members of deceased persons, and front-line workers, etc.
April 7, 2020 (30)	National Health Commission of China;	"Psychological Counseling and Social Work Service Proposal for Patients with New Coronary Pneumonia, Their Families, and People Were Quarantined" was released	Patients with COVID-19 and their families; people who were quarantined	All provinces in China were required to follow this proposal, conduct health education, promote internet and psychosocial services, help them return to normal life and work, and create a social environment of mutual care.
April 8, 2020 (31)	National Health Commission of China	"Technical Proposal for the Prevention of New Coronary Pneumonia Outbreaks in Key Places and Key Institutions" was released	Various public places; mental health institutions	Relevant departments were required to reserve protective equipment (such as masks) and disinfection materials, monitor the health status of staff, set up quarantine wards, and organize knowledge training on prevention of new coronary pneumonia, etc.
April 14, 2020 (32)	Ministry of Civil Affairs National Health Commission of China	"Proposal for Precise Community Prevention Service for the New Coronavirus Pneumonia" was released	The general population	All provinces in China were required to set up a community working group, establish a psychological assistance mechanism for community residents, and help them adapt to the closed management of the community.
April 21, 2020 (33)	National Health Commission of China Ministry of Civil Affairs Ministry of transport	"Psychological Counseling and Social Work Service Proposal for Inward Personnel" was released	Inward personnel	Conduct health education, promote internet and face-to-face psychosocial services, and provide psychological counseling and psychological intervention for people in need.
April 27, 2020 (34)	Ministry of Civil Affairs National Health Commission of China Ministry of Education	"Proposal for Building a National Psychosocial Service System-Key Tasks in 2020" was released	Wuhan city	Wuhan was added as a new experimental city, specific evaluation criteria was established, which tried to comprehensively improve the mental health service level in Wuhan in 2020.
May 8, 2020 (35)	Ministry of Education; National Health Commission of China	"Technical Guidelines for Prevention of New Coronavirus Pneumonia in Primary, Secondary Schools and Child Care Institutions" was released	Teachers; adolescents; children	Relevant schools were required to conduct mental health knowledge training, conduct psychological counseling, and announce a psychological hotline.
May 13, 2020 (36)	Ministry of Education; National Health Commission of China; National Healthcare Security Administration; National Administration of Chinese Medicine	"Rehabilitation Treatment Proposal for COVID-19 Patients with Major Dysfunction" was released	Discharged patients with COVID-19;	Relevant hospitals were required to conduct rehabilitation interventions for patients with emotional problems, cognitive changes, behavioral disorders, or physiological reactions due to psychological problems; communities were required to strengthen community publicity and reduce social discrimination.

the general public throughout all provinces in China (11, 43, 47). Besides, from January to June, the Chinese Psychological Society and other psychological institutions provided face-to-face psychological crisis intervention services for patients and medical staff in several hospitals in Wuhan according to the related policies (43, 44). Furthermore, some mental health institutions proposed a series of effective ward management strategies based on related policies and presented practical and resource-efficient models of psychological intervention for inpatients (48). See **Table 3** for the details.

TABLE 3 | Implementation of mental health policies developed during COVID-19 outbreak.

Date	Organization	Implementation of policy
January 28, 2020 (10)	Chinese Psychological Society Chinese Association of Mental Health Chinese Society of Psychiatry	Conducted first round of training for supervisors
January 30, 2020 (37)	Institute of Psychology, Chinese Academy of Sciences Chinese Psychological Society Ali Pay	National Crisis Intervention Platform for New Coronavirus Pneumonia was developed
January 31, 2020 (38)	Chinese Psychological Society	Published handbook for hotline organizations and volunteers "Guidelines on Providing Hotline Psychological Support for Disease Outbreak (draft)"
February 2, 2020 (19)	National Health Commission of China	Published guidelines for hotline organization, published list of organizations for psychological counseling
February 3, 2020 (10)	Chinese Psychological Society	Updated guidelines for hotline organization
February 6, 2020 (50, 53)	Chinese Psychological Society	Published ethics guidelines
February 7, 2020 (49, 52)	National Health Commission of China Bureau of Disease Prevention and Control	Published guidelines for the general public "Psychological Adjustment Guidelines for Coping with the New Coronavirus Pneumonia" was published
February 12, 2020 (10)	Chinese Psychological Society Chinese Association of Mental Health Chinese Society of Psychiatry	"Guidelines for Online Psychological Assistance Services during the Prevention and Control of Novel Coronavirus Pneumonia" was published
February 9, 2020 (10)	Chinese Society of Psychiatry Central Radio and television Station	Video of "Online Lessons of Psychological Intervention during the New Coronavirus Pneumonia Outbreak" was published
February 12, 2020 (10)	Peking University Sixth Hospital Beijing Anding Hospital Mental Health Center of Hubei province	Conducted second round of training for supervisors
February 12, 2020 (46, 47)	Wuhan University People's Hospital Peking University Sixth Hospital The First Affiliated Hospital of China Medical University Southern Hospital Beijing Anding Hospital, etc.	Platform for psychological support was developed. Online psychological self-help intervention systems, including online cognitive behavioral therapy were developed
February 2020 (9, 44, 45, 54)	National Health Commission of China/Several provinces in China	More than 500 psychiatrists from all over China were sent to Wuhan to provide on-site psychological assistance for front-line medical staff and critically ill patients;
February 24–June 4, 2020 (50)	Chinese Psychological society	Published five lists of recommended hotline organizations
March 27, 2020 (39)	32 provinces in China	A total of 625 hotlines were announced in 31 provinces in China, with over 200,000 calls answered
January–March 2020 (52)	Chinese Psychological society	The mental health status of the general population was investigated on January 31, February 6, and March 10. Data were provided for the adjustment of a national psychological assistance plan
January–March 2020 (38, 40, 43)	Chinese Psychological Society Chinese Association for Mental Health Chinese Society of Psychiatry, etc.	Several books associated with COVID-19 and mental health were published. Such as "Guidelines for Public Psychological Self-Help and Counseling of 2019-nCoV Pneumonia," "Handbook of Psychological Intervention for Government Department"
May 2020 (47, 48)	Mental health institutions	Practical and resource-efficient models of psychological intervention were presented to inpatients
January 29–June 17, 2020 (43, 44)	Chinese Psychological society	From January to June, psychological crisis intervention services were provided for patients in several hospitals in Wuhan
January–March 2020 (48)	Mental health institutions	Some mental health institutions proposed a series of effective ward management strategies based on related policy
January–July 2020 (34, 44, 48, 52)	Government, universities, mental health institutions, social organization, Chinese Psychological society, etc.	Online mental health education with communication programs, such as WeChat, Weibo, and Douyin (TikTok), were widely used for medical staff and the general public throughout all provinces in China

DISCUSSION

Key Findings

Our review suggests that China has responded quickly and comprehensively to the possible mental health crisis among different populations during the COVID-19 outbreak. In response to the COVID-19 outbreak, there have been ongoing measures and concerted efforts in China, resources were used as much as possible to implement these mental health policies. In the early stages of the epidemic, the focus of

these mental health policies was to mobilize various resources and provide psychological crisis intervention for people in need. In the later stage, the focus of these mental health policies was on psychological rehabilitation intervention. Besides, the importance of providing online psychological counseling and improving people's self-help ability has been emphasized throughout the epidemic period. Psychiatrists from all over China were sent to Wuhan by several provinces to provide on-site psychological assistance. Mental health hotlines were quickly established across China and provided patients, medical staff, and the general public with counseling and psychological services. The telephone-based and internet-based programs were widely used to deliver mental health care services, and social media platforms (e.g., TikTok, WeChat, and Weibo) were widely utilized to share strategies, guidelines, and education programs for managing potential mental health problems. In addition, governments, academic groups, and medical institutions also published many self-help handbooks on psychological interventions related to COVID-19.

Characteristics of Mental Health Policies During the COVID-19 Outbreak

Firstly, psychosocial interventions were organized very quickly to deal with the COVID-19 outbreak. On January 26, just 3 days after the lockdown implementation of Wuhan, the Chinese government published a guideline document for emergency psychological crisis interventions for the public (18). After this document was released, psychiatrists from all over China were immediately sent to Wuhan to provide psychological assistance, and several hotlines and internet-based platforms were developed for psychological counseling (10). However, some drawbacks of these policies should be noted. For example, who should deliver which type of intervention, for which group in need, and by which delivery mode were not specified in most policies (55). Also, we think there was a lack of separate policies for specific mental health issues during the COVID-19 outbreak. Such as PTSD, which is one of the most common mental health problems in a national emergency or disaster (56).

Another feature was the extensive use of mental health resources. Under the guidance of these mental health policies, cooperation between different institutions and organizations maximized the use of resources. Since January 24, 2020, some institutions had already launched a free crisis intervention hotline for the public (45). The government, academic societies, and hospitals quickly carried out cross-organizational cooperation, mobilized the resources they had, organized online training, organized academic conferences, and conducted telephone-based psychological interventions and internet-based psychological interventions for the public across China. Given that the fast transmission of the novel coronavirus between people may hinder traditional face-to-face psychological interventions and the widespread adoption of smartphones, online mental health services were heavily used in China. Massive use of online mental health services may maximize the beneficiaries from those programs, contributing to helping remove the barriers to accessing quality care for mental health.

Thirdly, the importance of implementation quality and outcome evaluation of those mental health interventions was emphasized. The Chinese government had emphasized in several guidelines that it was necessary to use qualified organizations and staff to provide psychological interventions, they also pointed out the importance of professional training (18, 24, 28, 31). Besides, the ethics of psychological intervention were highly valued in related guidelines (50). Also, the evaluation of the effectiveness of psychological interventions were emphasized (24), and the focus of psychological assistance was constantly being adjusted as the epidemic changed.

Challenges of Mental Health Policies During the COVID-19 Outbreak

It is said that China has long been faced with an extremely low rate of mental health service utilization (58, 59). To date, most of the attention has been focused on the provision of mental health services, with the utilization of these services to a large extent neglected. He et al. (58, 60) reported that only 3.70–5.58% of the general population actively sought out mental health services during the COVID-19 outbreak. After a large increase in mental health services, how to improve the utilization of services is also an issue that needs to be urgently considered.

Due to the relatively short duration of the outbreak, many mental health policies released during the outbreak of COVID-19 had been implemented for only a few weeks, the implementation data found in the current review were limited. Based on the included data, it seems that most of mental health policies released during the COVID-19 outbreak were implemented, but the process and quality of implementation is still unclear. Although the importance of implementation quality and outcome evaluation of those mental health interventions was emphasized, relative data have not yet been published. Nationwide surveys of psychological well-being during the COVID-19 outbreak were conducted (61, 62), but those surveys did not describe whether they used mental health services. Another question is that most mental health services were provided via telephone and the internet. Both the implementation quality and program effectiveness are difficult to guarantee (9, 58). Thus, we think the integration of assessment in structure, process, and outcomes of those mental health programs is needed in the forthcoming months. These recommendations may inform how other countries can overcome the shortage of mental health resources when facing the COVID-19 outbreak. Moreover, people with low socioeconomic status (SES) may not be able to take full advantage of digital technologies that online mental health services rely on (46, 58). What should be considered is whether the uneven development of online mental health services for this epidemic will widen the mental health gap in China.

Furthermore, China currently lacks a well-established mental healthcare system, and has no existing national-level emergency response system and designated workforce to provide psychological crisis interventions during a national emergency or disaster (55). The shortage of professional

human resources on mental health is also a problem. Over the past decade, the number of psychiatrists in China has increased (63). However, the amount of mental health professionals still cannot meet the needs of psychosocial intervention during this kind of large-scale epidemic (42). System defects and lack of personnel may have affected the implementation of mental health policies during the COVID-19 outbreak (64). In order to better respond to infectious disease outbreaks and ensure the effectiveness of mental health policies, it is important to address these issues in the future.

Limitations

At first, the implementation data found in the current review were limited. It seems that most of the mental health policies released during the COVID-19 outbreak were implemented, but the process and quality of implementation is still unclear, which needs further exploration. Secondly, in order to presented as much data related to policy implementation as possible, we have included data from some comments and letters to the editor, which may not have been peer-reviewed. Another possible limitation is that this review is based on implemented mental health policies at the national level. Since all provinces in China are basically carrying out relevant work under the guidance of national-level mental health policies, we did not consider local-level mental health policies, there may be bias in the representativeness of the results.

Implications for Future Research

Firstly, we think the long-term outcomes and implementation quality of these mental health interventions need further evaluation in future studies. Secondly, it is necessary to evaluate the impact of those known problems (such as low utilization of mental health services, with no existing national-level emergency response system and designated workforce) on the implementation of these mental health policies released during the outbreak of COVID-19. Besides, there was a lack of separate policies for specific mental health issues during the COVID-19 outbreak in China. Future research is needed to explore the necessity of making separate policies for some common mental health problems (such as PTSD) in a national emergency or disaster.

CONCLUSIONS

This review suggests that China has responded quickly and comprehensively to the possible mental health crisis during the COVID-19 outbreak, appropriate mental health policies were released for different populations. As the epidemic situation continued to change, the focus of mental health policies was adjusted accordingly. However, we should note that there was a lack of separate policies for specific mental health issues during the COVID-19 outbreak. Such as PTSD, which is one of the most common mental health problems in a national emergency or disaster. In addition, the combination of telemedicine and face-to-face mental health services should be considered in middle-income and low-income countries, which may help remove barriers to accessing quality mental health care. Lastly, we believe this is a critical time to recognize these extraordinary advances in policy making, as it provides an unprecedented opportunity to evaluate the effects of mental health policies that China may adopt in the post-COVID-19 era.

DATA AVAILABILITY STATEMENT

The original contributions generated in the study are included in the article/Supplementary Materials, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

SX and DQ contributed to the design of the study. JH and FO searched through the databases. DQ and YL screened the text. DQ and LL extracted and analyzed the data. DQ wrote the first draft of the manuscript with input from SX. All the authors approved the final manuscript.

FUNDING

This research was supported by the Ministry of Science and Technology of China (Grant No: 2016YFC0900802).

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyt.2020.588137/full#supplementary-material

REFERENCES

1. Houlihan CF, Whitworth JA. Outbreak science: recent progress in the detection and response to outbreaks of infectious diseases. *Clin Med*. (2019) 19:140–4. doi: 10.7861/clinmedicine.19-2-140
2. Organization WH. *Weekly Epidemiological Update—10 November 2020*. (2020) Available online at: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/situation-reports/ (accessed October 12, 2020).
3. Steele L, Orefuwa E, Dickmann P. Drivers of earlier infectious disease outbreak detection: a systematic literature review. *Int J Infect Dis*. (2016) 53:15–20. doi: 10.1016/j.ijid.2016.10.005
4. Chen S, Li F, Lin C, Han Y, Nie X, Portnoy RN, et al. Challenges and recommendations for mental health providers during the COVID-19 pandemic: the experience of China's First University-based mental health team. *Glob Health*. (2020) 16:59. doi: 10.1186/s12992-020-00591-2
5. Zhang WR, Wang K, Yin L, Zhao WF, Xue Q, Peng M, et al. Mental health and psychosocial problems of medical health workers during the COVID-19 epidemic in China. *Psychother Psychosom*. (2020) 89:242–50. doi: 10.1159/000507639
6. Liu N, Zhang F, Wei C, Jia Y, Shang Z, Sun L, et al. Prevalence and predictors of PTSS during COVID-19 outbreak in China hardest-hit areas: gender differences matter. *Psychiatry Res*. (2020) 287:112921. doi: 10.1016/j.psychres.2020.112921
7. Wang C, Pan R, Wan X, Tan Y, Xu L, McIntyre RS, et al. A longitudinal study on the mental health of general population during the COVID-19 epidemic in China. *Brain Behav Immun*. (2020) 87:40–8. doi: 10.1016/j.bbi.2020.04.028

8. Zhou W, Yu Y, Yang M, Chen L, Xiao S. Policy development and challenges of global mental health: a systematic review of published studies of national-level mental health policies. *BMC Psychiatry*. (2018) 18:138. doi: 10.1186/s12888-018-1711-1
9. Miu A, Cao H, Zhang B, Zhang H. Review of mental health response to COVID-19, China. *Emerg Infect Dis*. (2020) 26:2482–4. doi: 10.3201/eid2610.201113
10. Li W, Yang Y, Liu ZH, Zhao YJ, Zhang Q, Zhang L, et al. Progression of mental health services during the COVID-19 outbreak in China. *Int J Biol Sci*. (2020) 16:1732–8. doi: 10.7150/ijbs.45120
11. Liu S, Yang L, Zhang C, Xiang YT, Liu Z, Hu S, et al. Online mental health services in China during the COVID-19 outbreak. *Lancet Psychiatry*. (2020) 7:e17–8. doi: 10.1016/S2215-0366(20)30077-8
12. Arksey H, O'Malley L. Scoping studies: towards a methodological framework. *Int J Soc Res Methodol*. (2005) 8:19–32. doi: 10.1080/1364557032000119616
13. Armstrong R, Hall BJ, Doyle J, Waters E. 'Scoping the scope' of a cochrane review. *J Public Health (Oxf)*. (2011) 33:147–50. doi: 10.1093/pubmed/fdr015
14. Tricco AC, Lillie E, Zarin W, O'Brien KK, Colquhoun H, Levac D, et al. PRISMA extension for scoping reviews (PRISMA-ScR): checklist and explanation. *Ann Intern Med*. (2018) 169:467–73. doi: 10.7326/M18-0850
15. Suri H, Clarke D. Advancements in research synthesis methods: from a methodologically inclusive perspective. *Rev Educ Res*. (2009) 79:395–430. doi: 10.3102/0034654308326349
16. Dixon-Woods M, Agarwal S, Jones D, Young B, Sutton A. Synthesising qualitative and quantitative evidence: a review of possible methods. *J Health Serv Res Policy*. (2005) 10:45–53. doi: 10.1177/1355819605010 00110
17. Braithwaite J, Zurynski Y, Ludlow K, Holt J, Augustsson H, Campbell M. Towards sustainable healthcare system performance in the 21st century in high-income countries: a protocol for a systematic review of the grey literature. *BMJ Open*. (2019) 9:e025892. doi: 10.1136/bmjopen-2018-025892
18. China NHCo. *Principles of the Emergency Psychological Crisis Interventions for the New Coronavirus Pneumonia.* (2020). Available online at: http://www.gov.cn/xinwen/2020-01/27/content_5472433.htm (accessed July 18, 2020).
19. Education Mo. *Principles of Opening Psychological Support Hotlines and Network Counseling Services for the New Coronavirus Pneumonia in the Education System.* (2020). Available online at: http://www.gov.cn/xinwen/2020-01/28/content_5472681.htm (accessed July 18, 2020).
20. China NHCo. *Notices on Establishing Psychological Assistance Hotlines for the COVID-19 Outbreak.* (2020). Available online at: http://www.gov.cn/xinwen/2020-02/02/content_5473937.htm (accessed July 18, 2020).
21. China TSCo. *Notice on the Implementation of Several Measures to Improve the Working Conditions of First-Line Medical Staff and to Care for the Physical and Mental Health of Medical Staff.* (2020). Available online at: http://www.nhc.gov.cn/xcs/zhengcwj/202002/85896fabe90747cba8b79beb4c57f202.shtml (accessed July 18, 2020).
22. China NHCo. *Notice on Strengthening the Treatment and Management of Patients with Severe Mental Disorders During the New Coronary Pneumonia Epidemic.* (2020). Available online at: http://www.nhc.gov.cn/xcs/zhengcwj/202002/f315a6bb2955474c8ca0b33b0c356a32.shtml (accessed July 18, 2020).
23. China NHCo. *Technical Proposal for the Prevention of New Coronary Pneumonia Outbreaks in Mental Health Institutions.* (2020). Available online at: http://www.gov.cn/xinwen/2020-02/25/content_5483024.htm (accessed July 18, 2020).
24. China NHCo. *Guidelines for Psychological Assistance Hotline During the Prevention and Control of New Coronavirus Pneumonia (in Chinese).* (2020). Available online at: http://www.gov.cn/xinwen/2020-02/27/content_5484047.htm (accessed July 18, 2020).
25. China NHCo, Affairs MoC. *Proposal for Psychological Assistance and Social Work Services in Cabin Hospitals (in Chinese).* (2020). Available online at: http://www.mca.gov.cn/article/xw/tzgg/202003/20200300025367.shtml (accessed July 18, 2020).
26. China NHCo, Affairs MoC. *Proposal for Psychological Assistance and Social Work Services in Designate Hospitals (in Chinese).* (2020). Available online at: http://www.mca.gov.cn/article/xw/tzgg/202003/20200300025367.shtml (accessed July 18, 2020).
27. China NHCo, Affairs MoC. *Proposal for Psychological Assistance and Social Work Services for People in Quarantine (in Chinese).* (2020). Available online at: http://www.mca.gov.cn/article/xw/tzgg/202003/20200300025367.shtml (accessed July 18, 2020).
28. China NHCo. *Rehabilitation Proposal for Discharged Patients with New Coronary Pneumonia (Draft).* (2020). Available online at: http://www.gov.cn/zhengce/zhengceku/2020-03/05/content_5487160.htm (accessed July 18, 2020).
29. China NHCo. *Psychological Counseling Work Proposal for the New Coronavirus Pneumonia (in Chinese).* (2020). Available online at: http://www.gov.cn/xinwen/2020-03/19/content_5493051.htm (accessed July 18, 2020).
30. China NHCo. *Psychological Counseling and Social Work Service Proposal for Patients With New Coronary Pneumonia, their Families and People Were Quarantined (in Chinese).* (2020). Available online at: http://www.gov.cn/xinwen/2020-04/08/content_5500131.htm (accessed July 18, 2020).
31. China NHCo. *Technical Proposal for the Prevention of New Coronary Pneumonia Outbreaks in Key Places and Key Institutions (in Chinese).* (2020). Available online at: http://www.gov.cn/xinwen/2020-04/09/content_5500689.htm (accessed July 18, 2020).
32. Affairs MoC, China NHCo. *Proposal for Precise Community Prevention Service for the New Coronavirus Pneumonia (in Chinese).* (2020). Available online at: http://www.gov.cn/zhengce/zhengceku/2020-04/16/content_5503261.htm (accessed July 18, 2020).
33. China NHCo, Affairs MoC, Transport Mo. *Psychological Counseling and Social Work Service Proposal for Inward Personnel (in Chinese).* (2020). Available online at: http://www.nhc.gov.cn/jkj/s5888/202004/2661b96444524b02b9f88fddb3d695f6.shtml (accessed July 18, 2020).
34. Affairs MoC, China NHCo, Education Mo. *Proposal for Building a National Psychosocial Service System–Key Tasks in 2020 (in Chinese).* (2020). Available online at: http://www.nhc.gov.cn/jkj/s5888/202004/3009df2cf619434899575cce6ae2af77.shtml (accessed July 18, 2020).
35. Education Mo, China NHCo. *Technical Guidelines for Prevention of New Coronavirus Pneumonia in Primary and Secondary Schools and Child Care Institutions (in Chinese)* (2020).
36. Education Mo, China NHCo, Administration NHS, Medicine NAoC. *Rehabilitation Treatment Proposal for COVID-19 Patients with Major Dysfunction (in Chinese).* (2020) Available online at: http://www.nhc.gov.cn/yzygj/s7653pd/202005/b15d59b5228341129cc8c5126f663b10.shtml (accessed July 18, 2020).
37. Society CP. *Psychological Assistance and Crisis Intervention in the Fight Against COVID-19 (in Chinese).* (2020). Available online at: https://www.cpsbeijing.org/cms/show.action?code=publish_402880766305a05d016305ffc2710078&siteid=100000&newsid=eb5ea1131e064055972be41e296a0f3d&channelid=0000000036 (accessed July 20, 2020).
38. Society CP. *Guidelines on Providing Hotline Psychological Support for Disease Outbreak (Draft).* (2020). Available online at: https://mp.weixin.qq.com/s?__biz=MzA3NzcyMDQ5MQ%3D%3D&mid=2650156017&idx=1&sn=38485d9d760ee1612dc2cd7cfb1eaf50&scene=45#wechat_redirect (accessed July 20, 2020)
39. Wang J, Wei H, Zhou L. Hotline services in China during COVID-19 pandemic. *J Affec Disord*. (2020) 275:125–6. doi: 10.1016/j.jad.2020.06.030
40. Zhou J, Liu L, Xue P, Yang X, Tang X. Mental health response to the COVID-19 outbreak in China. *Am J Psychiatry*. (2020) 177:574–5. doi: 10.1176/appi.ajp.2020.20030304
41. Zhang XB, Gui YH, Xu X, Zhu DQ, Zhai YH, Ge XL, et al. Response to children's physical and mental needs during the COVID-19 outbreak. *World J Pediatr*. (2020) 16:278–9. doi: 10.1007/s12519-020-00365-1
42. Yang J, Tong J, Meng F, Feng Q, Ma H, Shi C, et al. Characteristics and challenges of psychological first aid in China during the COVID-19 outbreak. *Brain Behav Immun*. (2020) 87:113–4. doi: 10.1016/j.bbi.2020.04.075
43. Wang Y, Zhao X, Feng Q, Liu L, Yao Y, Shi J. Psychological assistance during the coronavirus disease 2019 outbreak in China. *J Health Psychol*. (2020) 25:733–7. doi: 10.1177/1359105320919177
44. Kang L, Li Y, Hu S, Chen M, Yang C, Yang BX, et al. The mental health of medical workers in Wuhan, China dealing with the 2019 novel coronavirus. *Lancet Psychiatry*. (2020) 7:e14. doi: 10.1016/S2215-0366(20)30047-X

45. Kang C, Tong J, Meng F, Feng Q, Ma H, Shi C, et al. The role of mental health services during the COVID-19 outbreak in China. *Asian J Psychiatry*. (2020) 52:102176. doi: 10.1016/j.ajp.2020.102176
46. Hu N, Pan S, Sun J, Wang Z, Mao H. Mental health treatment online during the COVID-19 outbreak. *Eur Arch Psychiatry Clin Neurosci*. (2020) 270:783–4. doi: 10.1007/s00406-020-01129-8
47. Cui Y, Li Y, Zheng Y, Chinese Society of C, Adolescent P. Mental health services for children in China during the COVID-19 pandemic: results of an expert-based national survey among child and adolescent psychiatric hospitals. *Eur Child Adolesc Psychiatry*. (2020) 29:743–8. doi: 10.1007/s00787-020-01548-x
48. Chen J, Xiong M, He Z, Shi W, Yue Y, He M. The enclosed ward management strategies in psychiatric hospitals during COVID-19 outbreak. *Global Health*. (2020) 16:53. doi: 10.1186/s12992-020-00586-z
49. China NHCo. *Psychological Adjustment Guidelines for Coping with the New Coronavirus Pneumonia (in Chinese)*. (2020). Available online at: http://www.gov.cn/fuwu/2020-02/08/content_5476190.htm (accessed July 20, 2020)
50. Society CP. *Ethics Guidelines for Hotlines (Draft)*. (2020). Available online at: https://mp.weixin.qq.com/s/iG6eeV1-vAVfjf36SbdMLA (accessed July 20, 2020).
51. Society CP. *Mental Health of the General Population During the COVID-19 Outbreak (The Third Round of Investigation)*. (2020). Available online at: https://mp.weixin.qq.com/s/YKLqbBpUMqO_ZPL_ApMYsg (accessed July 20, 2020)
52. Song M. Psychological stress responses to COVID-19 and adaptive strategies in China. *World Dev*. (2020) 136:105107. doi: 10.1016/j.worlddev.2020.105107
53. Rui Z, Jing W, Xue Z, Jing-xuan W, Lan P, Lei Z. Discussion on the working mode of COVID-19 public welfare hotline group under epidemic situation. *Xinli Yuekan*. (2020) 17:152–3. doi: 10.19738/j.cnki.psy.2020.17.062
54. Ju Y, Zhang Y, Wang X, Li W, Ng RMK, Li L. China's mental health support in response to COVID-19: progression, challenges and reflection. *Global Health*. (2020) 16:102. doi: 10.1186/s12992-020-00634-8
55. Dong L, Bouey J. Public mental health crisis during COVID-19 pandemic, China. *Emerg Infect Dis*. (2020) 26:1616–8. doi: 10.3201/eid2607.200407
56. Xiao S, Luo D, Xiao Y. Survivors of COVID-19 are at high risk of posttraumatic stress disorder. *Glob Health Res Policy*. (2020) 5:29. doi: 10.1186/s41256-020-00155-2
57. Moher D, Liberati A, Tetzlaff J, Altman DG. Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement. *Ann Intern Med*. (2009) 151:264–9. doi: 10.1371/journal.pmed.1000097
58. Yao H, Chen JH, Xu YF. Rethinking online mental health services in China during the COVID-19 epidemic. *Asian J Psychiatry*. (2020) 50:102015. doi: 10.1016/j.ajp.2020.102015
59. Shi JW, Tang L, Jing LM, Geng JS, Liu R, Luo L, et al. Disparities in mental health care utilization among inpatients in various types of health institutions: a cross-sectional study based on EHR data in Shanghai, China. *BMC Public Health*. (2019) 19:1203–12. doi: 10.1186/s12889-019-7343-7
60. He L. A study on the characteristics of psychological-aid receiver in the period of covid-19. *J Yibin Med Coll*. (2020) 20:1–7. doi: 10.19504/j.cnki.issn1671-5365.2020.04.002
61. Gao J, Zheng P, Jia Y, Chen H, Mao Y, Chen S, et al. Mental health problems and social media exposure during COVID-19 outbreak. *PLoS ONE*. (2020) 15:e0231924. doi: 10.1371/journal.pone.0231924
62. Qiu JY, Shen B, Zhao M, Wang Z, Xie B, Xu YF. A nationwide survey of psychological distress among Chinese people in the COVID-19 epidemic: implications and policy recommendations. *Gen Psychiatry*. (2020) 33:e100213. doi: 10.1136/gpsych-2020-100213
63. Shi C, Ma N, Wang L, Yi Ll, Wang X, Zhang W, et al. Study of the mental health resources in China. *Chin J Health Policy*. (2019) 12:51–7. doi: 10.3969/j.issn.1674-2982.2019.02.008
64. Fang M, Hu SX, Hall BJ. A mental health workforce crisis in China: a pre-existing treatment gap coping with the COVID-19 pandemic challenges. *Asian J Psychiatry*. (2020) 54:102265. doi: 10.1016/j.ajp.2020.102265

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychiatry

MINI REVIEW
published: 08 January 2021
doi: 10.3389/fpsyt.2020.589618

Mental Health During COVID-19: *Tam Giao* and Vietnam's Response

Sean Small[1] *and Judite Blanc*[1,2]*

[1] *Department of Applied Psychology, New York University Steinhardt School of Culture, Education, and Human Development, New York, NY, United States,* [2] *Department of Population Health, Center for Healthful Behavior Change, New York University Grossman School of Medicine, New York, NY, United States*

COVID-19 is a novel infectious disease and global health crisis with major psychological implications. Of particular focus are the effects it will have on low- and middle-income countries (LMICs) as being under-resourced poses many challenges. Vietnam, a country with an estimated population of 97.33 million people, which until 30 July, 2020, had 459 confirmed COVID-19 cases with no fatalities but as of November 4th had 35 deaths, can be viewed as a model LMIC for other countries struggling with COVID-19. Employing key tactics such as transparency and effective communication, Vietnam was able to foster strong cooperation between government and citizens, contributing to its success during COVID-19. Moreover, Vietnamese resilience, attributable, in part, to "*tam giao," a coexistence of* religious and philosophical Taoism, Buddhism, and Confucianism through cultural additivity, provides a unique mindset that other countries can learn from to adapt and even build psychological resilience against COVID-19 pandemic's psychological outcomes. We suggest countries prioritize transparency and communication to mitigate stigmatization and psychological distress that can result from quarantine and other interventions while promoting resources that provide accurate scientific information and psychological aid to citizens. We believe that *Tam giao* could be repurposed to relieve inevitable contradictions between values and lifestyles in the context of this devastating global health crisis.

Keywords: Vietnam, cultural additivity, COVID-19, *tam giao*, community solidarity

OPEN ACCESS

Edited by:
Stefan Swartling Peterson, Uppsala University, Sweden

Reviewed by:
Jose Gallucci-Neto, University of São Paulo, Brazil
Quan-Hoang Vuong, Phenikaa University, Vietnam

***Correspondence:**
Judite Blanc
Judite.blanc@nyulangone.org

Specialty section:
This article was submitted to Public Mental Health, a section of the journal Frontiers in Psychiatry

Received: *31 July 2020*
Accepted: *30 November 2020*
Published: *08 January 2021*

Citation:
Small S and Blanc J (2021) Mental Health During COVID-19: Tam Giao and Vietnam's Response. Front. Psychiatry 11:589618. doi: 10.3389/fpsyt.2020.589618

INTRODUCTION

SARS-CoV-2, or COVID-19, is a novel infectious disease of pressing global public health concern. Its high transmissibility with an estimated reproductive number (R_0) of 2.5 and devastating outcomes in susceptible populations (i.e., the immunocompromised) have disrupted the healthcare systems, economies, and psychological well-being of hundreds of countries worldwide (1, 2). Moreover, as of 4 November 2020, there have been more than 44 million confirmed cases and more than 1 million confirmed deaths of COVID-19 (3). It is thus imperative for countries currently affected by COVID-19 or preparing to re-open to learn from successful nations to stymie the spread of the disease and concomitantly reduce subsequent physical and mental health consequences. Success is predicated on efforts to successfully develop and/or maintain vaccines and therapies quickly in the context of stressed public health systems as well as unequivocal, transparent communication promoting guidelines such as social-distancing. In order to prevent further harm, every sector must be involved. Of particular focus is the impact COVID-19 has and will have on low- to middle-income countries (LMICs). LMICs are under-resourced and

particularly vulnerable to the consequences of outbreaks, so protecting them is vital to successfully overcome COVID-19. Sadly, some LMICs like Brazil, which as of 4 November 2020, has over 5.4 million confirmed cases and over 150,000 deaths from COVID-19, are suffering immensely (4). Brazil's outcome can be attributed to a fragmented response involving political denialism by President Bolsanaro and misinformation (5, 6). It is worth noting that judgements regarding Brazil's response and subsequent reviews are mixed, with some suggesting political blame to be biased and its response to be better than (or the same as) certain high-income countries (7, 8). Vietnam, on the other hand, appears to have controlled the virus and provides lessons that can be adapted by other countries to attenuate its global impact. The Vietnamese government's seemingly high efficacy in containing COVID-19 was likely facilitated by a complex culture that is collectivist, highly trusting of its government, open to adopting new ideas, and particularly prepared from past experiences with SARS- making it particularly distinct from individualist cultures of, for example, the United States (9).

We will proceed by describing in detail Vietnam's early response to COVID-19, followed by a description of cultural additivity and *tam giao*. Then, we will discuss mental health concerns surrounding COVID-19 and subsequent lifestyle changes as well as how *tam giao* may have played a role in psychological resiliency in Vietnam. It is worth noting that to our knowledge, there are no studies examining the exact impact of cultural additivity of *tam giao* on COVID-19 related resilience in Vietnam. A section disclosing limitations of our mini-review and a conclusion will round off our discussion.

VIETNAM'S RESILIENCY TO COVID-19

Being under-resourced and neighbors with China, where cases of COVID-19 initially emerged, Vietnam was in a precarious position of potentially having an explosion of COVID-19 cases (9). With an estimated population of 97.33 million people, which until 30 July, 2020, had 459 confirmed COVID-19 cases with no fatalities but as of November 4th had 35 deaths, it can be viewed as a model LMIC for other countries struggling with COVID-19 (10, 11). The country proved resilient through significant and early efforts to detect and contain the virus while employing clear and consistent messaging to citizens about risks and relevant steps to take (9, 12). Every aspect of Vietnam's response cannot be realistically adopted, however, as its one-party government and past experiences with SARS, for example, cannot be replicated swiftly (9). Detection of the virus involved early development of testing kits- the first being developed on 7 February 2020- and proliferation of testing capacity - with the number of sites nationwide increasing from two in January to 120 by May 2020 (9). A noteworthy achievement of Vietnam's containment response is the employment of an approach of identifying and quarantining potential cases based on epidemiological risk, rather than observability of symptoms (9, 13). This approach may have significantly contributed to Vietnam's resiliency in its understanding of the infectiousness of COVID-19 arising before symptom discernibility (9).

The high efficacy of the communication of public health information can be traced to strict enforcement against misinformation and apt use of existing technologies. Included in Vietnam's total government response was the mobilization of police forces to engender trust among communities, spread relevant information about the virus, and strictly enforce guidelines (14). Of importance is the community approval of suspending certain personal rights to combat the spread of the virus as Vietnam's strict enforcement (i.e., distributing fines to those spreading misinformation) (9, 14) may be incompatible in other countries such as the United States of America where people protested mandatory mask-wearing (14). Trust fostered between communities and police, or community policing, involved a relationship in which the latter would distribute essentials such as face masks and accommodate to locals required to quarantine, allowing residents to feel comfortable providing trustworthy contact-tracing information (14). Communication by the Vietnamese government was early, beginning on 9 January 2020- prior to any confirmed cases- and continued to involve consistent use of technologies such as widespread texts and messaging on Facebook (9). Successful apps such as "NCOVI," a joint "neighborhood watch" project by telecom companies and the Ministry of Health, saw 1,040,000 downloads, facilitating efforts to contact trace and quarantine with real-time data (9, 15). Reacting to and managing a pandemic inevitably involves reliance on one's public health system. Vietnam's increasing yearly investments into its public health infrastructure and past experiences with SARS proved to prepare it for COVID-19 with its national emergency operations center and surveillance system (9). The center featured a strong system focused on epidemiological training and disease prevention (9). The surveillance system, though extremely helpful in its ability to gain data relevant to contact tracing in real-time and prevent severe widespread infections, may not be a feasible system to adopt by other countries as it raises concerns about privacy and personal rights (9). Part of Vietnam's early hospital management policies included attention to infection prevention among healthcare workers, which proved problematic during the 2003–2004 SARS outbreak with many deaths (9, 15). The result, after strengthened procedures and training, as of 30 June 2020, was just four healthcare workers having been infected (9). Although Vietnam's public healthcare system has not been strained or overwhelmed to the extent of other countries, its preparedness and subsequent success can be learned from. Countries should seriously consider investing in public health infrastructure to bolster preventative strategies (9).

TAM GIAO AND THE VIETNAMESE COVID-19 RESPONSE

Tam giao, or the Three Teachings, is essential to Vietnamese culture and especially folklore, which acts as a cultural transmitter influencing contemporary thought and behavior (16). The Three Teachings is a coexistence of fundamental understandings of Buddhism, Confucianism, and Taoism. The specifics of how each individual views, interprets, and practices

each of the teachings is variable, so essential or "basic" concepts accepted by laypeople such as *karma* in Buddhism are acknowledged when discussing *tam giao* (17). Each philosophy can be described as culturally added in that they are incorporated regardless of whether they may or may not contradict each other (17). An example would be the coexistence of Confucianism and Taoism where the former revolves around harmonious relationships with other members of society and maintaining social structures and the latter entails leaving the constrictions of society for living freely in nature, *wuwei* (16, 17). The two philosophies seem to contradict, but are able to be followed simultaneously in that one can follow Confucianism while working and then find solace in nature outside of work, for example (17). Interestingly, the influence or presence of each philosophy is not equally distributed in *tam giao* (17). Rather, Vuong et al. in their analysis of differing levels of cultural additivity suggest a higher possibility of additivity of Confucianism and Taoism, and isolation of Buddhism, in folklore (17). Moreover, there could be a dominance of Confucianism over the other two religions, which when supplemented by positive outcomes being seen in folklore stories with Confucianism and the vice of lying, has implications for understanding contradictory behaviors in Vietnamese culture-contradictory in the sense that one acts in a way seemingly opposed to a followed philosophy (16, 17). Thus, *tam giao* can be defined as a distinctly Vietnamese culture allowing the presence of the three philosophies with Confucianism holding a stronger position over the other two. This inequality could be attributable to folktale collections having been written largely by Confucian scholars and Vietnamese Confucianism expanding and subsequently opposing Buddhism in the twelfth-thirteenth centuries and beyond (17). Taoism, with its lack of institutional form, may be able to coexist more easily with Confucianism in that it remains non-threatening politically (17).

Tam giao in folklore as a means to perpetuate and communicate societal norms and expectations is important for gaining insight into the complexity of human decision-making, especially discrepancies between folklore and real-world conduct (16). The aforementioned finding of Confucianism and lying resulting in positive outcomes for characters in stories suggests that Vietnamese culture may tolerate or even validate lying for the maintenance of social harmony (16). This complicates Vietnamese culture and behavior in the context of the coronavirus pandemic, where lying or spreading misinformation, for example, can have severely deleterious effects. Lying about the seriousness of COVID-19 to maintain calm, however myopic, could be supported by *tam giao*. The deployment of strict police enforcement of guidelines can be seen as having two functions with regards to *tam giao*. It may (1) combat the fallacy of denying the seriousness of the pandemic for common good and (2) coincide with maintaining social harmony in effectively combating COVID-19 by promoting solidarity. The efficacy and approval of community policing were bolstered by messaging by the government that framed combatting COVID-19 as fighting a common enemy (war rhetoric), which produced an inspirational community spirit to come together to adopt measures such as wearing a mask (9, 14). Reinforcing knowledge about the virus while promoting and aiding public health measures via mask distribution in the context of this community spirit may illustrate how *tam giao* was intricately involved in the success of community policing in Vietnam. *Tam giao* exemplifies the intricacy of culture, government response, human behavior broadly, but especially so in the midst of a global pandemic. Although direct appraisals of causation or generalizations of the interaction between *tam giao* and Vietnam's resiliency need further study, the Three Teachings may have facilitated the confluence of prepared, swift government response and community cooperation, trust, and harmony.

CONSIDERATIONS FOR MENTAL HEALTH

COVID-19, unlike the previous SARS disease, is markedly transmissible, necessitating swift and stricter interventions such as quarantining (1). Vietnam's broad response was successful in containing the spread of the virus, but poses considerations for subsequent precipitated mental health concerns specific to pandemic (responses) (18–24). Some studies of Vietnam have shown that social distancing and isolation measures can be associated with high rates of post-traumatic stress (20) and increased rates of depression/anxiety (24), especially those present in hospitals suspected of having COVID-19 symptoms (22). Quarantining, which Vietnam has been aggressively employing, can impose psychological strain related to stigma, financial constraint, and guilt (18, 19). Stigmatization, specifically health-related stigma that arises from the novelty and high transmissibility of a disease, carries mental health burdens both somatic and psychological (19, 21). In the context of Vietnam, front-line HCWs quarantined for more than 3 weeks at Bach Mai Hospital reported stigma that worsened with regards to domains of poor self-image and public attitudes (19). Strikingly, stigma centered around guilt toward family and friends was the most common (19). The global pandemic inevitably presents and exacerbates mental health challenges, Vietnam as no exception. Although mental health programs are needed in Vietnam to address the psychological impacts of COVID-19, we will consider some of the (possible) protective factors that can be learned from their response.

Vietnam's swift unified response in the context of a resilient culture of additivity and *tam giao,* specifically, may have provided protective psychological factors such as health literacy, community solidarity and positive attitudes toward (the government's efficacy in) preventing further spread of COVID-19 (10, 22, 25–27). Interventions aimed at reducing psychological burden during COVID-19 depend in part on the repetitive dissemination of relevant information, total coordination of multiple health sectors, and promotion of altruistic behavior (18, 28). Having sufficient knowledge about the virus is necessary for epidemiological purposes and may correlate with increases in positive attitudes toward the virus (26). Moreover, this can be translated to health literacy, which can lower the likelihood of depression and increase measurements of quality of life in outpatients suspected of having COVID-19 symptoms

(22). The Vietnamese government's rigorous campaign to combat misinformation alongside consistent equivocal messages about the virus may have protected against the effects of quarantine, facilitating optimistic attitudes and trust in the government, reducing catastrophic appraisals of health (18, 26). Communication by the government was laden with surprisingly effective war rhetoric (9, 25). Avoiding scapegoating or individualist solutions that can result from using war as a metaphor, Vietnam fostered community solidarity (25, 27). This ethical collective patriotism acts makes sense in maintaining the social harmony predominant in *tam giao*. Its effects to influence behavior and promote resilience can be seen with three-fourths of a Vietnamese sample implementing all six preventative measures and philanthropists supporting vulnerable groups with "rice ATMs" (23). Social solidarity can also be framed to buffer the mental health effects of viewing social distancing as social isolation, especially for vulnerable populations (25). Solidarity on its own cannot account for this, however. The success of the community solidarity seen in Vietnam can be seen as having included the ethical values of care and responsibility (25). These latter values are consistent with *tam giao*. Care, especially toward elder populations, who in this case are particularly vulnerable to COVID-19, is inextricable from Confucianism. Responsibility can be framed as fulfilling Confucian and/or Buddhist philosophies in that one has a duty to maintain the well-being of his community and perform good deeds such as social distancing as a form of good *karma*, for example. It is worth noting that acting responsibly may follow the former perspective as Confucianism "dominates" over Buddhism in *tam giao* (17). Additionally, Taoist philosophies of flowing in nature may function to uphold social distancing as behaviors to be alone concurrently reduces the spread of COVID-19. Community solidarity against COVID-19 in Vietnam, incorporating ethical values and practices that correspond with *tam giao,* may have functioned as community resilience to the psychological impact of the pandemic (29). Community policing facilitating greater tracking efforts by citizens may be an example of collaborative efforts contributing to Vietnamese collective solidarity (14). The multisectoral mobilization of the Vietnamese government, effectively disseminating quality information (and stopping widespread misinformation) about the pandemic and fostering collective wisdom/knowledge about practices and optimistic attitudes toward government capability, fit into a framework of collaborative positive psychology (9, 26, 30). Collaborative positive psychology is a model that highlights how negative emotions in a time of crisis can motivate positive collaborative transformation in which problem-focused and method-driven responses supporting sustainable well-being are predicated on key principles of collective solidarity, empowerment, intelligence, and teamwork (30). Sustainable well-being necessarily involves psychological health. *Tam giao* may have acted as a cultural catalyst undergirding community solidarity in Vietnam in response to the pandemic. Its promotion of collectivist ethics in the backdrop of altruistic acts and swift public health interventions may shape salutogenesis and ultimately have acted as psychological resilience (23, 30). The adaptability of Vietnam may be attributable, in part, to a turbulent cultural history of additivity in the face of many abrupt ideological changes (10). *Tam giao*, thus, may be inseparable from Vietnamese resilience and solidarity.

LIMITATIONS

We acknowledge that there are many limitations to this mini-review. This review is not systematic and does not have concrete data measuring changes in the mental health of the Vietnamese throughout the global pandemic. Moreover, we were unable to find literature explicitly connecting *tam giao* and its impacts on resilience or psychological health in Vietnam. In light of this, however, we believe this can motivate further research into cultural additivity and *tam giao,* as well as their place in community and individual mental health and resilience.

CONCLUSIONS

Vietnam has been effective in containing the spread of COVID-19 early, this being facilitated by swift government response and community resilience facilitated by its collectivist and additive culture. A unified response involving multi-sectoral coordination including community policing and acquisition of real-time data allowed Vietnam to control the spread of COVID-19 (9, 14). *Tam giao* and its ethical values and philosophies may have aided the efficacy of resulting health literacy, community solidarity, and positive outlook in relieving some of the psychological impacts of the pandemic. Information is extremely important for resilience against the psychological consequences of the pandemic (6, 18, 20). The psychological consequences of COVID-19 are beginning to become more clear with post-traumatic stress, depression, anxiety, and other symptoms associated with quarantine and social-distancing being observed (15, 18, 20, 21). Vietnam was (and still is) successful in responding to COVID-19, but, inevitably, did not completely avoid these psychological consequences (15, 20, 21). However, the phenomena of cultural additivity, involving the adoption of seemingly contradictory values, and *tam giao*, culminating in a collectivist manifestation of resilience, solidarity, and additivity and its role in response to COVID-19, may offer inspiration for future measures by other LMICs.

AUTHOR CONTRIBUTIONS

SS was tasked with research and writing of the abstract and manuscript. JB was tasked with overseeing and assisting the work of SS, providing edits and feedback. Both authors contributed to the article and approved the submitted version.

FUNDING

This study was funded by National Institutes of Health, National Heart, Lung, and Blood Institute, US (Grant Number: T32HL129953), JB.

REFERENCES

1. Petersen E, Koopmans M, Go U, Hamer DH, Petrosillo N, Castelli F, et al. Comparing SARS-CoV-2 with SARS-CoV and influenza pandemics. *Lancet Infect Dis.* (2020) 20:238–44. doi: 10.1016/S1473-3099(20)30484-9
2. Randolph HE, Barreiro LB. Herd immunity: understanding COVID-19. *Immunity.* (2020) 52:737–41. doi: 10.1016/j.immuni.2020.04.012
3. Roser M, Ritchie H, Ortiz-Ospina E, Hasell J. *Coronavirus Pandemic (COVID-19) - Statistics and Research*. (2020). Retrieved from: https://ourworldindata.org/coronavirus (accessed October 29, 2020).
4. Roser M, Ritchie H, Ortiz-Ospina E, Hasell J. *Brazil: Coronavirus Pandemic Country Profile*. (2020). Retrieved from: https://ourworldindata.org/coronavirus/country/brazil?country=~BRA (accessed October 29, 2020).
5. Bastos MH. Brazil's COVID-19 response. *Lancet.* (2020) 396:e31. doi: 10.1016/S0140-6736(20)31914-0
6. Lancet T. COVID-19 in Brazil: "So what?". *Lancet.* (2020) 395:1461. doi: 10.1016/S0140-6736(20)31095-3
7. Pontes MR, Lima JP. Brazil's COVID-19 response. *Lancet.* (2020) 396:34. doi: 10.1016/S0140-6736(20)31919-X
8. Rizzo LV, Wolosker N. Brazil's COVID-19 response. *Lancet.* (2020) 396:33. doi: 10.1016/S0140-6736(20)31915-2
9. Pollack T, Thwaites G, Rabaa M, Choisy M, Van Doorn R, Luong DH, et al. *Emerging COVID-19 Success Story: Vietnam's Commitment to Containment*. (2020). Retrieved from: https://ourworldindata.org/covid-exemplar-vietnam (accessed October 27, 2020).
10. Balderstone S, Logan W. *Vietnamese Dwellings: Tradition, Resilience, and Change. Asia's Old Dwellings Tradition, Resilience, and Change*. (2003). p. 135–57.
11. Paddock R. *Vietnam, Lauded in Coronavirus Fight, Has First Local Case in 100 Days*. (2020). Retrieved from: https://www.nytimes.com/2020/07/25/world/asia/coronavirus-vietnam.html (accessed July 27, 2020).
12. Pei S, Kandula S, Shaman J. Differential effects of intervention timing on COVID-19 spread in the United States. *medRxiv [Preprint].* (2020). doi: 10.1101/2020.05.15.20103655
13. Shira D. *Vietnam Business Operations and the Coronavirus: Updates*. (2020). Retrieved from: https://www.vietnam-briefing.com/news/vietnam-business-operations-and-the-coronavirus-updates.html/ (accessed June 05, 2020).
14. Luong HT, Jardine M, Thomson N. Mobilizing the police from the top-down as public health partners in combatting COVID-19: A perspective from Vietnam. *J Comm Saf Well Being.* (2020) 5:57–9. doi: 10.35502/jcswb.132
15. La V-P, Pham T-H, Ho M-T, Nguyen M-H, P Nguyen K-L, Vuong T-T, et al. Policy response, social media and science journalism for the sustainability of the public health system amid the COVID-19 outbreak: the Vietnam lessons. *Sustainability*. (2020) 12:2931. doi: 10.3390/su12072931
16. Vuong Q-H, Ho M-T, Nguyen H-KT, Vuong T-T, Tran T, Hoang K-L, et al. On how religions could accidentally incite lies and violence: folktales as a cultural transmitter. *Palgr Commun.* (2020) 6:82. doi: 10.1057/s41599-020-0442-3
17. Vuong Q, Bui Q, La V, Vuong T, Nguyen VT, Ho M, et al. Cultural additivity: behavioural insights from the interaction of Confucianism, Buddhism and Taoism in folktales. *Palgr Commun.* (2018) 4:143. doi: 10.1057/s41599-018-0189-2
18. Brooks SK, Webster RK, Smith LE, Woodland L, Wessely S, Greenberg N, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *Lancet.* (2020) 395:912–20. doi: 10.1016/S0140-6736(20)30460-8
19. Do Duy C, Nong VM, Van AN, Thu TD, Do Thu N, Quang TN. COVID-19 related stigma and its association with mental health of health-care workers after quarantined in Vietnam. *Psychiatry Clin Neurosci.* (2020) 74:566–68. doi: 10.1111/pcn.13120
20. Le XT, Dang KA, Toweh J, Nguyen QN, Le HT, Toan DT, et al. Evaluating the psychological impacts related to COVID-19 of Vietnamese people under the first nationwide partial lockdown in Vietnam [Abstract]. *Front Psychiatry*. (2020) 11:284. doi: 10.3389/fpsyt.2020.00824
21. Lee S, Chan LY, Chau AM, Kwok KP, Kleinman A. The experience of SARS-related stigma at Amoy Gardens. *Soc Sci Med.* (2005) 61:2038–46. doi: 10.1016/j.socscimed.2005.04.010
22. Nguyen HC, Nguyen MH, Do BN, Tran CQ, Nguyen T, Pham KM, et al. People with suspected COVID-19 symptoms were more likely depressed and had lower health-related quality of life: the potential benefit of health literacy. *J Clin Med.* (2020) 9:965. doi: 10.3390/jcm9040965
23. Nguyen T, Vu DC. Impacts of the COVID-19 pandemic upon mental health: perspectives from Vietnam. *Psychol Trauma Theory Res Pract Policy.* (2020) 12:480–1. doi: 10.1037/tra0000694
24. Tran BX, Nguyen HT, Le HT, Latkin CA, Pham HQ, Vu LG, et al. Impact of COVID-19 on economic well-being and quality of life of the Vietnamese during the national social distancing. *Front Psychol.* (2020) 11:565153. doi: 10.3389/fpsyg.2020.565153
25. Ivic S. Vietnam's response to the COVID-19 outbreak. *Asian Bioethics Rev*. (2020) 12:341–47. doi: 10.1007/s41649-020-00134-2
26. Nhu HV, Tuyet-Hanh TT, Van NT, Linh TN, Tien TQ. Knowledge, attitudes, and practices of the vietnamese as key factors in controlling COVID-19. *J Comm Health*. (2020) 45:1263–9. doi: 10.1007/s10900-020-00919-4
27. Huynh T. The COVID-19 containment in Vietnam: what are we doing? *J Global Health.* (2020) 10:338. doi: 10.7189/jogh.10.010338
28. Ransing R, Adiukwu F, Pereira-Sanchez V, Ramalho R, Orsolini L, Teixeira A, et al. Mental Health Interventions during the COVID-19 pandemic: a conceptual framework by early career psychiatrists. *Asian J Psychiatry*. (2020) 51:102085. doi: 10.1016/j.ajp.2020.102085
29. Patel SS, Rogers MB, Amlôt R, Rubin GJ. What do we mean by 'community resilience'? A systematic literature review of how it is defined in the literature. *PLoS Currents.* (2017) 9. doi: 10.1371/currents.dis.db775aff25efc5ac4f0660ad9c9f7db2
30. Hogan MJ. Collaborative positive psychology: Solidarity, meaning, resilience, wellbeing, and virtue in a time of crisis. *Int Rev Psychiatry.* (2020) 32:1–15. doi: 10.1080/09540261.2020.1778647
31. Roser M, Ritchie H, Ortiz-Ospina E, Hasell J. *Vietnam: Coronavirus Pandemic Country Profile*. (2020). Retrieved from: https://ourworldindata.org/coronavirus/country/vietnam?country=~VNM (accessed October 29, 2020).

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychiatry

POLICY AND PRACTICE REVIEWS
published: 08 January 2021
doi: 10.3389/fpsyt.2020.603875

Mental Distress and Human Rights Violations During COVID-19: A Rapid Review of the Evidence Informing Rights, Mental Health Needs, and Public Policy Around Vulnerable Populations

*Muhammad Rahman[1], Rabab Ahmed[2], Modhurima Moitra[1,3], Laura Damschroder[4], Ross Brownson[2], Bruce Chorpita[5], Priscilla Idele[6], Fatima Gohar[6], Keng Yen Huang[7], Shekhar Saxena[8], Joanna Lai[6], Stefan Swartling Peterson[9], Gary Harper[10], Mary McKay[2], Beatrice Amugune[11], Tammary Esho[12], Keshet Ronen[1], Caleb Othieno[13] and Manasi Kumar[1,11]**

[1] University of Washington, Seattle, WA, United States, [2] Washington University, St. Louis, MO, United States, [3] Department of Health Metrics Sciences, University of Washington, Seattle, WA, United States, [4] VA Ann Arbor Healthcare System, Ann Arbor, MI, United States, [5] Department of Psychology, University of California Los Angeles Life Sciences, Los Angeles, CA, United States, [6] United Nations International Children's Emergency Fund (UNICEF), New York, NY, United States, [7] New York University, New York, NY, United States, [8] Harvard T.H Chan School of Public Health, Harvard University, Cambridge, MA, United States, [9] Uppsala University, Uppsala, Sweden, [10] University of Michigan, Ann Arbor, MI, United States, [11] University of Nairobi, Nairobi, Kenya, [12] Amref Health Africa, Nairobi, Kenya, [13] University of Botswana, Gaborone, Botswana

OPEN ACCESS

Edited by:
Wulf Rössler, Charité – Universitätsmedizin Berlin, Germany

Reviewed by:
Samia Tasnim, Texas A&M University, United States
Fred Were, University of Nairobi, Kenya
Andy Shih, Autism Speaks, United States

***Correspondence:**
Manasi Kumar
manni_3in@hotmail.com

Specialty section:
This article was submitted to Public Mental Health, a section of the journal Frontiers in Psychiatry

Received: *08 September 2020*
Accepted: *23 November 2020*
Published: *08 January 2021*

Citation:
Rahman M, Ahmed R, Moitra M, Damschroder L, Brownson R, Chorpita B, Idele P, Gohar F, Huang KY, Saxena S, Lai J, Peterson SS, Harper G, McKay M, Amugune B, Esho T, Ronen K, Othieno C and Kumar M (2021) Mental Distress and Human Rights Violations During COVID-19: A Rapid Review of the Evidence Informing Rights, Mental Health Needs, and Public Policy Around Vulnerable Populations. Front. Psychiatry 11:603875. doi: 10.3389/fpsyt.2020.603875

Background: COVID-19 prevention and mitigation efforts were abrupt and challenging for most countries with the protracted lockdown straining socioeconomic activities. Marginalized groups and individuals are particularly vulnerable to adverse effects of the pandemic such as human rights abuses and violations which can lead to psychological distress. In this review, we focus on mental distress and disturbances that have emanated due to human rights restrictions and violations amidst the pandemic. We underscore how mental health is both directly impacted by the force of pandemic and by prevention and mitigation structures put in place to combat the disease.

Methods: We conducted a review of relevant studies examining human rights violations in COVID-19 response, with a focus on vulnerable populations, and its association with mental health and psychological well-being. We searched PubMed and Embase databases for studies between December 2019 to July 2020. Three reviewers evaluated the eligibility criteria and extracted data.

Results: Twenty-four studies were included in the systematic inquiry reporting on distress due to human rights violations. Unanimously, the studies found vulnerable populations to be at a high risk for mental distress. Limited mobility rights disproportionately harmed psychiatric patients, low-income individuals, and minorities who were at higher risk for self-harm and worsening mental health. Healthcare workers suffered negative mental health consequences due to stigma and lack of personal

protective equipment and stigma. Other vulnerable groups such as the elderly, children, and refugees also experienced negative consequences.

Conclusions: This review emphasizes the need to uphold human rights and address long term mental health needs of populations that have suffered disproportionately during the pandemic. Countries can embed a proactive psychosocial response to medical management as well as in existing prevention strategies. International human rights guidelines are useful in this direction but an emphasis should be placed on strengthening rights informed psychosocial response with specific strategies to enhance mental health in the long-term. We underscore that various fundamental human rights are interdependent and therefore undermining one leads to a poor impact on the others. We strongly recommend global efforts toward focusing both on minimizing fatalities, protecting human rights, and promoting long term mental well-being.

Keywords: mental and behavioral health, human rights, lockdown, health care worker [non-MESH], stigma and discrimination, vulnerable populations, LMICs (low and middle income countries)

INTRODUCTION

On March 11, 2020, the World Health Organization (WHO) declared a public health emergency of international concern in response the global pandemic of the novel Coronavirus disease (SARS-COV-2). To reduce the spread of the virus, countries have implemented urgent emergency health measures. These measures include stay at home orders and the closure of schools which have led people to reorganize their lives and necessitated changes in livelihood and health services (1, 2).

In responding to public health emergencies, governmental authorities have to navigate the delicate balance between protecting the public's health and safeguarding their inherent human rights including education, freedom of movement, and access to health care. Measures to prevent the spread of infectious diseases are not zero-sum tradeoffs and can decrease fatalities but also increase suffering if human rights are not respected. As such, while being protected from clear public health threats, many people, especially vulnerable populations, may be deprived of their inherent human rights (3). We are in favor of using science to achieve globally shared objectives, but it is important to consider all sources of evidence in addition to the infectious diseases realm in the contexts of known tradeoffs—between lockdown and freedom to assert social and economic freedom. We recommend nations focus both on minimizing fatalities and protecting human rights. The United Nations (UN) defines human rights as: "*…fundamental to all human beings, regardless of race, sex, nationality, ethnicity, language, religion, or any other status. These rights include the right to life and liberty, freedom from slavery and torture, freedom of opinion and expression, the right to work and education, and many more such as a safe & clean environment have become important to uphold. Everyone is entitled to these rights, without discrimination or threat of any kind*" (4).

Within bioethics, the needs of different populations marked as vulnerable have even more urgent and impactful implications because applying the human rights lens focuses on highlighting and protecting the rights withing vulnerable populations. Vulnerable populations are defined as *"groups and communities at a higher risk for poor health as a result of the barriers they experience to social, economic, political and environmental resources, as well as limitations due to illness or disability"* (5). The principle of vulnerability is pertinent in the context of global disasters. It emphasizes ethical discourse on ameliorating the conditions that produce vulnerability, rather than on emergency actions focused on saving lives (6). Vulnerability is a global phenomenon but in the context of the pandemic it is exacerbated in many societies where inequality and access to basic freedoms is restricted. In lower- and middle-income countries (LMICs) such freedoms can easily be impacted due to existing system challenges and adverse social determinants of health. In High Income Countries (HICs), similar challenges surface during pandemic, and vulnerable groups have also been systematically marginalized.

Mental health is integral, closely related to, and dependent upon the realization of human rights (7). In the context of the coronavirus disease 2019 (COVID-19) pandemic, reports highlight gross undermining of mental health and violations of individual civil liberties and fundamental rights such as mobility rights, access to accurate information, access to proper protection for health workers, right to education, and discrimination against marginalized populations (8). Human rights protection and mental health needs are not always adequately integrated into emergency response policy and management. The evidence highlights that vulnerable populations, including those living in abusive families, individual with disabilities, children, elderly, domestic caregivers, health care workers (HCWs), and ethnic and marginalized communities, are especially at risk for mental health distress (9–11) with the psychological needs of these populations not likely to be fulfilled without meaningful legislation and intervention (9, 12). There have been long standing concerns within the field of mental health that the human rights of psychiatric populations and individuals and communities under psychosocial distress tend to be ignored. From mental health

policy perspectives, how human right policies and practices is integrated in emergency response policy and management has not been focused. There are several aspects of vulnerability, disability, coerciveness of treatment and system level oppression that have been key concerns. In this review we focus on rights associated violations and grievances that would potentiate further mental distress and long-term harm to critical subsections of at-risk populations that will be negatively impacted.

Given the current evidence, we believe that it is important to broaden our understanding of what rights violations entail in the context of this global pandemic and learn critical lessons in mitigation and prevention of these abusive and unethical situations and mental distress emanating from these. As the first step to inform global human rights policy and guidelines, and practices for better managing a global pandemic, it is important to understand and summarize current knowledge and practices. The focus of this review therefore is to collate evidence on human rights abuses and violations and resultant mental and behavioral health outcomes of different populations, especially those known to be at high risk or have greater vulnerabilities warranting additional mitigation, prevention, and treatment approaches during COVID-19 (13). The two specific objectives are:

1) Scoping of prominent rights-based issues with a focus on basic human rights violations during the COVID-19 pandemic and its association with mental and behavioral health of populations. In this regard, people from different ages, regardless of their gender, ethnicity, status (i.e., orphans or refugees), profession, or religion, will be included.
2) Appraisal of binding agreements and global or national policies that enforce human rights during emergencies and developed for this pandemic that are designed to strengthen human rights and well-being of vulnerable populations.

METHODS

A rapid literature review was conducted using published data sources on human rights violations and resulting psychological impact on vulnerable populations during COVID-19. For this review, we used the following working definition of rapid review "*…a type of knowledge synthesis in which components of the systematic review process are simplified or omitted to produce information in a short period of time*" (14, 15).

Literature that focused on human rights and related violations, health stigma and discrimination in the context of the pandemic was prioritized. For mental health, literature related to both generic factors such as quality of life, well-being and condition-specific aspects such as symptoms due to human rights abuses were included. The search strategy involved locating relevant concepts in PubMed and Embase databases. Relevant data was extracted and summarized into five main themes: (1) Mobility rights, quarantine, and lockdown, (2) Shortage of supplies and equipment for HCWs, (3) Child rights, (4) Elderly's rights, and (5) Disproportionate impacts on minority rights and psychiatric patients.

A search was conducted in July 2020 for studies published during December 2019 to July 2020 with assistance from a health science librarian. After eliminating duplicates, we screened titles and abstracts (MR and MK) and did a secondary screening of full-text articles using the inclusion/exclusion criteria and extracted data (MR, RA, and MK). A cursory search of Google Scholar was also conducted to identify any possible missed studies that meet the inclusion criteria. All authors read and commented on human rights and mental health related literature and their associations. We have reported findings following the PRISMA guidelines (16).

Studies were included if they described an empirically based (data-driven either qualitatively or quantitatively) assessment of human rights violations, social stigma and discriminatory behaviors against people of certain ethnic backgrounds, HCWs, and anyone perceived to have been in contact with the virus. It also included studies that reported mental, social, and behavioral health outcomes of the violations according to DSM/ICD classifications diagnostic categories or as ascertained using psychometric instruments. Furthermore, protocols and reports including guidelines by international agencies vetted by scientific and peer reviewers which address one of the primary outcomes were included. Studies were excluded if they tested one of the primary outcomes of interest without mentioning the association between them or the association between the constructs of interest or if those were not assessed in a data-driven approach. Systematic reviews, meta-analysis or scoping reviews were excluded if the analysis did not include one of the primary outcomes. Studies that are not peer-reviewed articles or not published in the English language were also excluded. **Figure 1** shows the flowchart diagram of the selection of articles.

RESULTS

A total of 24 studies were included in this review (see **Figure 1**). There was a wide variation in the included studies between methodology, the study design, and location. These studies represented findings from 14 countries (six from HICs and eight LMICs). Based on their methodological approach, 14 used a cross-sectional study design, three were observational studies, two were case studies and the rest had differing study designs such as two being case controls.

Of the empirically based studies, five studies examined impacts of limited mobility rights, due to quarantine and lockdown, on mental health; four studies examined impacts of lack of PPE or stigma on HCWs; and the rest examined impacts of COVID-19 such as violation of right to education, health care, and access, on special populations, including children, elderly, minorities, and psychiatric patients. The sections below highlighted key results in each area. **Table 1** describes the characteristics for articles reviewed under each area (e.g., country, theme of violation, study population, design, and findings).

Mobility Rights, Quarantine, and Lockdown

According to the international human rights law, restrictions of mobility including lockdown or mandatory quarantine due to public health emergency must be carried out for a legitimate purpose, based on scientific evidence, of limited duration, and

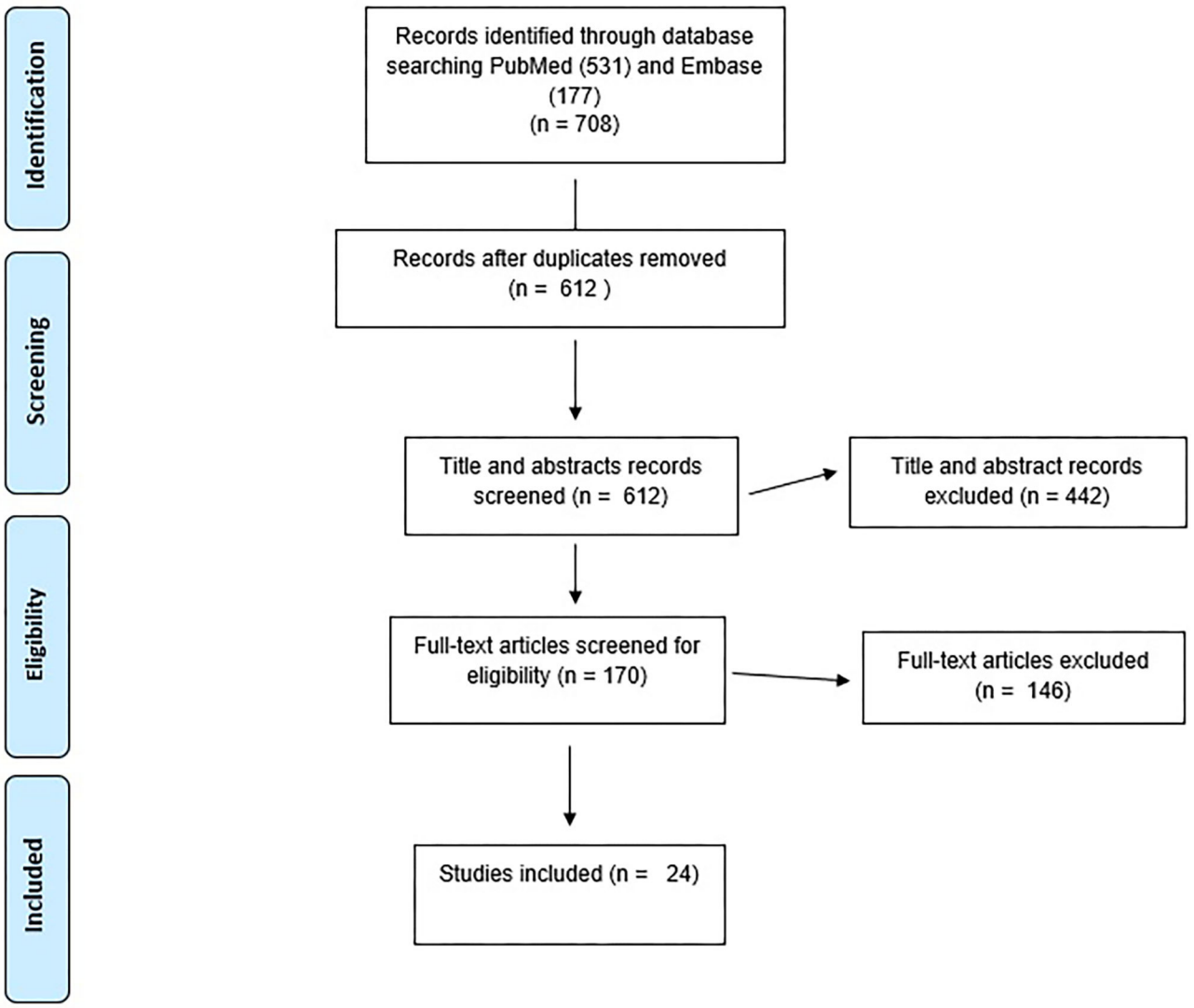


FIGURE 1 | PRISMA flow diagram.

respectful of human dignity (53). Quarantines are successful at limiting the spread of infectious diseases, but they introduce the side effects of increasing people's risk for psychological impact including suicide and other behavioral symptoms.

In our review, three studies reported rise in suicide incidence in several countries due to mobility restriction and lockdown. In Colombia, a national-level lockdown increased the risk of suicide in vulnerable populations and among those with pre-existing predisposing factors such as emotional problems, financial troubles, and job loss (29). One out of 13 adult Colombians reported high suicide risk; people experiencing depressive episodes or poor sleep quality including insomnia, had a higher risk for suicidal behaviors than the general population. In Pakistan, most of the investigated suicide cases were carried out by individuals who were socially-economically impacted by economic turmoil and experiencing financial troubles caused by the lockdown (30). Similar findings were reported in India where suicide cases increased as COVID cases increased, especially among individuals with pre-existing mental illness and those in poor socio-economic conditions (31).

Mobility restrictions were also found to be correlated with poor mental and social well-being in developed countries. In Italy, lockdown restrictions mediated other mental and behavioral symptoms such as anxiety in patients with serious mental illness (46). In the United Kingdom, since the start of their national lockdown, 9% surveyed participants reported experiencing psychological or physical abuse during the lockdown (32). About, 18% reported experiencing thoughts of suicide or self-harm in the first month of lockdown and 5% reported harming themselves at least once since the start of the lockdown. Reported frequencies of abuse, self-harm, thoughts of suicide, and self-injurious behavior were higher among women,

TABLE 1 | Included studies.

Country and authors	World bank income level	Theme of violation	Type of population	Key findings	Study design
Colombia (29)	Upper-middle income	Mobility restrictions and lack of adequate resources for mental health support and suicide intervention	General (ages 18–76)	• 7.6% of participants reported a high suicide risk. 1 out of 13 Colombians in a non-probability sample reports a high suicide risk during COVID-19 • association between perceived stress related to COVID-19, risk of depressive episode, insomnia, and suicidal behavior in the context of a restriction on the mobility	Cross-sectional
Pakistan (30)	Lower-middle income	Economic hardships including unemployment due to mobility restrictions without access to financial support caused by lockdown	Suicide cases (ages 24–68)	• Most of the suicide cases occurred due to the lockdown-related economic recession • 24% of population lives below poverty line and 20.5% is undernourished, both issues exacerbated by lockdown	Retrospective cohort suicide research
India (31)	Lower-middle income	Misinformation and fear or stigma related to possible COVID-19 infection were primary causes of suicide	Suicide attempts and cases (ages 18 and above)	• Rise in the number of suicide cases, which coincides with an increase in confirmed cases of COVID-19 and mitigation efforts (e.g., countrywide lockdown) • Social, financial insecurity, loss of employment or business, increase in family disputes, and pre-existing mental illness or medical illness might be predisposing and precipitating factors for an increase in suicide cases	Retrospective suicide research
United Kingdom (32)	High income	Significant psychological symptoms caused by lockdown but majority could not or did not receive formal or informal support indicating need for intervention and support especially for vulnerable populations and victims of gender based violence	General	• 9% surveyed reported experiencing psychological or physical abuse, 18% reported experiencing thoughts of suicide or self-harm in the first month of lockdown and 5% reported harming themselves at least once • The reported frequency of abuse, self-harm and thoughts of suicide/self-harm was higher among women, black, Asian and minority ethnic groups and people experiencing socioeconomic disadvantage, unemployment, disability, chronic physical illnesses, mental disorders and COVID-19 diagnosis • Psychiatric medications most common type of support, but fewer than half of those affected were accessing formal or informal support	Analysis of COVID-19 Social Study: a non-probability sample weighted to population proportions
United States (33)	High income	Worse health outcomes in part due to knowledge gaps in effective prevention methods and inability to adhere to prevention methods due to crowding and work conditions	General, minority	• Black and Hispanic populations bear a disproportionate burden of medical conditions across their lifespans, including obesity, diabetes, and heart disease • COVID-19 disparities exacerbated by structural racism, which impacts housing, economic opportunities, education, transportation, food availability, and health care access	Cross-sectional survey
India (34)	Lower middle income	Misinformation, rumormongering, and negative perceptions influenced by media worsen marginalization, prejudice and stigma harming both targets and those with prejudiced viewpoints	General (ages 18–83)	• Fear of COVID-19, age, collectivism, and generalized xenophobia are closely linked with well-being • Significant negative relationship between fear of COVID-19 and well-being indicating holding xenophobic attitudes may be harmful not just for target of prejudice but also for those holding such attitudes • Critical to prevent marginalization and lessen COVID-19 stigma via proper information being distributed and combating misinformation	Cross-sectional survey
India (35)	Lower-middle income	Worry of length of lockdown and impacts on livelihood including financial troubles due to inadequate and unclear support	Migrant workers	• Difficulties in following precautions such as frequent hand washing, maintaining social distancing within shelter-mates and wearing masks • Uncertainty about the duration of lockdown, eagerness to travel and meet family, fear of being abandoned/deserted by employers, insecurity over income and job, substance use–related concerns • Pregnant women and children particularly feared inattention to their health issues	Qualitative—in person visits by mental health professionals

(Continued)

TABLE 1 | Continued

Country and authors	World bank income level	Theme of violation	Type of population	Key findings	Study design
Jordan (36)	Upper-middle income	Strict lockdown, spread of misinformation, fear of contracting and spreading COVID and lack of PPE contributed to anxiety symptoms	General population, HCWs (ages 18 and above)	• Anxiety prevalent by health care professionals was 11.3% compared to general population 8.8% • Females among health care professionals, pulmonologists and ENT specialists at front lines, at higher risk of developing depression • Contributing factors are physician burnout, isolation from family, and feeling helpless due to the nature of this disease	cross-sectional survey
Lebanon (37)	Upper-middle income	Heavy psychological stress due to isolation from family support due to possible COVID infection, worry over stigma, and frustration over unclear information and health policy	HCWs: 13 quarantined health care professionals, 9 (69.2%) nurses 4 (30.8%) physicians	• HCWs being psychologically challenged through quarantine and need clear health communication from nursing managers, leaders, and policymakers • Proper health communication should be provided to the public so that they can know the reality of the situation and bypass any misconceptions and stigmatization • Moral and financial support should be offered to the quarantined personnel from governmental and non-governmental health policymakers	Qualitative design
Singapore (38)	High income	Perceived stigma against HCWs due to increased risk of infection lead to avoidance of public and worsening mental health outcomes indicating need for combatting stigma and stress	HCWs: residents with 61.7% junior and 38.3% senior	• No differences found between junior and senior residents in psychological and coping responses to pandemic • Those deployed to high-risk areas had lower perceived stress as those not deployed to high-risk areas had anticipatory anxiety contributing to higher stress levels • Higher perceived stigma level associated with higher levels of perceived stress and post-traumatic stress symptoms	Cross-sectional survey
Egypt (39)	Lower-middle income	Insufficient protection in workplaces leading to potentially higher chance of infection among HCWs and therefore increased stigma	HCWs: (60.2%) working at university hospital, (25.6%) general hospitals, primary health care or centers (14.2%)	• Most common statements as causes of perceptions of fear of COVID-19 infection: fear of transmission of infection to families (98.5%), disease being highly transmissible (90.4%), no available vaccine (78.6%) or treatment (87%), fatality of the disease (82.1%), fear of entering COVID-19 isolation hospitals (86.5%), and stigma related to COVID-19 (66.3%) • Most common reasons stated by HCWs explaining higher susceptibility to COVID-19 infection than others were: PPE shortages (83.6%), crowded workplaces (61.4%) and ill ventilation (72%)	Cross-sectional survey
China (40)	Upper-middle income	Stigma around former COVID patients worsened mental health outcomes	Former COVID-19 patients including 13.3% medical staff (physicians and nurses who had been ill)	• Perceived discrimination associated with clinically significant PTSD symptoms, severe depression, and severe anxiety • Perceived discrimination was strong risk factor for all anxiety, depression, and PTSD and was always an important variable in predicting anxiety, depression, or PTSD	Cross-sectional survey
Ghana (41)	Lower-middle income	Lockdown measures including ban on social gatherings and lack of PPE for caregivers worsens mental health of cancer patents	Cancer patients	• Ban on social gatherings including religious activities important for support likely to worsen their mental health • Socializing and spirituality play a significant role in the health and well-being of cancer patients in Ghana	Case study
Italy (42)	High income	Social restrictions and limitations on mobility lead to worsening of symptoms for OCD patients	OCD patients	• Significant changes on severity of total OCD symptoms, obsessions, and compulsions from before the quarantine to quarantine period, suggesting overall worsening on all these outcomes • Those who could not work/study remotely during the quarantine, those living with a parent in the same house during the quarantine and those with contamination symptoms had a significantly stronger worsening on the severity of total OCD symptoms, obsessions, and compulsions from before quarantine to the quarantine period	Preliminary naturalistic study with semi-structured interviews

(Continued)

TABLE 1 | Continued

Country and authors	World bank income level	Theme of violation	Type of population	Key findings	Study design
China (43)	Upper middle income	Insufficient knowledge among insomniacs leading to worsening symptoms caused by lockdown induced confinement	Insomnia patients (ages 18–65)	• Sleep latency, sleep duration, sleep efficiency and daytime function affected • During isolation period, patients have irregular work schedules and rest time. Patients sleep poorly at night and their social functions are affected during the day • During home isolation, patients worried and panicked which was mostly attributed to a lack of knowledge about disease prevention and control	Cross-sectional survey
China (44)	Upper-middle income	Due to strict lockdown measures, severe negative psychological impact on psychiatric patients with need to intervene and provide support and monitor and prevent increased suicide ideations	Psychiatric patients (ages 18 and above)	• Psychiatric patients scored significantly higher on the total IES-R, DASS-21 anxiety, depression, and stress subscales and, total ISI scores • More than one-quarter of psychiatric patients reported PTSD-like symptoms and moderate to severe insomnia. • Psychiatric patients were significantly more likely to report worries about their physical health, anger, impulsivity, and suicidal ideation • Improved access to telepsychiatry services, home delivery of psychotropic medications, online psychiatric first-aid resources, and infectious disease outbreak preparedness play a pivotal role in minimizing the severity of psychiatric symptoms experienced by psychiatric patients	Cross-sectional survey
India (45)	Lower-middle income	Inadequate knowledge among severely mentally ill and due to lockdown, decreased access to medication. Caregivers do not receive enough financial support and are overburdened	Severely mentally ill patients clinically stable before covid-19 and their caregivers (family): patients were from lower socioeconomic status (60.6%) with diagnoses being schizophrenia (59.1%), bipolar affective disorder (25%), major depressive disorder (12.1%), and schizoaffective disorder (3.8%). Ages were 18–55 years old	• Around 80%of patients missed appointments with mental health professionals in previous month and 22% stopped psychiatric medication due to the non-availability of medication and mental health professionals, lack of transportation, due to strict legal enforcement of lockdown • Two-third of patients lacked adequate knowledge of precautionary measures against COVID-19. Patients from lower socioeconomic status, low literacy levels, with inadequate social support showed less knowledge related to COVID-19 • Impairment was noted in sleep (37.9%), food intake (23%), and personal care (20%) and 29.5% showed re-emergence of previous psychiatric symptoms. • 63.6% reported that they were experiencing verbal and physical aggression from others • 30.3% caregivers reported increase in the burden of taking care of patients in addition to the burden related to other reasons, like the lockdown. • 45.5% caregivers perceived inadequate social support during this period and 62.9% were facing financial difficulties during lockdown	Cross-sectional survey
Italy (46)	High income	Increased lockdown restrictions worsening mental state of severely mentally ill	Severely mentally ill and control subjects. the following diagnosis were included: schizophrenia spectrum; bipolar disorder; recurrent major depression (ages 18–70)	• Patients were four times more likely to perceive high COVID-19 pandemic-related stress and had 2–3 times higher risk of severe anxiety and depressive symptoms. • Patients with serious mental illness had lower economic status and higher rates of concomitant medical diseases. Actual perceived stress from COVID-19 outbreak and lockdown restrictions appears a strong predictor and mediator of the heightened risk of suffering from severe anxiety in patients with serious mental illness	Case–control

(Continued)

TABLE 1 | Continued

Country and authors	World bank income level	Theme of violation	Type of population	Key findings	Study design
United States (47)	High income	Lockdown and home confinement increasing cases of gender-based violence with traditional support venues cut	Orthopedic trauma patients	• In 2019, 76 patients (26%) had a mental health diagnosis compared with 110 patients (43%) in 2020 • In 2019, 34 patients (11%) reported interpersonal violence vs. 51 patients (20%) in 2020 • Proportion of women presenting with fracture was higher in the 2020 group	Retrospective cohort study
Spain (48)	High income	Lockdown and home confinement lead to social isolation potentially worsening cognition and functioning due to limits on exercise and social interaction	Elderly (community dwelling with mild cognitive impairment or mild dementia)	• Living alone reported greater negative psychological effects and sleeping problems and some elderly changed living situation to have family as support network • Measures adopted to address negative experiences of lockdown included keeping informed, accessing health and social services, having support network that prevents risk of exposure to COVID-19 and guarantees food and medical supplies, daily routine with maintained sleeping habits and leisure activities, staying physically and mentally active with exercise, and preventing social isolation via technology	Cross-sectional
France (49)	High income	Lockdown limiting mobility and ban on social gatherings restricting ability to socially stimulate and physically workout—both critical to health	Elderly	• Despite decline in participation in group physical activities before quarantine, older adults expressed need to perform physical activity at home • Physical activity important for elderly to maintain level of independence, mental health, and well-being	Qualitative inquiry with semi-structured interviews
Spain (50)	High income	Lockdown limits community and family support for elderly and crucial for adequate resources for mental health available for elderly	Elderly (ages 60–80)	• Oldest of elderly and youngest of elderly showed no difference in psychological well-being and age only a negative impact on personal growth • Perceived-health, family functioning, resilience, gratitude, and acceptance had significant associations with both personal growth and purpose in life	Cross-sectional
China (51)	Upper-middle income	Lockdown measures including ban on social gatherings leads to reduction of outdoor activities and social interaction which are important for development	Children/students in grades 2 through 6	• Students who were slightly or not worried about being affected by COVID-19 had significantly lower CDI-S scores than those who were quite worried, with a decreased risk of depressive symptoms • Those who were not optimistic, compared with those who were quite optimistic, had significantly higher CDI-S scores, with an increased risk of depressive symptoms	Cross-sectional
China (52)	Upper-middle income	Lockdown interrupted education and increased pressure and stress especially on students preparing for entrance exams	Children/adolescents	• With increasing grade, proportion of students with depressive and anxiety symptoms increased • Scores for COVID-19 knowledge, prevention and control measures, and projections of COVID-19 trend higher among students without depressive and anxiety symptoms • Female students suffered greater psychological impact, and higher levels of stress, anxiety, and depressive symptoms	Cross-sectional

TABLE 2 | Key UN human rights protocols and policy documents for diverse populations.

Legal/ethical policies	Guidance and recommendations
Emergency measures (17)	State of emergencies should: • Be temporary in scope, not used to stifle dissent, transparent, and least intrusive to achieve goals • Have safeguards such as sunset or review clauses and allow independent review and legislative scrutiny • Not violate non-derogable rights and use deprivation of liberties as penalty only as last resort and be reasonable, lawful, and appropriate • Not arbitrary, unreasonable, necessary, proportionate to interest at stake, non-discriminatory, without arbitrary enforcement, and justified • Support core economic and social rights of people • Make sure law enforcement is compliant with international standards and human rights violation by them are met with swift investigation and justice
Human rights of migrants (18, 19)	To respect the human rights of migrants, states should: • Put in place legislative, policy, administrative measures to ensure timely and effective access to health facilities regardless of immigration status • Have provision of essential services separate from immigration enforcement and have social protection measures against unemployment available • Counter stigma related to racism and xenophobia through measures to prevent and address • Make available information on prevention, diagnosis, and treatment of COVID in languages migrants can understand • Take specific actions need to be taken to protect health of migrants in inadequate and unsafe conditions • Include migrant children in policies for access to education and think of innovative ways for access to education • Guarantee tightened border controls is non-discriminatory, confidential, and handled with dignity—and not imply indefinite detention • Release migrants in detention and give services and non-custodial alternatives to protect both migrants and staff • Guarantee labor rights of migrant works, and especially for those working in essential sectors • Include migrants and their families in economic recovery policies • Guarantee right of all migrants and their families to return to the country of which they are nationals
Women's human rights (20)	States should: • Recognize women are 70% of the frontline HCWs and therefore need adequate PPE and protection from stigma, safe and confidential access to health services, and protection of sexual and reproductive rights • Place special emphasis and attention to make sure girls continue their education particularly in LMICs • Declare protection structures and services for victims of gender-based violence as essential • Update referral pathways to reflect changes in available care facilities, ensure sufficient safe shelters • Adequately resource hotlines and other support and reporting mechanisms • Raise awareness via channels victims may seek help through and exempt that fleeing violence from punishment
Action on mental health (21)	States should • Consider mental health as essential components of national response and craft communication to be aware of potential impact on mental health • Ensure the widespread availability of emergency mental health and psychosocial support such as scaling up investments to remote services • Declare in-person care for severe mental health disorders as essential • Ensure social connectedness for older adults and other vulnerable populations in confinement through support of community action strengthening cohesion, solidarity, and healthy coping to reduce loneliness • Protect and promote the human rights of people with severe mental health conditions and psychosocial disabilities, for example, by monitoring whether they have equal access to care for COVID-19 • Develop and fund the implementation of national services re-organization strategies that shift care away from institution to community services • Ensure mental health is part of universal health coverage
Human rights of persons with disabilities (22)	States and stakeholders need to: • Prohibit denial of treatment on basis of disability, ensure priority testing, and promote research on impact of COVID on disabled • Identify and remove barriers to treatment and ensure the continued supply and access to medicines • Closely consult with and actively involve disabled people and representative organizations • Conduct training and awareness-raising of health workers • Refrain from blanket prohibitions of leaving the home and instead create exemptions for persons with disabilities to be outside
COVID-19 and civic space (23)	States should: • Create avenues for participation and feedback and reach out to most at-risk (e.g., women, older persons, disabled) • Maintain existing channels of civil society participation • Uphold freedom of assembly and ensure the limiting of the exercise of that right is only and strictly tied to protect public health • Respect right to privacy and adequate safeguards and accountability ensured with any surveillance proportional, lawful, and necessary • Respect freedom of expression must be respected and not engage in limitation on access to relevant data, censorship, or criminalizing journalistic activity • Not penalize expression based on vague concepts which are not compatible with requirements of legality and proportionality
Human rights of older persons (24)	To ensure the well-being of the elderly, states should: • Prioritize testing of vulnerable populations including older adults living in long-term facilities • Ensure continuity of adequate care services such as mental health services, palliative and geriatric care, including through support for caregivers • Strengthen services to prevent and protect older persons, particularly older women, from violence and abuse, such as domestic violence and neglect • Ensure visitor policies in residential care facilities, hospitals and hospices balance protection of others with need for family and connection • Assess needs, particularly those more isolated or with cognitive decline/dementia to provide support, including mental health and psychosocial

(Continued)

TABLE 2 | Continued

Legal/ethical policies	Guidance and recommendations
	• Do not stigmatize them and avoid stereotyping. Avoid labeling older adults as uniformly frail and vulnerable or words with negative connotations • Adopt socioeconomic relief measures and social safety nets, such as guaranteed access to food, water, essential goods and services and basic health care
Human rights of children (25)	To minimize the impact of COVID-19 on children, states should: • Rebalance combination of interventions to minimize impact of standard physical distancing and lockdown on children in low-income countries and communities and expand social protection programs to reach the most vulnerable • Prioritize the continuity of child-centered services, with focus on equity of access—particularly in relation to schooling, nutrition programs, immunization and other maternal and newborn care, and community-based child protection programs. • Provide practical support to parents and caregivers, including how to talk about the pandemic with children, how to manage their own mental health and the mental health of their children, and tools to help support their children's learning
Human rights of minorities (26, 27)	States should: • Ensure equal access to health care and eliminate any discriminatory practices against racial or ethnic groups • Prioritize access to free or affordable testing, medications and needed procedures • Involve communities and representative associations in designing and implementing health programs • Ensure racial or ethnic minorities are not disproportionately controlled, harassed and profiled by law enforcement authorities • Ensure the right of individuals to an effective remedy against the perpetrators of acts of racial discrimination, including when such acts are committed by law enforcement officers or other State officials • Ensure online learning does not exacerbate existing racial inequalities, and bridge digital divide • Mitigate disproportionate impacts of violation of the right to adequate housing through measures that include providing direct financial assistance, and enacting a moratorium on evictions due to arrears • Ensure food, water, and sanitation facilities are accessible and available in quantity and quality sufficient to satisfy needs of all • Adopt fiscal stimulus and social protection packages aimed to mitigate longer term economic and social consequences of pandemic
Human rights of persons in detention (28)	States should: • Address prison overcrowding, prioritize release of individuals of those who are children, persons with health conditions, low risk profiles, and persons with imminent release dates • Ensure that rationing of health responses and allocation decisions are guided by human rights standards based on clinical status and do not discriminate based on any other selection criteria, such as age, gender, social or ethnic affiliation, and disability to minimize creating avoidable rise in anxiety and stress levels, especially among children and the elderly

Key human rights protocols and policy documents relevant to this review are summarized in this table.

black, Asian and minority ethnic groups, people experiencing socioeconomic disadvantage, unemployment, disability, chronic physical illnesses, mental disorders and COVID-19 diagnosis. Furthermore, a study in the United States found an increased number of orthopedic trauma patients reporting a mental health diagnosis post-quarantine compared to pre-quarantine as well as an increased number of patients reporting interpersonal violence as the reason for their injury (47).

Shortage of Supplies and Equipment for HCWs

As part of the right to health, the International Covenant on Economic, Social and Cultural Rights obliged the governmental and health agencies to plan and optimize the use of personal protective equipment (PPE) among HCWs during public health emergencies such as COVID-19 (54, 55). This also includes providing them with appropriate training, education, and informational material that can prevent physical and mental harm from health care-associated infections.

According to the UNICEF and WHO, it is estimated that the majority of HCWs provide services and work in environments that lack basic infrastructure to support water, sanitation, hygiene and basic health care-related waste management (56). Lack of PPE has found to have negative consequences on HCWs' mental health. In a study conducted in Egypt, HCWs reported that crowded and ill-equipped workplaces and widespread shortages of PPE during COVID-19 pandemic increased their fear of getting a serious infection (39). These situations add emotional and mental burden for HCWs in attempting to self-isolate themselves from their families and communities (36). A cross-sectional study in Lebanon reported that quarantined HCWs suffered adverse mental effects such as anxiety, stress, and depression that increase under self-isolation because suspected COVID-19 infection (37). A similar study in Jordan found depression and anxiety to be more prevalent among HCWs than the general population. Specifically, pulmonologists and ENT specialists, who are at the frontline of the pandemic, scored higher in depression and anxiety surveys compared to other specialists (36).

Studies reported that fear in communities about the exposure to infection through interaction with HCWs expose them to fear-driven shunning and outright discrimination and persecution (38, 57). In Singapore, a study conducted among different HCWs found a higher perceived stigma level that was associated with higher levels of stress and post-traumatic stress symptoms. The study highlighted how internalization of stigma can reinforce avoidant behavior and social isolation which would increase traumatic stress symptoms, triggered by negative reactions from the surrounding community (38). Another study from Egypt found two-thirds of surveyed HCWs feared stigmatization and discrimination related to COVID-19 (39). The authors suggested that in collective societies and faith-based communities in Egypt,

social stigma associated with COVID-19 can be addressed through education, clear announcing of health care policies, and launching stigma reduction programs. A study from China on former COVID-19 patients, including 13.3% medical staff, found perceived discrimination was associated with clinically significant PTSD symptoms, severe depression, and severe anxiety (40).

Child Rights

According to the Declaration of the Rights of the Child (58), children's rights include protection, education, health care, shelter, and good nutrition. Numerous studies have found impacts of the pandemic on children's behavioral health, development and growth, physical health, and educational outcomes, with possible differential impacts by age and gender. In China, the national government imposed a reduction of outdoor activities and social interaction among the population, including children, out of fear of spreading the virus. This resulted in adverse outcomes in children's mental, social, and behavioral health. Specifically, it found that during home confinement, Chinese children, ages 7–11, who felt insecure and anxious, had a significantly higher risk of depressive and anxiety symptoms (51). Also, the closure of schools and educational institutions in China during lockdown disrupted the learning and educational process. It also deprived students of the sense of stability and normalcy that schooling provides. In a survey of 8,140 students in different educational stages, the proportion of students who reported depressive and anxiety symptoms was high, especially among those preparing for entrance exams which had been disrupted (52). The same study reported that female and male students differ in their perceptions of the psychological impact due to losing access to schools during COVID-19 with girls suffering from greater psychological impact, including stress, anxiety, and depressive symptoms (52). Also, specific facets of children's rights, such as health care, shelter, and nutrition, were also affected. Specifically, families that deal with lockdown and COVID-19 related financial stressors, struggle to provide basic needs and daily supplies, resulting in adverse mental health outcomes for family members such as stress, anxiety, and depression (59).

Rights of Elderly Individuals

In recent years, there have been significant advocacy efforts supporting human rights of older persons including full respect for their needs, privacy, and health care (60). During COVID-19, elderly individuals were found to have less access to free movement including in open and public spaces which restricted their ability to exercise and engage in leisurely or other essential activities—deteriorating their mental health and well-being (49). In our review, we identified two studies in developed countries, and no studies related to elderly populations in developing countries. A study in Spain of community-dwelling older adults with mild cognitive impairment or dementia found that enforced lockdowns, curfews, and social isolation had more significant adverse psychological effects and exacerbated sleeping problems for elderly living alone (48). In contrast, another study found that the COVID stress-related factors, except for the loss of a loved one, were not statistically linked with the deterioration of psychological health among the elderly during stay-at-home orders; the participants showed resilience in managing COVID-related stress challenges due to sufficient personal resources (50).

Disproportionate Impacts on Minorities and Psychiatric Patients

In accordance with the UN Pact on civil and political rights, national, ethnic, religious, or linguistic minorities (61) are meant to freely receive health services without any discrimination (62). In the United States, which has the highest number of confirmed COVID-19 cases as of August 2020 (Johns Hopkins University, 2020) (63), the populations that have been impacted the most disproportionately are racial and ethnic minorities. Prevalence for COVID-19 infection was reported higher in ethnic minorities than whites given inequality in health, welfare service access, and other existing social structural issues such as structural racism and discrimination, and this inequality and right violations may have led to higher mental health problems in racial and ethnic minorities. A cross-sectional study investigating differences between awareness about COVID-19 by race and ethnicity found African-Americans and Hispanics were less likely to be informed about the pandemic and effective prevention methods (33). These findings align with another study in India where patients with mental illness from disadvantaged backgrounds had less access to information via the internet, media, online health information (45). Unequal access to information along with lack of proper health care during lockdown jeopardize their physical and mental health.

Spreading of infectious diseases often fuels racism and xenophobic tendencies, especially against racial and ethnic minorities (64, 65). This results in a detrimental impact on the health well-being of disadvantaged minority populations and indirectly denies them access to medical care (66). A cross-sectional study linked xenophobia with mental well-being among ethnic/religious minorities: a survey of the non-Muslim Indian population found that fear, generalized xenophobia, and specific xenophobia, and collectivism negatively impacted their feelings and functional aspects of mental well-being (34). In another study, researchers screened the physical and mental health of minority migrants' workers in 140 areas across India, which included construction sites, relief camps, government hostels, and shelter homes during the COVID-19 pandemic. Their findings underscored that the economic, social, and environmental disadvantages were bothersome to the migrants and were worsening their mental health, undermining their resilience, and upsetting their quality of daily living (35). The impact was prominent among pregnant women as the interviewees who were feeling overwhelmed and concerned about their lack of access to health services because of the pandemic.

Similarly, unintended consequences of the strict legal enforcement of lockdown during the COVID-19, including lack of access to medications and mental health professionals and coupled with lack of transportation, negatively impacted treatment compliance among psychiatric patients. Specifically, in

India, a study of severely mentally ill patients during lockdown found 80% of patients missed their appointments and failed to contact their mental health professionals, 30% showed features of relapse of symptoms during the lockdown, and 22% stopped their psychiatric medication with patients from lower socioeconomic status, low literacy levels, and with inadequate social support showing less knowledge related to COVID-19 (45). A similar pattern was observed among patients with Obsessive-compulsive disorder (OCD) in Italy. In a group of patients with OCD who had completed an evidence-based therapeutic path for OCD before the quarantine, there was significant worsening of OCD symptoms compared to the pre-quarantine period. The author hypothesized that the lockdown and limited access to mental health centers may have discouraged patients in from seeking help and delayed the needed interventions (42).

Psychiatric patients in China were found to show higher rates of anxiety, depression, and stress symptoms compared to the general population (44). Another study from China found insomnia patients had worse sleep latency, sleep duration, and sleep efficiency due to home isolation and insufficient knowledge (43). Due to limitation on mobility, cancer patients in Ghana were unable to engage in activities involving social gatherings, worsening their mental health (41). Even though psychiatric patients often experience high levels of social discrimination (67), in this review, a study in China reported that patients with mental illnesses had not been experiencing additional discrimination during the COVID-19 epidemic (44). Though, in India, self-isolation and stay-at-home orders forced many psychiatric patients to live in unsafe homes and increase their exposure to domestic violence. In India, ∼63.6% of psychiatric patients reported that they were experiencing verbal and physical aggression from others and 30.3% of their caregivers expressed a feeling of the excessive burden of taking care of patients in addition to the burden related to other reasons, like financial issues related to the lockdown (45).

DISCUSSION

Overview

The review identified human rights violations that are associated with adverse mental health outcomes such as mobility restrictions including quarantines and lockdowns, shortages of supplies and equipment, stigma, xenophobia, and discrimination, losing access to schools and proper education, lack of access to information, and inequalities around access to quality mental health services. In addition, the findings of this review underscore several points in advancing our understanding and knowledge of human rights restrictions and violations and their association with mental health well-being during the COVID pandemic. *Given these findings, we would like to make a case that human rights of individuals and vulnerable populations must be protected during this pandemic and given that mental health is one of the fundamental rights, it needs prioritization at the public policy level* (8). *Human rights and mental health are such delicate entities that at times public health and public policy actions might compromise larger interests of the most afflicted or vulnerable populations.* Evidence-based policies may not always be representative of all members of the community. Therefore, ethical and rights-based approaches to ensure no added harm or disenfranchisement of individuals/groups is a sentiment that needs to be acted upon post-pandemic.

Summary Findings Around Vulnerable Groups

From the articles reviewed, 24 identified studies were published between April and July 2020. This is consistent with the fact that the health emergency measures in response to COVID-19 were declared worldwide in March 2020 and therefore most relevant studies for this review would take place in the following months. Many of the identified studies were conducted in developed countries and there may be variation in the understanding of human rights and legislations across countries. See **Table 2** that enlists Key UN human rights protocols and policy documents for diverse populations. The definition, understanding and agreement on vulnerable populations might also vary from one country context to the other. The understanding, development and functioning of public mental health systems might also vary in different geopolitical contexts. Previous studies found that many developing countries lack the basic legal framework to protect patients suffering with mental illness as well as a recognition that there is an absence of specific human rights policy during health emergencies to guide mitigation and protection measures (13). Both observations lend evidence to disproportionate impact on vulnerable key populations. The intersectional nature of multiple minoritized identities coalescing together such as being a migrant, disabled, and an adolescent girl—their complexity, need for comprehensive policy action—cannot be under-emphasized here.

In our review, a strong association between the adverse mental health outcomes and human rights restrictions such as quarantine has been well-documented, a clear finding in our review with anxiety and mood disorders being the most common conditions impacting populations (68). Additionally, *countries with higher-than-average rates of stress-related symptoms pre-COVID may continue to experience increases if effective measures are not implemented which necessitates a collective plan of action.*

Findings of adverse mental health outcomes following human rights violations were reported among vulnerable subgroups such as children, girls, elderly, and racial/ethnic minorities. The two studies that examined the mental health-related adverse outcomes associated with human rights violations found significant deterioration in children's mental, social, and behavioral health due to restriction in daily activities and movement (51, 52). It is important to note that the lockdown and social distancing could cause children—and especially children with mental disorders including developmental disabilities or physical or psychological comorbidities—to be prevented from fulfilling their psychological needs and developmental milestones leading to underdevelopment (69). Furthermore, home confinement can increase child abuse as pre-pandemic the vast majority of abuse was reported by staff working at institutions which were temporarily closed raising concerns that child abuse will go unnoticed, leading to higher child

morbidity and mortality and long-term negative developmental consequences (70). The United Nations Population Fund (UNFPA) estimates, due to the COVID-19 pandemic, 42–66 million more children potentially falling into poverty, and 13 million child marriages by 2030 that could otherwise have been averted, and 2 million more cases of female genital mutation by 2030 that could have been avoided (71, 72). Child marriages, child labor and such practices can flourish unchecked during this protracted pandemic. This is also an example of practices and cultural traditions that would yield in harmful short and long term mental health outcomes for the vulnerable children.

In this review, we found that girls suffered varied mental health outcomes due to violations of their human rights via losing access to school (52). These are consistent with what is reported by WHO (73), as existing gender inequalities are exacerbated by COVID-19 which affect both genders differently (74). The realization of girls' human rights and their well-being, especially during emergencies, have not always been accorded priority attention (75). Furthermore, females' access to sexual and reproductive health services is likely to be affected (76). In our review, difficulties were reported by pregnant women in accessing basic prenatal services during the pandemic due to closure and movement restrictions (35) and a previous report found that stay-at-home orders may contribute to women's vulnerability and considered a risk factor for gender based violence (74). Mobility restrictions can increase domestic violence and in our review a study from the United States found an increase in orthopedic trauma patients reporting interpersonal violence post-lockdown compared with pre-lockdown with an increase in fractures in female patients indicating an increase in gender based violence (47). Additionally, a UN human rights report alluded to rise in gender based and domestic violence due to economic and psychosocial challenges (76). *We do strongly recommend national level action on mitigating the harms caused by violence on women and girls as domestic violence is both a cause and consequence of mental ill-health* (77). A gender responsive training for health care workers, police, law enforcement officers and social protection workers would be critical in reducing the disproportionate burden of mental ill-health that will fall on young girls and women exposed to abusive environments.

Our review found HCWs suffered negative consequences as a result of shortage of supplies and equipment as well as stigma (39). Other reports have also found mistreatment because of stigma toward HCWs such as the denial of public transport, eviction from homes, and assaults when carrying out duties negatively impacted their mental health (75). To mitigate stigma, proper health education is needed to target the public to prevent social harassments of HCWs and COVID-19 survivors.

Regarding elderly's rights, two studies examined the association of human rights violations and mental health outcomes among elderly people in developed countries (48, 50). Common characteristics across the studies that were indicative of human rights violations were: enforced lockdown, curfews, and restricted the ability to exercise and engage in essential activities. No identified study examined old age discrimination or factors that directly contributed to autonomy of elderly individuals. However, other reports have noted that well-intentioned but ageist public messages can cause the elderly to be marginalized and to mitigate this, countries can use inclusive language and avoid negative emphasis on risk (78). Furthermore, to lessen potential adverse mental health impacts on the elderly—especially those with mental disorders or predisposed to feelings of loneliness—due to home confinement and curtailing of mobility rights, countries can engage in promoting social connection in public health messaging, mobilizing resources from family members, and giving help via community-based networks (79, 80). One of the moral imperatives we have as a global community is to strengthen mental health via reduction of increasing social isolation in the face of this protracted pandemic.

Studies have noted with concern adverse mental health outcomes due to human rights violations including lack of access to accurate and up-to-date information among racial and ethical minorities (33). Our review also found xenophobic viewpoints were correlated with negative well-being for both holding those viewpoints and those targeted which have co-incited with underreporting and biased media coverage as well as misinformation targeting religious minorities (34). In our review, a study has revealed an additional model of ecology of health and sickness based on social determinants of health among migrant workers which are one of most marginalized and stigmatized population in LMICs (35). It has also been noted that refugees and immigrants in detention centers face an increased likelihood of developing post-traumatic stress disorder as many refugees associate economic hardship, food and medicine shortages with a threat to life alongside viewing military presence to enforce restrictions as a threat and not a protection (81). There has been little-to-no scholarly work on this subject though police brutality has been on the rise in context of enforcing stay-at-home and mask-guidelines (82). *Concerns have been raised over the disproportionate impact of over policing in enforcing lockdown measures toward minority communities* (83). *There have also been reports of physical beatings or killings over breakings of curfew laws* (84) *which is a violation of human rights* (85). The mental stress and trauma associated with such events would become subject of further inquiry as time moves on but sensitivity training and ethical psychosocial response needs to be embedded within judicial and armed services assisting emergency response. Racial, ethnic and religious discrimination remains an area with very limited evidence around how mental health field can be leveraged to promote equity and social justice focused messages but also ways of providing care to aggrieved populations.

Human rights restrictions and violations have significant impacts on treatment outcomes, but higher impacts on patients with mental disorders given pre-existing mental health condition and social ostracization due to stigma. Research suggests that patients with mental illness are suffering from worsening of their pre-existing condition and difficulty in maintaining medication adherence because of restriction of mobility and lack of access to medications (42, 45). This was coupled with increased experiences of verbal and physical violence at hands caregivers. It is important to limit the abuses of human rights of those with mental health conditions especially by curtailing marginalization and stigmatization and increasing resources toward providing services (86). Article 11 of the Convention on

the rights of individuals with disabilities (CRPD) stipulating that all necessary measures to ensure protection and safety of persons with disabilities in situations of risk should be pursued (87). Furthermore, it is vital to ensure the well-being of caregivers of vulnerable individuals. This is especially pertinent in a disability setting as the caregiver's well-being is also important for the well-being of their charge or family member. A side effect of the lockdown in Europe on people with disabilities has been a massive harmful impact with reductions, early discharge, and the stoppings of admissions to rehabilitation expected to lead to an increased rehabilitation demand after the emergency subsides (88). *Despite the boom in digital health during the COVID-19, no reported studies examined the role of engagement of technology with available services in mitigating the structural barriers to getting mental health care during the COVID pandemic.* For example, concerns have been expressed that digital health services may not assist in decreasing inequity due to factors such as limited access of digital health services for those in poverty (89). This is an area in need of serious research and policy level attention. Resource allocation in providing quality digital and telehealth services, online learning or improving access to services for high risk groups also needs urgent prioritization.

Upholding Global Rights Conventions and Further Recommendations

UN committees that monitor nation states human rights actions include UN International Covenant on Civil and Political rights (ICCPR) (90), Committee on Economic, Social and Cultural rights (CESCR) (55), Committee on Elimination of Racial Discrimination (CERD) (91), Committee on All forms of discrimination against women (CEDAW) (92), Committee against Torture (CAT) (93), Convention on the rights of the child (CRC) (94), and CRPD (95). In the context of emergencies, these committees advocate for right to health, human rights in health systems as well as upholding of human rights through health (96). There are a number of guidelines in place as seen from **Table 1** on key recommendations mostly from the Office of the High Commissioner around COVID-19 and vulnerable populations. The UN recommendations and guidance around COVID stipulates a public health approach to managing the pandemic impact based on equal rights, opportunity, and valuing freedoms especially of the most-at risk populations. Many share similar recommendations such as advising for more investment into these vulnerable populations to ensure the negative impacts of the lockdown—including quarantine, social distancing, economic fallout—are lessened and disproportionate limitations around access to services and rights due to structural inequities are addressed. It is important to consider these as they provide valuable insight in how to minimize the consequences of the COVID-19 pandemic response and its response which embeds human rights informed care and risk mitigation pathway. However, there needs to be more emphasis on strategies that would address lockdown, public health action associated impacts and their mental health outcomes, and the need to prioritize mental health and well-being holistically. Given that the pandemic is going to take us through several waves of infection spread and containment, it is critical for this rights based approach to embrace short and long term mental health consequences and mitigation strategies.

If we are to achieve a shared vision of protecting the population from adverse mental effects due to the pandemic and necessary pandemic responses, policy makers would benefit from an increased focus on strengthening leadership and governance, finance mechanisms, and developing programs and policies that include vulnerable populations (97). *For LMICs, it is critical for the service provision be focused on accessible and equitable evidence-based community care models corresponding with the existing mental health capacity to deliver care, train existing primary care staff to cater to increased mental health needs, implement prevention and promotion programs tailored to local needs, and support civil societies and employers to address the increased burden of mental illness.*

Furthermore, mental health can be supported in the form of investment in the development of virtual platforms and telehealth to provide psychoeducation, self-guided low intensity interventions, alongside peer, and specialist-supported e-therapies. These can be embedded within integrated electronic health records and service platforms (98). Task shifting to provide psychosocial and peer-based support will also be useful such as using lay volunteers trained to provide human connectedness to address physical distancing and resultant isolation- a strategy well-adopted in LMICs. These approaches will also be beneficial in HICs in that effective management of the mental health consequences of the pandemic in historically marginalized communities requires a multilevel, community-wide approach led by culturally sensitive mental health professionals (99).

Improving Care for All

Regarding vulnerable and at-risk populations, *there is a specific need to pay attention to their mental health as many of the inequities, access and service issues have longstanding history prior to COVID-19, and the pandemic has only further exacerbated them.* Human rights violations in the mental health context remain significant throughout the world and cannot be explained by a lack of resources alone (100). WHO QualityRights initiative aims to reform human rights within mental health field and has developed policies and sensitization strategies to carry out system level strengthening of a holistic response to mental illness keeping our right to dignity, freedom and health at center (101). This thinking has been part of the WHO mental health treatment gap action program (mhGAP) framework to champion human rights informed thinking and rally for mental health as a core human right. Various fundamental human rights are interdependent therefore undermining one leads to a poor impact on others (102). This means that all human rights should be addressed together, including mental health.

To help strengthen mental health systems researchers should focus on developing robust information systems able to be enhanced by linking with other data sources to run predictive models using robust informatics methodology. A focus can also be placed on community-based interventions to address the COVID-19 mental health issues in integrated approach alongside innovative digital solutions (97). There is an urgent

TABLE 3 | Emerging findings and recommendations going forward.

I OVERALL KEY FINDINGS

- Fundamental human rights of the elderly, individuals living with mental illness or disabilities, and other vulnerable populations are disproportionately affected due to COVID restrictions. These rights violations are compounded by significant levels of discrimination and stigma
- HCWs experienced stigma and discrimination in addition to neglect in their working conditions putting them and their families at risk
- Most of the empirical studies covered COVID-19 restrictions which, when protracted, lead to significant human rights violations
- Gender based violence and income inequities increased as a result of lockdown contributing to loss of livelihood and socioeconomic strains and disproportionately affecting women and girls
- Limited access to enhanced alternative services (such as m-learning or e-health support) whether educational, vocational or health to populations most disproportionately impacted by the pandemic
- Significant loss of education and social protection to children in vulnerable contexts due to closure of schools and other related servicers
- Socioeconomic and health costs of worsening mental health of vulnerable individuals—the motto of "do no harm" flouted during pandemic restrictions meaning restrictions meant to protect should not worsen health or harm

II OVERVIEW OF IMPACT AND RECOMMENDATIONS TO POLICY MAKERS AND RELEVANT STAKEHOLDERS

- *Mental health is a fundamental human right* and irrespective of race, class, gender, ethnicity, or age, needs to be prioritized during emergencies. If considerable populations become scarred as a result of this pandemic, their worsening mental health would deteriorate their own and nations' recovery from the pandemic
- *Health systems strengthening approach:* human rights violations tend to increase when systems are under-resourced and poorly managed. A holistic health system strengthening approach and adequate response to human rights is needed
- *Equity and justice through health:* one of the ways of upholding CRPD and CRC and related conventions is to address systematic, structural inequities by providing health services and prioritizing multidimensional needs of the vulnerable
- *Protect civil liberties.* It is also important to inform the affected population of the exact substantive, territorial and temporal scope of the application of the state of emergency and its related measures as suggested by the ICCPR guidelines. Additionally, it is important to value individual and community's right to expression of their concerns and voices
- *Legality of enforcement of bans/closures/restrictions:* As recommended by ICCPR and other international rights guidance, legality of state action and role of state actors on lockdown, restrictions and delays in services/opportunities needs to be kept in mind. Protracted restrictions run the risk of increasing levels of apathy and increasing violations by people in charge
- *Human rights violations would lead to increased mental distress:* abrasively implemented state actions can make individuals and families prone to mental distress and illness; these effects can be long lasting
- *Have a pandemic and post-pandemic human rights approach infused with mental health:* building back nations and economies requires developing community level solutions through champions who can address needs and identify strategies to build back better. State level funding and resource allocation is needed to address mental health during and after the pandemic

Recommendations include –

- *prioritizing protecting lives and valuing marginalized and vulnerable populations' interests, helping people anticipate and address their health, and improved service access and livelihood challenges*
- *address discrimination and stigma in time, rapidly train government and civil services in what needs to be a human right informed response to the pandemic*
- *keep an eye on efforts to reducing inequality and disparities during and post-pandemic to make systems stronger*

For certain specific vulnerable populations:

  - *Improve access to telepsychiatry services, home delivery of medications, and online psychiatric resources to minimize relapse of or worsening of symptoms by psychiatric patients*
  - *Offer moral and financial support to HCWs, especially those under quarantine*
  - *For elderly, adopt measures to ensure they are keeping informed, accessing health and social services, and guarantee food and medical supplies*
  - *Use trusted sources in racial or ethnic minority communities to disseminate information and ensure job security*

- *Create a multi-stakeholder dialogue and discussion for policy action so it is well-informed, consultative and transparent in decision making, based in equity, with access and needs of most disenfranchised prioritized, with human rights elements relevant to COVID made part of mission statements of organizations, and learns from success stories within your own country and from other countries*
- *Actions to embrace for HICs:* racial, ethnic and religious minorities are more vulnerable and so upholding their civil liberties and quality services and enhanced access is critical to reduce disproportionate ill-health burden. There needs to be a coordinated response between resourceful governments on supporting other countries by example and leading mobilization of action around inequity, stigma and discrimination both of mental illness as well as COVID-19 related fear and phobic responses. Gender and income inequity remain the key areas of action
- *Actions to embrace for LMICs:* enhanced investment and improved access to quality health services including mental health. Universal health coverage (UHC) needs to be prioritized and mental health care has to be an integral part of the UHC. Countries should actively develop policy and programmatic response that would reduce gender and income inequality. Given that the pandemic would impact a large number of informal workers in LMICs, services need to be offered without discrimination. Stigma and discrimination have to be actively addressed and focus on key vulnerable populations should receive policy and programmatic prioritization

III RECOMMENDATIONS TO MENTAL HEALTH PRACTITIONERS

- Giving a voice to the prioritization of psychosocial needs of vulnerable and at-risk highly marginalized populations including a trauma-informed approach. Development of low intensity interventions that can be rolled out with strategies such as task-sharing and task-shifting. Psychotherapy support should be promoted through social works and community volunteers
- Integrate system level human rights approach in delivering essential health services and in specialist health care: training health personnel, teachers, social, and other essential workers in basic psychological first aid and human rights-based service provision and system thinking
- Recognize how inequities and inequalities have exacerbated global burden of mental disorders and actively develop policy, programmatic and research level instruments to combat these disparities and improve mental health conditions of populations. Identify conceptual models and theories that guide intervention development targeting improved mental health outcomes, equity, emancipation, and social justice as key themes
- Develop solutions such as public information programs to address and caution against stigma and discrimination and use media platforms to disseminate anti-stigma and discrimination messages

need for research to address how mental health consequences for vulnerable groups can be mitigated under pandemic conditions, and on the impact of repeated media consumption and health messaging around COVID-19 (103).

Addressing human rights can be a helpful way to mitigate the impact of mental illness on populations especially during public health emergency. Policy and frameworks to address different aspects of human rights can complement the various form of health services to enhance the mental health well-being during pandemics. However, effective implementation of the medico-legal and ethical aspect of the human rights will rely on the extent to which the research proved a direct association between violations and adverse mental health outcomes and how the implementation will be applied through public policy. Going forward this understanding may help to minimize the mental health risk associated with violations of human rights during health emergencies and provide the policy makers useful directions on how to address discrimination and human right violations in guidance, policies, and practices (104). This review we hope has provided findings that set the foundation on how to integrate human rights as an integral part of public health response keeping mental health as a core thematic. In addition, the review provides pointers to ethical guidance when dealing with vulnerable populations especially during public heath crises (see **Table 3** for further recommendations and overview of prominent findings). To target concerns about human rights violations during pandemics, policy makers should work with mental healthcare providers and target populations to ensure that suitable emergency health measures are provided through human rights lenses. This collaborative approach can pave the road to continue engaging or increasing engagement of different stakeholders in different sectors during stressful periods.

Although this review provides evidence that is valuable for addressing human rights perspectives while providing mental health services to different population, future research should (1) consider that some countries are still not signatories of the UN universal declaration of human rights and countries may have a different interpretation of what counts as a human rights violation; (2) countries also have different legal systems to define and enforce human rights measures; (3) there is need to arrive at a consensus on defining of human rights restrictions and violations in mental health and how it should be identified and quantified; and going forward through different UN human rights conventions as instruments to make that change; (4) adequate reporting of human rights restrictions and violations especially among vulnerable populations should be better etched out and this should include adverse mental health outcomes.

Strengths and Limitations

This review followed the guidelines for a rapid review. The review highlights human rights violations influencing the mental well-being in impacted population. We summarize the agreements and global or national policies that enforce human rights during emergencies as a reminder of what we ought to be looking out for and values countries need to hold themselves accountable to. Our findings contribute to a broader understanding of the impact of COVID pandemic on population health. This review does have some limitations, however. The research team tried to identify and include as many published papers as possible; however, because of the novelty of the topic, the defined articles were limited and the rapidly evolving nature of the pandemic and associated scholarly literature could have caused some relevant articles to be missed. There is difficulty in creating a comprehensive list of human rights constructs as they are different based on factors such as target population and country of interest (105). Also, articles that were not data-driven were not included in our analysis, which may have impacted results of this review. Nevertheless, this approach was applied to ensure peer-reviewed articles were included which strengthens our results. Moreover, the study team attempted to group the results based on the themes that reported in the WHO report (84). We only included articles that addressed the research questions of focus of the review and therefore, generalizing the results on different setting and population should be done with caution.

CONCLUSIONS

Finally, this review also acknowledges the implications for guideline and policies on different populations and therefore, (1) efforts to improve engagement of policy makers may be beneficial to address mental health outcomes during public health emergency and (2) civil society and human rights champions (including lived experience representatives), health care providers, and policy makers should work together to identify the policy, services, and interventions that enforce human rights which have a lasting impact on mental health of key populations during emergencies. We will be better served to understand the tradeoffs and the reciprocating relationships among physical health, mental health, human rights, and individual rights, that there could be better statements in global reports of values-driven, shared objectives in light of these tradeoffs and relationships, and a more thorough consideration of many relevant areas of science (including but not limited to, infectious disease) to establish a policy that strikes the most acceptable balance.

AUTHOR CONTRIBUTIONS

MR and MK developed the study protocol. RA helped edit the protocol. MR, RA, and MK extracted the data and compiled the initial list of studies. MR and RA along with MK wrote the manuscript. All authors read, edited, and approved the final version of the paper.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyt.2020.603875/full#supplementary-material

REFERENCES

1. World Bank. *How the World Bank Is Mitigating the Impacts of COVID-19 in the Health Sector* (2020). Available online at: www.worldbank.org/en/news/feature/2020/06/16/how-the-world-bank-is-mitigating-the-impacts-of-covid-19-in-the-health-sector
2. World Health Organization. *Coronavirus Disease (COVID-19) - Events as They Happen* (2020). Available online at: www.who.int/emergencies/diseases/novel-coronavirus-2019/events-as-they-happen
3. United Nations. *We are all in this Together: Human Rights and COVID-19 Response and Recovery* (2020). Available online at: www.un.org/en/un-coronavirus-communications-team/we-are-all-together-human-rights-and-covid-19-response-and
4. United Nations. *Human rights* (2016). Available online at: https://www.un.org/en/sections/issues-depth/human-rights/
5. National Collaborating Centre for Determinants of Health. *Vulnerable Populations*. Available online at: https://nccdh.ca/glossary/entry/vulnerable-populations#:~:text=Vulnerable%20populations%20are%20groups%20and,due%20to%20illness%20or%20disability.
6. ten Have H. Disasters, vulnerability and human rights. In: O'Mathúna D, Dranseika V, Gordijn B, editors. *Disasters: Core Concepts and Ethical Theories*. *Advancing Global Bioethics*. Vol 11:1–10. Cham: Springer (2018).
7. American Psychological Association. *Mental Health is a Human Right* (2020). Available online at: https://www.apa.org/international/pi/2018/12/mental-health-rights
8. Office of the High Commissioner for Human Rights. *COVID-19 and Its Human Rights Dimensions: Guidance* (2020). http://digitallibrary.un.org/record/3860124/files/COVID19Guidance.PDF
9. Dubey S, Biswas P, Ghosh R, Chatterjee S, Dubey MJ, Chatterjee S, et al. Psychosocial impact of COVID-19. *Diabetes Metab Syndr Clin Res Rev*. (2020) 14:779–88. doi: 10.1016/j.dsx.2020.05.035
10. Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease 2019. *JAMA Netw Open*. (2020) 3:e203976. doi: 10.1001/jamanetworkopen.2020.3976
11. Moitra, M., Rahman, M., Collins, P., Gohar, F., Weaver, M., Kinuthia, J. et al. Mental Health Consequences of Health care Workers in the context of COVID-19: a scoping review to draw lessons for LMICs and fragile settings. *Front Psychiatry*. (2020).
12. Pfefferbaum B, North CS. Mental health and the Covid-19 pandemic. *N Engl J Med*. (2020) 383:510–2. doi: 10.1056/NEJMp2008017
13. United Nations. *COVID-19 and Human Rights* (2020). Available online at: https://www.un.org/victimsofterrorism/sites/www.un.org.victimsofterrorism/files/un_-_human_rights_and_covid_april_2020.pdf
14. Tricco AC, Antony J, Zarin W, Strifler L, Ghassemi M, Ivory J, et al. A scoping review of rapid review methods. *BMC Med.* (2015) 13:224. doi: 10.1186/s12916-015-0465-6
15. Khangura S, Konnyu K, Cushman R, Grimshaw J, Moher D. Evidence summaries: the evolution of a rapid review approach. *System Rev. (2012)* 1:10. doi: 10.1186/2046-4053-1-10
16. McGowan J, Sampson M, Salzwedel DM, Cogo E, Foerster V, Lefebvre C. PRESS peer review of electronic search strategies: 2015 guideline statement. *J Clin Epidemiol.* (2016) 75:40–6. doi: 10.1016/j.jclinepi.2016.01.021
17. Office of the High Commissioner for Human Rights. *Emergency Measures and COVID-19 : Guidance* (2020). Available online at: http://digitallibrary.un.org/record/3861152/files/EmergencyMeasuresCOVID19.PDF
18. Office of the High Commissioner for Human Rights. *COVID-19 and the Human Rights of Migrants: Guidance* (2020). Available online at: digitallibrary.un.org/record/3861155/files/OHCHRGuidanceCOVID19Migrants.PDF
19. United Nations. *Joint Guidance Note on the Impacts of the COVID-19 Pandemic on the Human Rights of Migrants* (2020). Available online at: https://www.ohchr.org/Documents/Issues/Migration/CMWSPMJointGuidanceNoteCOVID-19Migrants.pdf
20. Office of the High Commissioner for Human Rights. *COVID-19 and women's human rights : guidance*. (2020) Available online at: http://digitallibrary.un.org/record/3861157/files/COVID-19ndWomensHumanRights.PDF
21. Office of the High Commissioner for Human Rights. *COVID-19 and the need for action on mental health: policy brief* (2020). Available online at: http://digitallibrary.un.org/record/3866300/files/mentalhealth.PDF
22. Office of the High Commissioner for Human Rights. *COVID-19 and the rights of persons with disabilities : guidance* (2020). Available online at: http://digitallibrary.un.org/record/3861159/files/COVID-19the_RightsPersonsDisabilities.PDF
23. United Nations. *Civic space and COVID-19: guidance* (2020). Available online at: http://digitallibrary.un.org/record/3861153/files/CivicSpaceandCovid.PDF
24. United Nations. *Policy Brief: The Impact of COVID-19 on older persons* (2020). Available online at: www.un.org/sites/un2.un.org/files/un_policy_brief_on_covid-19_and_older_persons_1_may_2020.pdf
25. United Nations. *Policy Brief: The Impact of COVID-19 on children* (2020). Available online at: www.un.org/sites/un2.un.org/files/policy_brief_on_covid_impact_on_children_16_april_2020.pdf
26. Office of the High Commissioner for Human Rights. *Racial Discrimination in the Context of the COVID-19 Crisis* (2020). Available online at: https://www.ohchr.org/Documents/Issues/Racism/COVID-19_and_Racial_Discrimination.pdf
27. Office of the High Commissioner for Human Rights. *COVID19 and Minority Rights: Overview And Promising Practices* (2020). Available online at: ohchr.org/Documents/Issues/Minorities/OHCHRGuidance_COVID19_MinoritiesRights.pdf
28. Inter-Agency Standing Committee. *COVID-19: Focus On Persons Deprived of Their Liberty* (2020). Available online at: https://interagencystandingcommittee.org/system/files/2020-03/IASC%20Interim%20Guidance%20on%20COVID-19%20-%20Focus%20on%20Persons%20Deprived%20of%20Their%20Liberty.pdf
29. Carmen C, Caballero-Domínguez CC, Jiménez-Villamizar MP, Campo-Arias A. Suicide risk during the lockdown due to coronavirus disease (COVID-19) in Colombia. *Death Stud*. (2020) 1–6. doi: 10.1080/07481187.2020.1784312
30. Mamun MA, Ullah I. COVID-19 suicides in Pakistan, dying off not COVID-19 fear but poverty?–The forthcoming economic challenges for a developing country. *Brain Behav Immunity*. (2020) 87:163–6. doi: 10.1016/j.bbi.2020.05.028
31. Shoib S, Nagendrappa S, Grigo O, Rehman S, Ransing R. Factors associated with COVID-19 outbreak-related suicides in India. *Asian J Psychiatry*. (*2020*) *53:e102223*. doi: 10.1016/j.ajp.2020.102223
32. Iob E, Steptoe A, Fancourt D. Abuse, self-harm and suicidal ideation in the UK during the COVID-19 pandemic. *Br J Psychiatry* (2020) 217:543–6. doi: 10.1192/bjp.2020.130
33. Jones J, Sullivan PS, Sanchez TH, Guest JL, Hall EW, Luisi N, et al. Similarities and differences in COVID-19 awareness, concern, and symptoms by race and ethnicity in the United States: cross-sectional survey. *J Med Internet Res*. (2020) 22:e20001. doi: 10.2196/20001
34. Ahuja KK, Banerjee D, Chaudhary K, Gidwani C. Fear, xenophobia and collectivism as predictors of well-being during Coronavirus disease 2019: an empirical study from India. *Int J Soc Psychiatry* (2020). doi: 10.1177/0020764020936323
35. Chander R, Murugesan M, Ritish D, Damodharan D, Arunachalam V, Parthasarathy R, et al. Addressing the mental health concerns of migrant workers during the COVID-19 pandemic: an experiential account. *Int J Soc Psychiatry* (2020). doi: 10.1177/0020764020937736
36. Naser AY, Dahmash EZ, Al-Rousan R, Alwafi H, Alrawashdeh HM, Ghoul I, et al. Mental health status of the general population, health care professionals, and university students during 2019 coronavirus disease outbreak in Jordan: a cross-sectional study. *Brain Behav*. (2020) 10:e01730. doi: 10.1002/brb3.1730
37. Fawaz M, Samaha A. The psychosocial effects of being quarantined following exposure to COVID-19: a qualitative study of Lebanese health care workers. *Int J Soc Psychiatry*. (2020) 66:560–5. doi: 10.1177/0020764020932202
38. Chew QH, Chia FL, Ng WK, Lee W, Tan P, Wong CS, et al. Psychological and coping responses to COVID-19 amongst residents in training across ACGME-I accredited specialties in Singapore. *Psychiatry Res*. (2020) 290:113146. doi: 10.1016/j.psychres.2020.113146

39. Wahed WYA, Hefzy EM, Ahmed MI, Hamed NS. Assessment of knowledge, attitudes, and perception of health care workers regarding COVID-19, a cross-sectional study from Egypt. *J Community Health*. (2020) 45:1242–51. doi: 10.1007/s10900-020-00882-0
40. Liu D, Baumeister RF, Veilleux JC, Chen C, Liu W, Yue Y, et al. Risk factors associated with mental illness in hospital discharged patients infected with COVID-19 in Wuhan, China. *Psychiatry Res*. (2020) 292:113297. doi: 10.1016/j.psychres.2020.113297
41. Kugbey N, Ohene-Oti N, Vanderpuye V. COVID-19 and its ramifications for cancer patients in low-resource settings: Ghana as a case study. *Ecancermed Sci*. (2020) 14:ed99. doi: 10.3332/ecancer.2020.ed99
42. Davide P, Andrea P, Martina O, Andrea E, Davide D, Mario A. The impact of the COVID-19 pandemic on patients with OCD: effects of contamination symptoms and remission state before the quarantine in a preliminary naturalistic study. *Psychiatry Res. (2020) 291:*113213. doi: 10.1016/j.psychres.2020.113213
43. Yang L, Yu Z, Xu Y, Liu W, Liu L, Mao H. Mental status of patients with chronic insomnia in China during COVID-19 epidemic. *Int J Soc Psychiatry*. (2020) 66:821–6. doi: 10.1177/0020764020937716
44. Hao F, Tan W, Jiang L, Zhang L, Zhao X, Zou Y, et al. Do psychiatric patients experience more psychiatric symptoms during COVID-19 pandemic and lockdown? A case-control study with service and research implications for immunopsychiatry. *Brain Behav Immunity*. (2020) 87:100–6. doi: 10.1016/j.bbi.2020.04.069
45. Muruganandam P, Neelamegam S, Menon V, Alexander J, Chaturvedi SK. COVID-19 and severe mental illness: impact on patients and its relation with their awareness about COVID-19. *Psychiatry Res. (2020) 291:*113265. doi: 10.1016/j.psychres.2020.113265
46. Iasevoli F, Fornaro M, D'Urso G, Galletta D, Casella C, Paternoster M. Psychological distress in serious mental illness patients during the COVID-19 outbreak and one-month mass quarantine in Italy. *Psychol Med*. (2020) 1–3. doi: 10.1017/S0033291720001841
47. Ohliger E, Umpierrez E, Buehler L, Ohliger AW, Magister S, Vallier H, et al. Mental health of orthopaedic trauma patients during the 2020 COVID-19 pandemic. *Int Orthopaedics*. (2020) 44:1921–5. doi: 10.1007/s00264-020-04711-w
48. Goodman-Casanova JM, Dura-Perez E, Guzman-Parra J, Cuesta-Vargas A, Mayoral-Cleries F. Telehealth home support during COVID-19 confinement for community-dwelling older adults with mild cognitive impairment or mild dementia: survey study. *J Med Internet Res. (*2020) 22:e19434. doi: 10.2196/19434
49. Goethals L, Barth N, Guyot J, Hupin D, Celarier T, Bongue B. Impact of home quarantine on physical activity among older adults living at home during the COVID-19 pandemic: qualitative interview study. *JMIR Aging* (2020) 3:e19007. doi: 10.2196/19007
50. Lopez J, Perez-Rojo G, Noriega C, Carretero I, Velasco C, Martinez-Huertas JA, et al. Psychological well-being among older adults during the covid-19 outbreak: a comparative study of the young-old and the old-old adults. *Int Psychogeriatrics*. (2020) 1–6. doi: 10.1017/S1041610220000964
51. Xie X, Xue Q, Zhou Y, Zhu K, Liu Q, Zhang J, et al. Mental health status among children in home confinement during the coronavirus disease 2019 outbreak in Hubei Province, China. *JAMA Pediatr*. (2020) 174:898–900. doi: 10.1001/jamapediatrics.2020.1619
52. Zhou SJ, Zhang LG, Wang LL, Guo ZC, Wang JQ, Chen JC, et al. Prevalence and socio-demographic correlates of psychological health problems in Chinese adolescents during the outbreak of COVID-19. *Eur Child Adolesc Psychiatry*. (2020) 29:749–58. doi: 10.1007/s00787-020-01541-4
53. ILGA Europe. *Obligations of States in the Field of Human Rights in the Context of COVID-19* (2020). Available online at: ilga-europe.org/sites/default/files/covid19%20%20states%20obligations%20in%20the%20field%20of%20lgbti%20human%20rights.pdf
54. World Health Organization. *International Covenant on Economic, Social Cultural Rights*. Health Human Rights. United Nations Human Rights, Office of the High Commissioner (2013). Available from: http://www.ohchr.org/EN/ProfessionalInterest/Pages/CESCR.aspx
55. UN General Assembly. *International Covenant on Economic, Social and Cultural Rights, United Nations, Treaty Series*. Vol. 993 (1966). p. 3. Available online at: https://www.refworld.org/docid/3ae6b36c0.html
56. World Health Organization. *WASH in Health Care Facilities: Global Baseline Report* (2019).
57. Rana W, Mukhtar S, Mukhtar S. Mental health of medical workers in Pakistan during the pandemic COVID-19 outbreak. *Asian J Psychiatry*. (2020) 51:102080. doi: 10.1016/j.ajp.2020.102080
58. Assembly UG. *Convention on the Rights of the Child. United Nations, Treaty Series, 1577*. (1989).
59. Rehman U, Shahnawaz MG, Khan NH, Kharshiing KD, Khursheed M, Gupta K, et al. Depression, anxiety and stress among indians in times of covid-19 lockdown. *Community Mental Health J*. (2020) 1–7. doi: 10.1007/s10597-020-00664-x
60. United Nations. *Human Rights of Older Persons*. (2011). Available online at: www.ohchr.org/en/issues/olderpersons/pages/olderpersonsindex.aspx
61. Office of the United Nations High Commissioner for Human Rights. *Minorities Under International Law* (2020). Available online at: ohchr.org/en/issues/minorities/pages/internationallaw.aspx
62. Panel on Race E, Bulatao RA, Anderson NB, National Research Council. National Research Council (US) Panel on Race, Ethnicity, and Health in Later Life. In: Bulatao RA, Anderson NB, editors. *Understanding Racial and Ethnic Differences in Health in Late Life: A Research Agenda*. Washington, DC: National Academies Press (2004).
63. Johns Hopkins University of Medicine. "COVID-19 Map." *Johns Hopkins Coronavirus Resource Center*. (2020). Available online at: coronavirus.jhu.edu/map.html
64. Kurzban R, Leary MR. Evolutionary origins of stigmatization: the functions of social exclusion. *Psychol Bull*. (2001) 127:187–208. doi: 10.1037/0033-2909.127.2.187
65. Park JH, Faulkner J, Schaller M. Evolved disease-avoidance processes and contemporary anti-social behavior: prejudicial attitudes and avoidance of people with physical disabilities. *J Nonverb Behav*. (2003) 27:65–87. doi: 10.1023/A:1023910408854
66. Williams DR, Rucker TD. Understanding and addressing racial disparities in health care. *Health Care Financing Rev*. (2000) 21:75–90.
67. Zhang Z, Sun K, Jatchavala C, Koh J, Chia Y, Bose J, et al. Overview of stigma against psychiatric illnesses and advancements of anti-stigma activities in Six Asian Societies. *Int J Environ Res Public Health*. (2019) 17:280. doi: 10.3390/ijerph17010280
68. Brooks SK, Webster RK, Smith LE, Woodland L, Wessely S, Greenberg N, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *Lancet*. (2020) 395:912–20. doi: 10.1016/S0140-6736(20)30460-8
69. Ye J. Pediatric mental and behavioral health in the period of quarantine and social distancing with COVID-19. *JMIR Pediatr Parent. (2020)* 3:e19867. doi: 10.2196/19867
70. Martinkevich P, Larsen LL, Græsholt-Knudsen T, Hesthaven G, Hellfritzsch MB, Petersen KK, et al. Physical child abuse demands increased awareness during health and socioeconomic crises like COVID-19: a review and education material. *Acta Orthop. (2020)* 1–7. doi: 10.1080/17453674.2020.1782012
71. UNFPA. "*Impact of the COVID-19 Pandemic on Family Planning Ending Gender-based Violence, Female Genital Mutilation Child Marriage*" *Interim Technical Note*. (2020). Available online at: https://www.unfpa.org/sites/default/files/resource-pdf/COVID-19_impact_brief_for_UNFPA_24_April_2020_1.pdf
72. Gentilini U, Almenfi M, Orton I, Dale P. *Social Protection and Jobs Responses to COVID-19: A Real-Time Review of Country Measures*. Washington, DC: World Bank (2020).
73. World Health Organization. *Addressing human rights as key to the COVID-19: response. 21 April 2020). (No. WHO/2019-nCoV/SRH/Rights/2020.1)*. World Health Organization (2020).
74. United Nations. *In Focus: Gender Equality Matters in COVID-19 Response* (2020). Available online at: www.unwomen.org/en/news/in-focus/in-focus-gender-equality-in-covid-19-response
75. Bagcchi S. Stigma during the COVID-19 pandemic. *Lancet Infect Dis. (2020)* 20:782. doi: 10.1016/S1473-3099(20)30498-9
76. United Nations Fund for Population Activities. *COVID-19: A Gender Lens* (2020). Available online at: www.unfpa.org/resources/covid-19-gender-lens

77. World Health Organization. *COVID-19 and Violence Against Women* (2020). Available online at: www.who.int/reproductivehealth/publications/vaw-covid-19/en/
78. Webb L. Covid-19 lockdown: a perfect storm for older people's mental health. *J Psychiatric Mental Health Nurs* (2020). doi: 10.1111/jpm.12644
79. Brown EE, Kumar S, Rajji TK, Pollock BG, Mulsant BH. Anticipating and mitigating the impact of COVID-19 pandemic on Alzheimer's disease and related dementias. *Am J Geriatric Psychiatry*. (2020) 28:712–21. doi: 10.1016/j.jagp.2020.04.010
80. Wu B. Social isolation and loneliness among older adults in the context of COVID-19: a global challenge. *Global Health Res Policy*. (2020) 5:1–3. doi: 10.1186/s41256-020-00154-3
81. Rees S, Fisher J. COVID-19 and the mental health of people from refugee backgrounds. *Int J Health Serv. (2020) 50*:415–7. doi: 10.1177/0020731420942475
82. Rani J. *Tamil Nadu: Blanket of Silence over Caste-Based Atrocities During COVID-19 Lockdown* (2020). Available online at: https://thewire.in/caste/tamil-nadu-dalit-tribal-violence-atrocities-covid-19-lockdown-silence
83. Amnesty International. *Policing the Pandemic: Human Rights Violations in the Enforcement of COVID-19 Measures in Europe*. Available online at: https://www.amnesty.org/download/Documents/EUR0125112020ENGLISH.PDF
84. Mark Heywood. *Human Rights, the Rule of Law, and COVID-19 in South Africa* (2020). Available online at: https://blog.petrieflom.law.harvard.edu/2020/06/04/south-africa-global-responses-covid19/
85. Office of the High Commissioner for Human Rights. *COVID-19 exacerbates the risk of ill-treatment and torture worldwide – UN experts* (2020). Available online at: https://www.ohchr.org/EN/NewsEvents/Pages/int-day-torture.aspx
86. Mfoafo-M'Carthy M, Huls S. Human rights violations and mental illness: Implications for engagement and adherence. *Sage Open*. (2014) 4:2158244014526209. doi: 10.1177/2158244014526209
87. Wilson K. The COVID-19 pandemic and the human rights of persons with mental and cognitive impairments subject to coercive powers in Australia. *Int J Law Psychiatry*. (2020) 72:101605. doi: 10.1016/j.ijlp.2020.101605
88. Negrini S, Grabljevec K, Boldrini P, Kiekens C, Moslavac S, Zampolini M, et al. Up to 2.2 million people experiencing disability suffer collateral damage each day of COVID-19 lockdown in Europe. *Eur J Phys Rehabil Med*. (2020) 56:361–5. doi: 10.23736/S1973-9087.20.06361-3
89. Crawford A, Serhal E. Digital health equity and COVID-19: the innovation curve cannot reinforce the social gradient of health. *J Med Internet Res. (2020)* 22:e19361. doi: 10.2196/19361
90. UN General Assembly. *International Covenant on Civil and Political Rights*. United Nations, Treaty Series, Vol. 999. (1966). p. 171. Available online at: https://www.refworld.org/docid/3ae6b3aa0.html
91. UN General Assembly. International Convention on the Elimination of All Forms of Racial Discrimination. United Nations, Treaty Series, vol. 660. (1965). p. 195. Available online at: https://www.refworld.org/docid/3ae6b3940.html (accessed September 7, 2020)
92. UN General Assembly. Convention on the Elimination of All Forms of Discrimination Against Women. United Nations, Treaty Series, vol. 1249. (1979). p. 13. Available online at: https://www.refworld.org/docid/3ae6b3970.html
93. Office of the High Commissioner for Human Rights. *Committee Against Torture*. Available online at: https://www.ohchr.org/en/hrbodies/cat/pages/catindex.aspx
94. United Nations. *Convention on the Rights of the Child*. Treaty Series, 1577.3. (1989).
95. United Nations. *Convention on the Rights of Persons with Disabilities*. Treaty Series, 2515.3 (2006).
96. Rubenson B. *Health and Human Rights*. SIDA (2002).
97. Maulik PK, Thornicroft G, Saxena S. Roadmap to strengthen global mental health systems to tackle the impact of the COVID-19 pandemic. *Int J Mental Health Syst*. Stockholm (2020) 14:1–13. doi: 10.1186/s13033-020-00393-4. Available online at: https://www.sida.se/contentassets/64753a5f4dee4a04af103e1cec12f247/20022-a-health-and-human-rights.-issue-paper_638.pdf
98. Vigo D, Patten S, Pajer K, Krausz M, Taylor S, Rush B, Yatham LN. Mental Health of Communities during the COVID-19 Pandemic. *Can J Phychiatry* (2020) 65:681–7. doi: 10.1177/0706743720926676
99. Sneed RS, Key K, Bailey S, Johnson-Lawrence V. Social and psychological consequences of the COVID-19 pandemic in African-American communities: Lessons from Michigan. *Psychol Trauma*. (2020) 12:446–8. doi: 10.1037/tra0000881
100. Puras D, Gooding P. Mental health and human rights in the 21st century. *World Psychiatry*. (2019) 18:42–3. doi: 10.1002/wps.20599
101. World Health Organization. *Ethical Considerations in Developing a Public Health Response to Pandemic Influenza* (2007). Available online at: https://apps.who.int/iris/bitstream/handle/10665/70006/WHO_CDS_EPR_GIP_2007.2_eng.pdf;jsessionid=C4EF6DC7DD0A26339AA681A7F6051A82?sequence=1
102. Institute of Medicine (US) Forum on Microbial Threats. *Ethical and Legal Considerations in Mitigating Pandemic Disease: Workshop Summary* (2007). Available online at: www.ncbi.nlm.nih.gov/books/NBK54169/
103. Holmes EA, O'Connor RC, Perry VH, Tracey I, Wessely S, Arseneault L, et al. Multidisciplinary research priorities for the COVID-19 pandemic: a call for action for mental health science. *Lancet Psychiatry*. (2020) 7:547–60. doi: 10.1016/S2215-0366(20)30168-1
104. World Health Organization. *Addressing Human Rights as Key to the COVID-19 Response* (2020). Available online at: www.who.int/publications/i/item/addressing-human-rights-as-key-to-the-covid-19-response
105. United Nations. *Human Rights* (2020). Available online at: www.un.org/en/sections/issues-depth/human-rights/

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Public Health

OPINION
published: 13 January 2021
doi: 10.3389/fpubh.2020.589772

Community Based Management of COVID-19 as a Way Forward for Pandemic Response

Sunil Kumar Panigrahi[1]*, *Sagarika Majumdar*[2], *Abhiruchi Galhotra*[1], *Santosh Chanbasappa Kadle*[3] and *Ashis Samuel John*[4]

[1] Department of Community and Family Medicine, All India Institute of Medical Sciences, Raipur, India, [2] Department of Obstetrics and Gynecology, All India Institute of Medical Sciences, Raipur, India, [3] District Health Services, Jalna, India, [4] Regional Technical Research Centre for Health Technology Assessment, Sree Chitra Tirunal Institute for Medical Sciences and Technology, Thiruvananthapuram, India

Keywords: COVID-19, community based management, health system, capacity, pandemic response

INTRODUCTION

The COVID-19 pandemic, which began with reports of atypical pneumonia cases in the city of Wuhan in Hubei province of China, was declared a public health emergency of international significance by the WHO on January, 30 2020. The virus SARS COV2 has, to date, infected more than 16 million people around the world and over 0.6 million people have succumbed to it. The pandemic has affected more than 220 countries (1). Some of the most developed economies, with state of art healthcare systems and advanced diagnostic and critical care facilities, have been worst affected by the pandemic (2). Deaths among COVID-19 cases are not only because of the pathogenesis of the virus but also because of increases in patients, which overwhelms healthcare institutions with unexpected surges in cases (3). Low and middle-income countries in South East Asia and Africa with inadequate health capacity, may face dire consequences after a surge of cases and loss of lives. Many international health agencies including the WHO have advised that "flattening the curve" and strengthening healthcare capacity can reduce the chances of overwhelming health systems (4).

The response in India, a LMIC, has focused on interrupting the transmission of infection through contact tracing, finding and isolating cases when they occur. The guidelines of the Ministry of Health recommends COVID care centers (CCC) be used for mild or very mild cases, separate dedicated COVID health centers (DCHC) for moderate cases (pneumonia without any signs of severe disease), and dedicated COVID hospitals with ICU facility (DCH) for critical cases (5).

NEED FOR COMMUNITY BASED MANAGEMENT

Though the steps taken in terms of prevention, interruption of transmission, and management of COVID-19 cases in India have been proactive, there is an urgent need to strengthen and integrate COVID care into the primary health care of the country. There exists a huge disparity between healthcare capacities among different states in India and states do not have similar capacities to and the ability to provide enough stand-alone centers like CCCs, DCHCs, or DCHs (6). Even in developed states in India, the rural-urban disparity is huge. Most often multi-specialty hospitals are centered on cities. The response against a prolonged and protracted pandemic with possible multiple waves of infection in the future will require more sustainable COVID-19 management through primary health care approaches and community participation instead of a vertical system of policy planning and management (7).

OPEN ACCESS

Edited by:
Stefan Swartling Peterson, Uppsala University, Sweden

Reviewed by:
Rory Nefdt, UNICEF United Nations International Children's Emergency Fund, United States

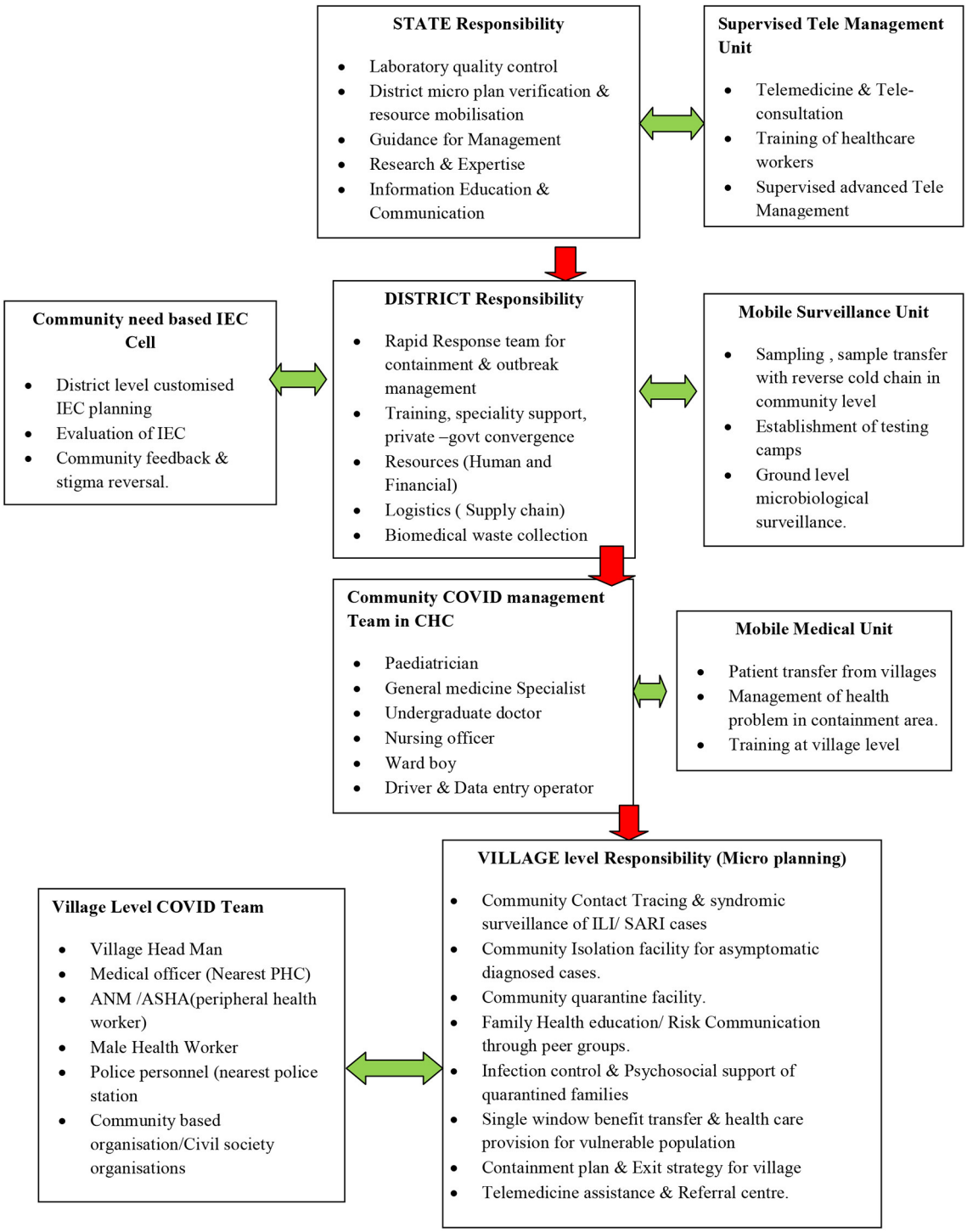
***Correspondence:**
Sunil Kumar Panigrahi
sunil1986panigrahi@gmail.com

Specialty section:
This article was submitted to Public Health Policy, a section of the journal Frontiers in Public Health

Received: *31 July 2020*
Accepted: *09 December 2020*
Published: *13 January 2021*

Citation:
Panigrahi SK, Majumdar S, Galhotra A, Kadle SC and John AS (2021) Community Based Management of COVID-19 as a Way Forward for Pandemic Response. Front. Public Health 8:589772. doi: 10.3389/fpubh.2020.589772

TABLE 1 | Flowchart of health system structure for the community-based management of COVID-19 cases.



PLANNING AND IMPLEMENTATION OF COMMUNITY-BASED MANAGEMENT OF COVID-19

We propose a three-tier system of community-based management of COVID-19 with a primary health care approach:

a) Tier I (Center for public health planning and implementation): Local Self Government (Village level Panchayatiraj Institutions/ Urban Local bodies)
b) Tier II (Center of medical management of COVID-19 in the community): CHC (Community Health Center or the first referral center)

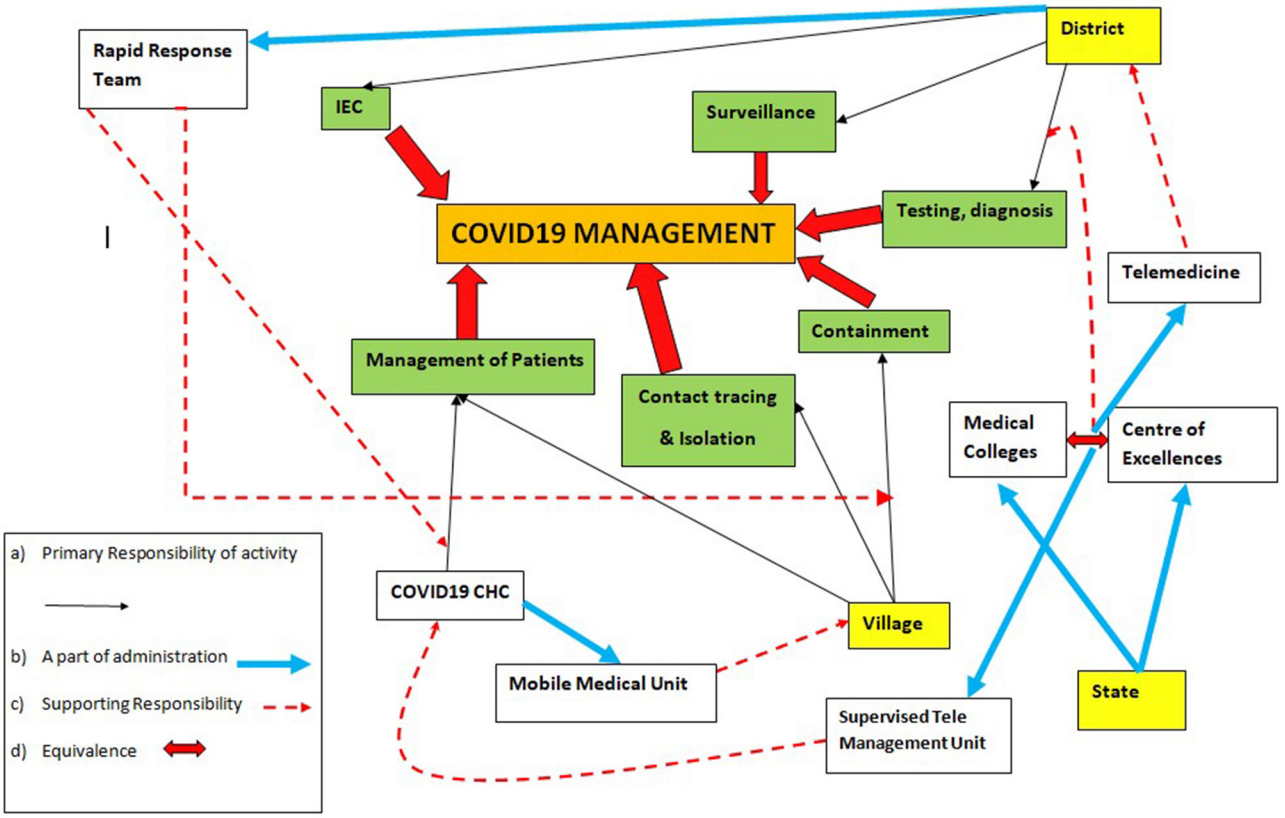


FIGURE 1 | Flowchart for operational health system for community based management of COVID-19.

c) Tier III (Center of IEC planning, Surveillance, and Inter-sectoral/ Inter-agency coordination): District.

DISCUSSION

The current practice in India focuses on the identification of suspects and confirmation of cases through RT-PCR testing. The ministry of health recommends the early segregation of cases into mild, moderate, and severe categories. The imperfect execution of segregation in many places has resulted in 77% of all patients admitted to hospitals having only mild symptoms of COVID-19 (8). Moreover, mild disease may worsen into a moderate or severe category. A dedicated referral channel is a necessity during the surge of cases. Due to the absence of fore-referral confirmation of the availability of ICU beds in the referral facility, there have been instances of denial or unavailability of critical care after the patient has reached the hospital (9).

We suggest that cases should be segregated based on the probability of future complications. Older patients with co-morbidities, pregnant mothers, children under 5 years of age, and patients exposed to high viral load in large closed door congregations should be admitted to dedicated COVID-19 hospitals with ICU facilities (10–12). Patients with a lesser probability of complications can be managed in village-level isolation centers if they are asymptomatic and Community Health Centers (COVID CHCs) if symptomatic. Village level isolation centers will not only help to enhance community engagement and improve risk communication but also promote local innovations for infection control through community participation, which are essential for a sustained and successful pandemic response (13–16). Some states have tried to decentralize decision making with success during the ongoing COVID-19 pandemic (17, 18).

The current practice of taking diagnosed COVID-19 patients to standalone healthcare centers promotes over-reliance on the health system, as a suspect is isolated from the community from the time of its contact tracing and quarantine through to testing, diagnosis, management, and finally, discharge (average 30 days) from the hospital. This increases the fear of disease among the population, which in turn increases the stigma not only against patients but also their family members, the recovered patients, and the health care workers who continue to stay in the community (19, 20). This makes contact tracing and the self-declaration of travel history or gathering exposure history difficult. Village level isolation centers will ensure that the management and recovery of asymptomatic and mild cases takes place under direct community supervision, with technical help from mobile medical units (**Table 1**), addressing the myriad social issues and stigma associated with COVID-19.

The Involvement of Community Health Centers (CHCs) the management of COVID19 will help diversify and decentralize the health care system in rural and semi-urban areas (**Figure 1**). It could lead to vital skill improvement in the management of infectious disease among health care workers including doctors in CHCs through supervised management of cases from medical colleges and centers of excellence. Supervised management through advanced telemedicine as a potential way of healthcare delivery for COVID-19 management is being increasingly used by some states in India with success (21). The involvement of at least 40% of CHCs all over the country could help create over 75,000 beds for mild to moderately sick COVID patients. This will help create a specialist pool of trainers, doctors, nurses, and infection control personnel who are equipped to handle the spread of infectious disease spread in the long term and possible future waves of the COVID-19 pandemic in the community (22, 23). This will spare the rest of the health care system and help ensure the continuation of essential and emergency health services by the other 60% CHCs, Sub-district, and District hospitals. This will help in integrating COVID-19 response into the primary health care system of the country.

One of the most important bottlenecks in the pandemic has been the lack of standardized, community-oriented, inclusive information, and a cohesive education and communication (IEC) strategy. A specialized IEC cell, with a community feedback mechanism under the district administration (**Table 1**) will help create community need-based, culturally appropriate IECs. This will improve the engagement of different communities by improving awareness, reducing prevailing stigma, and countering misinformation about the disease.

The current practice of laboratory diagnosis starts with the collection of nasopharyngeal and/or oro-pharyngeal swab by laboratory personnel or healthcare workers in individual hospitals or quarantine facilities or isolation centers. The samples are then sent to the designated laboratories for rt-PCR by maintaining the reverse cold chain (24). This increases the number of healthcare staff exposed to an aerosol-generating procedure of sample collection which leads to higher consumption of full COVID PPE. A specialized mobile surveillance unit at the district level can be mobilized for all facility-based and community-based sample collection under district administration. This will ensure quality sample collection by a specialized team which can help streamline laboratory diagnosis through better reverse cold chain maintenance.

The pandemic provides an opportune moment to expand primary healthcare infrastructure along with a once redundant network of telemedicine at community levels in India by resurrecting village-level resource centers (25).

CONCLUSION

The community-based management of COVID-19 cases will not only help in reducing the fear and stigma prevailing during this pandemic but also enhance community engagement through participation and an increase in healthcare capacity. This will also improve community preparedness for future re-emergence of infectious diseases and will reduce the need for drastic measures like lockdowns in the future.

AUTHOR CONTRIBUTIONS

SP: concept, intellectual content, and manuscript editing. SM: intellectual content and manuscript preparation. AJ: literature search and manuscript preparation. SK: literature search and manuscript preparation. AG: intellectual content and literature search. All authors contributed to the article and approved the submitted version.

REFERENCES

1. *Coronavirus Disease 2019*. World Health Organisation (2020). Available online at: https://www.who.int/emergencies/diseases/novel-coronavirus-2019 (accessed May 3, 2020).
2. Mortality Analyses—Johns Hopkins Coronavirus Resource Center. Available online at: https://coronavirus.jhu.edu/data/mortality (accessed May 3, 2020).
3. Cavallo JJ, Donoho DA, Forman HP. Hospital capacity and operations in the coronavirus disease 2019 (COVID-19) pandemic—planning for the Nth patient. *JAMA Heal Forum*. (2020) 1:e20 0345. doi: 10.1001/JAMAHEALTHFORUM.2020.0345
4. *EXPLAINER: "Flattening the curve"*. Available online at: www.who.int (accessed May 3, 2020).
5. *Guidance Document on Appropriate Management of Suspect/Confirmed Cases of COVID-19*. New Delhi: Ministry of Health and Family Welfare, (2020) p. 7. Available online at: https://www.mohfw.gov.in/pdf/FinalGuidanceonMangaementofCovidcasesversion2.pdf
6. *COVID-19 in India: State-Wise Estimates of Current Hospital Beds, ICU Beds, and Ventilators*. Center for Disease Dynamics, Economics and Policy. Available online at: https://cddep.org/publications/covid-19-in-india-state-wise-estimates-of-current-hospital-beds-icu-beds-and-ventilators/ (accessed May 6, 2020).
7. *Report on Healthcare Access Initiatives*. (2016). Available online at: https://www.indiaoppi.com/wp-content/uploads/2019/12/Report-on-healthcare-access-initiatives-For-web.pdf (accessed May 8, 2020)
8. *Report of COVID-19 Cases 29 April 2020*. Mumbai: Public Health Department, Government of Maharashtra (2020) p. 18.
9. *Mumbai: 36-Year-Old Doctor Dies of Multiple Organ Failure, Samples Test Positive For Covid-19—India News*. Available online at: https://www.indiatoday.in/india/story/mumbai-36-year-old-doctor-dies-of-multiple-organ-failure-samples-test-positive-for-covid-19-1670764-2020-04-24 (accessed May 7, 2020).
10. Zhou F, Yu T, Du R, Fan G, Liu Y, Liu Z, et al. Clinical course and risk factors for mortality of adult inpatients with COVID-19 in Wuhan, China: a retrospective cohort study. *Lancet*. (2020) 395:1054–62. doi: 10.1016/S0140-6736(20)30566-3
11. Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72314 cases from the Chinese Center for Disease Control and Prevention. *JAMA*. (2020) 323:1239–42. doi: 10.1001/jama.2020.2648
12. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*. (2020) 395:497–506. doi: 10.1016/S0140-6736(20)30183-5
13. Marston C, Renedo A, Miles S. Community participation is crucial in a pandemic. *Lancet*. (2020) 395:1676–78. doi: 10.1016/S0140-6736(20)31054-0
14. *Risk Communication and Community Engagement (RCCE) Readiness and Response to the 2019 Novel Coronavirus (2019-nCoV)*. Available online at: https://www.who.int/publications-detail/risk-communication-

and-community-engagement-readiness-and-initial-response-for-novel-coronaviruses-(-ncov) (accessed May 7, 2020).
15. *Community-Based Health Care, Including Outreach and Campaigns, in the Context of the COVID-19 Pandemic* (2020).
16. *Risk Communication and Community Engagement (RCCE) Action Plan Guidance COVID-19 Preparedness and Response*. Geneva: World Health Organisation. (2020) p. 26. Available online at: https://www.who.int/publications-detail/risk-communication-and-community-engagement-(rcce)-action-plan-guidance (accessed May 7, 2020).
17. *The Panchayati Front: Tap Potential of Local Self-Government to Fight COVID-19*. The Indian Express. Available online at: https://indianexpress.com/article/opinion/columns/coronavirus-pandemic-panchayati-front-6395715/ (accessed May 7, 2020).
18. *What Nation can Learn from Kerala: Lockdown is Not Enough. Preparedness, Decentralisation, are Key*. The Indian Express. Available online at: https://indianexpress.com/article/opinion/columns/coronavirus-covid-19-kerala-curve-6365935/ (accessed May 7, 2020).
19. *Ghaziabad Housing Society Bans Entry of Resident Doctors Out of COVID-19 Fears*; AIIMS RDA Pens Letter to Amit Shah. DNA (2020). Available online at: https://www.dnaindia.com/india/report-ghaziabad-housing-society-bans-entry-of-resident-doctors-out-of-covid-19-fears-aiims-rda-pens-letter-to-amit-shah-2824004 (accessed May 8, 2020).
20. *Recovered Coronavirus Patients Face Social Stigma in Bihar*. Times of India (2020). Available online at: https://timesofindia.indiatimes.com/city/patna/recovered-corona-patients-face-social-stigma-in-state/articleshow/75071886.cms (accessed May 8, 2020).
21. *Crack Team of Nine Doctors Treats City's Most Critical Cases*. Available online at: https://mumbaimirror.indiatimes.com/coronavirus/news/crack-team-of-nine-doctors-treats-citys-most-critical-cases/articleshow/75524743.cms (accessed May 8, 2020).
22. *How India Must Prepare for a Second Wave of COVID-19—Nature India*. Available online at: https://www.natureasia.com/en/nindia/article/10.1038/nindia.2020.80 (accessed May 8, 2020).
23. Xu S, Li Y. Beware of the second wave of COVID-19. *Lancet*. (2020) 395:321–2. doi: 10.1016/S0140-6736(20)30845-X
24. *Specimen Collection, Packaging and Transport Guidelines for 2019 Novel Coronavirus (2019-nCoV)*. (2020). Available online at: www.mohfw.gov.in (accessed May 8, 2020).
25. Chellaiyan V, Nirupama A, Taneja N. Telemedicine in India: Where do we stand? *J Fam Med Prim Care*. (2019) 8:1872. doi: 10.4103/jfmpc.jfmpc_264_19

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychiatry

PERSPECTIVE
published: 14 January 2021
doi: 10.3389/fpsyt.2020.588216

Efforts and Challenges to Ensure Continuity of Mental Healthcare Service Delivery in a Low Resource Settings During COVID-19 Pandemic—A Case of a Kenyan Referral Hospital

Edith Kwobah[1]*, *Florence Jaguga*[1], *Kiptoo Robert*[1], *Elias Ndolo*[1] and *Jane Kariuki*[2]

[1] Department of Mental Health, Moi Teaching and Referral Hospital, Eldoret, Kenya, [2] Mental Health and Rehabilitative Services, Moi Teaching and Referral Hospital, Eldoret, Kenya

The rising number of patients with Covid-19 as well as the infection control measures have affected healthcare service delivery, including mental healthcare. Mental healthcare delivery in low and middle income countries where resources were already limited are likely to be affected more during this pandemic. This paper describes the efforts of ensuring mental healthcare delivery is continued in a referral hospital in Kenya, Moi Teaching and Referral hospital, as well as the challenges faced. These efforts are guided by the interim guidelines developed by the Kenyan ministry of health. Some of the adjustments described includes reducing number of patients admitted, shortening the stay in the inpatient setting, using outdoors for therapy to promote physical distancing, utilization of electronic platforms for family therapy sessions, strengthening outpatient services, and supporting primary care workers to deliver mental health care services. Some of the challenges include limited ability to move about, declining ability for patients to pay out of pocket due to the economic challenges brought about by measures to control Covid-19, limited drug supplies in primary care facilities, inability to fully implement telehealth due to connectivity issues and stigma for mental health which results in poor social support for the mentally ill patients. It is clear that current pandemic has jeopardized the continuity of usual mental healthcare in many settings. This has brought to sharp focus the need to decentralize mental health care and promote community based services. Meanwhile, there is need to explore feasible alternatives to ensure continuity of care.

Keywords: mental health care, low resource setting, Kenya, Moi Teaching and Referral Hospital, continuity of care

OPEN ACCESS

Edited by:
Joanna Lai,
UNICEF United Nations International Children's Emergency Fund, United States

Reviewed by:
Rosemary Mamka Anyona, World Bank Group, United States
Anjali Singla, The Banyan Academy of Leadership in Mental Health, India

***Correspondence:**
Edith Kwobah
eckamaru@gmail.com

Specialty section:
This article was submitted to Public Mental Health, a section of the journal Frontiers in Psychiatry

Received: *28 July 2020*
Accepted: *14 December 2020*
Published: *14 January 2021*

Citation:
Kwobah E, Jaguga F, Robert K, Ndolo E and Kariuki J (2021) Efforts and Challenges to Ensure Continuity of Mental Healthcare Service Delivery in a Low Resource Settings During COVID-19 Pandemic—A Case of a Kenyan Referral Hospital. Front. Psychiatry 11:588216. doi: 10.3389/fpsyt.2020.588216

INTRODUCTION

The Severe Acute Respiratory Syndrome Coronavirus (SARS-CoV-2) also known as COVID-19 pandemic has infected millions of people globally and claimed thousands of lives. It also has affected various aspects of societies way of doing business, disrupting the lives of everyone, regardless of age, gender, or race (1). Because of the highly contagious nature of COVID-19 through close contacts (2), several measures have been put in place to limit the spread of the virus (3).

These measures as is now widely known include staying at home, wearing masks, limited public transport, and closing of business (4). These measures are key in not only reducing the spread but also reducing the percentage of people who will require hospitalization as this would otherwise overwhelm the healthcare systems (5).

The growing numbers of COVID-19 patients as well as the measures that have been put in place have had a significant bearing on access to general health care (6), as well as mental healthcare (7). For example, the directives to stay home, and keep physical distance has disrupted previous ease of traveling from one place to another, including traveling to a health facility. In addition, there is stigma and fear related to the Covid-19 infections and this includes fear of hospitals which are seen as high risk areas (8). Further, with the growing numbers of COVID-19 infected patients, a lot of material and human resources have been directed toward fighting the pandemic, potentially straining delivery of services for other medical conditions. The effect of the measures that demand reduced movement is likely more severe for patients with chronic diseases like mental illness who require regular follow up, check up, and prescription refills (9). This is especially tough for systems in Low and Middle income countries (LMIC) which were already suffering from inadequate resources and capacity even before Covid-19 due to limited resources for mental health (10).

Kenya has not been spared in this struggle and since the first patient tested positive in March 2020, the number of infected citizens has been on the rise with more than 18,000 positive patients and the death toll steadily rising, standing at 285 deaths at the end of July. This has resulted in wide spread anxiety on how the hospitals would address the risk posed by huge numbers of people coming into the health facilities. Earlier in the pandemic, one of the recommendations was to minimize the number of patients coming to hospitals in order to decongest the facilities and reduce risk of infection, but this changed when there were reports of patients with chronic illness complicating at home due to inability to access care (11). In addition, the pandemic has likely altered the health seeking behavior due to several pandemic related factors. For example, a study done in slum communities of Bangladesh, Kenya, Nigeria and Pakistan points to a reduction in general health seeking behavior due to factors such as increased cost of healthcare, reduced household income, increased challenges in physically reaching healthcare facilities, and exacerbated reluctance of residents to seek healthcare due to fear of infection and stigmatization (12).

This pandemic, therefore, calls professionals, including mental health practitioners to identify and problem-solve challenges that have a bearing on the service delivery, in order to minimize negative outcomes (13). It is clear that provision of mental healthcare has to be adjusted to meet the need of patients (14). There have been several suggestions of what need to be done to meet this need, but such suggestions such as use of telehealth that that are being implemented in developed countries (15) are not easy in low resource settings such as Kenya. This paper highlights adjustments that has been made in order to ensure continuity of mental healthcare in low resource settings, citing experiences from one of the leading mental health facilities in Kenya, the Moi Teaching and Referral Hospital (MTRH). It also points out some of the challenges faced and gives recommendations for possible way forward.

EFFORTS TO ENSURE CONTINUITY OF MENTAL HEALTHCARE IN LOW RESOURCE SETTINGS

The Kenyan Context

Kenya is a LMIC country with a population of about 48 million people according to the 2019 census (16). A study in a community sample in Western Kenya showed that 45% of the community have at least one mental health disorder (17), which was very close to an earlier study among patients attending general hospitals which reported a prevalence of 42% (18). There is also a huge shortage of human resources for mental health as only 29 of the 3,956 government owned facilities in Kenya actually provide mental health care, with a gross shortage of mental health workers in the country, hence patient travel long distances to access care (19). The cost of care is further complicated by the fact that <20% of the population has insurance cover (20), hence most patients pay out of pocket for their mental health services (21).

In March, the Kenyan government announced several precautionary measures which included a dusk to dawn curfew, wearing of masks in public places, closure of high risk businesses, and reduction of passengers in the public transport vehicles. The ministry of health Kenya recognized that mentally ill persons formed a population of vulnerable groups and their care during this pandemic would require special consideration. A protocol to offer guidelines on continued management of stable patients, admission of patients, management of mentally ill persons who tested positive for COVID-19, and the mental well-being of healthcare workers was developed, led by the Kenyan division of Mental Health (22). The document contains provisions that give guidance on the delivery of mental health services for persons with newly diagnosed and pre-existing mental disorders during the pandemic, including guidelines on the utilization of tele-health methods as well as the delivery of mental health care for persons in isolation and quarantine.

Efforts at a National Referral Hospital in Kenya to Ensure Continuity of Care

Moi Teaching and Referral Hospital is the second largest national referral center in Kenya located in Uasin Gishu County (http://www.mtrh.go.ke/). The Hospital serves residents of Western Kenya Region (representing at least 22 Counties), parts of Eastern Uganda and Southern Sudan with a population of ∼24 Million. MTRH has one of the best mental health facilities in Kenya, having a purposely built 70 bed capacity in-patient ward (Mental Health Unit-MHU) and 16 bed capacity Alcohol and Drug Abuse unit (ADAR). In addition, MTRH has robust outpatient services comprised of a daily walk in service located at the accident and emergency department that is open every day of the week and is the main entry into the mental health service, a weekly (Monday) clinic that serves children, forensic clients, and the addiction clients and a weekly (Wednesday) clinic that serves all the other general psychiatry patients.

Despite the challenges that Covid-19 brought to the delivery of health services, the MTRH mental health department needed to ensure the continuity of mental health services remain open for a number of reasons. First, the department serves patients from a huge catchment area in Western Kenya that do not have a psychiatrist or even a mental health service (there only 8 psychiatrists and <30 psychiatry nurses) available in the entire region. Changing our service delivery means an alternative service in peripheral hospitals which would not be feasible in the very short term. Second, due to availability of subsidized drugs that have been made possible by MTRH partners (Olanzapine and Fluoxetine are donated by El Lilly pharma making them affordable for many poor Kenyans, hence widely prescribed) patients prefer to travel long distances to lower the cost of purchasing medications. Changing our services would mean several patients going without medication as these two drugs are not only expensive but also not stocked in most peripheral hospitals. Third due to stigma related to mental illness other service providers in primary care setting may not be comfortable managing mentally ill patients and this may mean that in the context of widespread COVID-19 related anxiety among health workers there may be less accommodation for these patients. Fourth, persons with mental disorders often face difficulties accessing general healthcare and in the context of Covid-19, cognitive impairments may affect their ability to adhere to precautionary measures hence increase their risk of contracting COVID. Lack of care would ultimately increase the patient risk of contracting COVID-19 as well as other risk associated with poorly controlled mental illness.

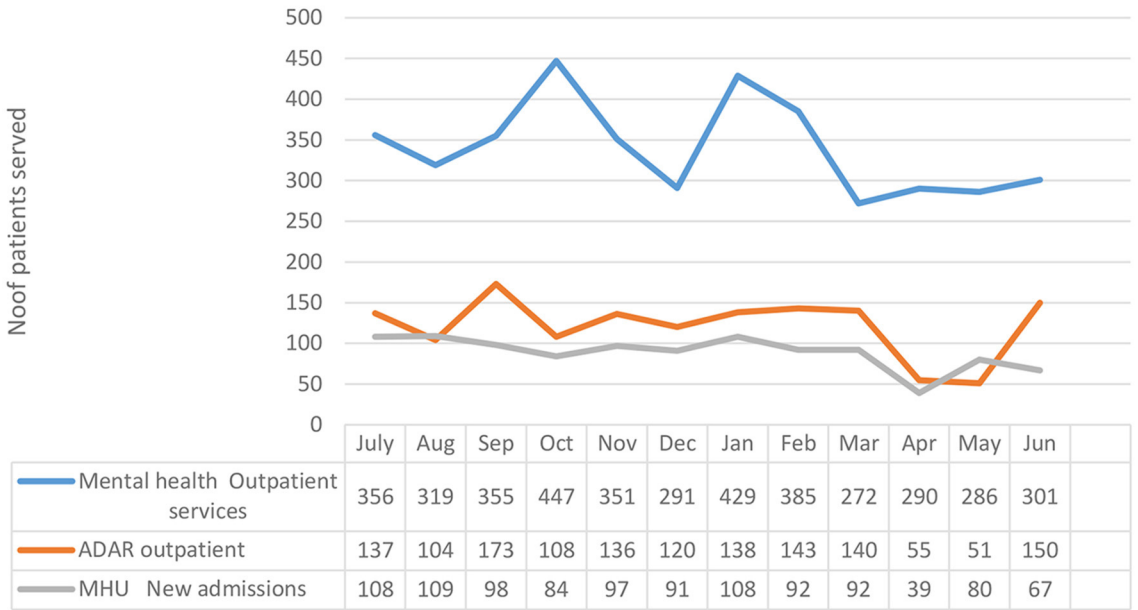
We made specific adjustments to ensure that as we served patients, we also protected both staff and patients from contracting COVID-19:

(1) At the alcohol and drug abuse unit we reduced the capacity of the clients from 16 to a maximum of 8 to allow for physical distancing. At the same time, we encouraged more patients to get booked in the outpatient alcohol and drug abuse clinic to cater for those who were locked out of the inpatient care. We held sessions with patients to sensitize them on infection control measures. Within the inpatient unit, we put the patients into smaller groups for group therapy sessions. We required that most of the occupational therapy activities are conducted outdoors which allows for more physical space and also allows better circulation given that the current unit is quite small. We also reverted to family therapy sessions using online platforms to minimize in person meetings and need to travel long distances.
(2) In the mental health unit we limited admissions to only those who are severely agitated. We strengthened triage in our daily outpatient walk in service to ensure that all those who could be managed at home were not admitted but were instead given a shorter review date. This was done by ensuring that a senior resident doctor reviewed all the patients intended for admissions. We shortened the stay in mental health inpatient care by ensuring frequent reviews and allowing patients home as soon as there was some improvement, as opposed to full recovery. We educated the families through brief family therapy session, to accept supporting their kin at home even when the mental health symptoms were not fully resolved, as long as there was no threat to self or others.
(3) To increase staff preparedness and also reduce anxiety, we trained the mental healthcare providers on infection controls measures, and how to screen for COVID-19, using the Ministry of health Case definition. We also set aside space for any mentally ill patients who displayed symptoms of COVID-19. Further, we put efforts to continually provide mental health and psychosocial support to our staff to continually allay their anxiety—through both group and individual therapy sessions.
(4) We continued to empower primary care workers in peripheral hospitals to manage mentally ill patients, in-order to cater for those who would not get to MTRH. This we did by conducting a 1 week zoom training of the Mental Health Gap Intervention Program MHGAP (23), but also supporting primary care workers through on phone consultations with a psychiatrist. We also supported continuation of alcohol support groups in the community through phone calls. This would ensure continuity of care for those who could not be accommodated in the inpatient service. Capacity building and community based alcohol support groups was made possible by an ongoing collaboration between MTRH and Indiana University which is currently funded by the Astellas Global Health Foundation.
(5) We also allocated a mental health nurse to make a telephone call to clients who did not come for their follow-up clinic using the phone number included in the hospital records, to explain to them the need to adhere to treatment as well as help them problem solve to ensure they continued with medication in whatever circumstances they were in that hindered in—person attendance. The nurse made the call in a private consultation room to safeguard privacy of the patient.
(6) We also continued to promote mental wellness among staff and the general public by incorporating mental wellness into all Covid-19 related trainings within MTRH, as well as participating in media sensitizations on local media stations, as well as participating in various webinars targeting various healthcare providers.

Figure 1 shows the trends of selected mental health service during the Covid-19 season at MTRH. The figure shows some reduction in admissions into mental health unit in April, the slight decline in number of patients attending mental health clinic in March, April, and May and the decline in attendance to alcohol and drug abuse outpatient clinic in April, May. The numbers then begin to be restored, and we attribute this in part to our efforts encouraging patients to adhere to care.

Challenges Faced in Ensuring Continuity of Care

In the context of COVID-19 pandemic, several factors contribute to disruption in ensuring continuity of mental healthcare in a low resource setting such as ours. These include:



	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Mental health Outpatient services	356	319	355	447	351	291	429	385	272	290	286	301
ADAR outpatient	137	104	173	108	136	120	138	143	140	55	51	150
MHU New admissions	108	109	98	84	97	91	108	92	92	39	80	67

FIGURE 1 | Showing utilization of selected mental health service between July 2019 and June 2020. ADAR, Alcohol and drug abuse—Rehabilitation; MHU, Mental health Unit.

Limited ability to move about: Patients served at MTRH travel long distances, some farther than 300 km on road. Using public transport, this would require use of two or three public vehicles, which means a lot of time spent during the connections and waiting for the vehicle to fill with passengers. In Kenya, public vehicles leave the bus stage upon filling up to capacity rather than following a time schedule. When COVID-19 measures were announced by the government, patients who needed to travel long distances to hospital were affected. When contacted, some patients reported being afraid of the journey as they would be caught on the road when the dusk to dawn curfew set in. In addition the cost of traveling had gone up as public vehicles almost doubled the bus fares as they could only carry three quarters of their usual capacity in order to allow physical distancing. Further due to the high cost of traveling, the number of people traveling had reduced, which means even more time waiting for the public vehicles to get filled.

Declining social economic status: Similar to other low resource settings the economic breakdown due to job losses has a negative effect on families ability to support costs related to mental health care (24). Because many of our patients have to pay out of pocket for their mental health care, this is likely to be affected greatly in a situation where spending on medication determines whether people will have food on the table (25). Given that mild to moderate mental illness is not seen as life threatening, it is likely that a family struggling to feed their children would not see care for mental illness as a priority.

Stigma associated with mental illness leading to poor social support. Discrimination and rejection of mentally ill patients is a major obstacle to care especially in low resource settings such as Kenya. During this season, we have had patients abandoned in the mental health unit by their loved ones due to the aggressive behaviors manifested in acute phases. This has led to patients staying longer than desired, hence making it difficult to achieve the desired numbers for physical distance.

Limited drug supply in peripheral facilities: Unlike other medications, the supply of even basic mental health drugs in most peripheral hospitals is largely limited in Kenya. This has resulted from the inadequate integration of mental healthcare in primary care setting. This has resulted in a limited prescription of mental health drugs and because most hospitals in Kenya use the pull system where you stock what is largely prescribed, the drugs are largely not procured. This means that a patient visiting any primary care facility without a mental health worker is immediately referred, and in this case MTRH is the main referral hospital.

Low internet availability for tele-health: Due to the effect of COVID-19 on ambulation, use of electronic platforms to deliver mental healthcare has been suggested as an effective alternative (26). In this circumstance, one would have expected that telehealth would somewhat bridge the gap for care in the setting of MTRH, as has been documented in developed countries such a Australia (27). Although many Kenyans own a phone, there is the cost of airtime and bundles to support teleconsultation. This is not an easy option for many poor clients, and it is further complicated by poor network connectivity in many remote areas.

Difficulties of mentally ill patients to adhere with infection control measures: There is evidence indicating that psychiatric inpatients may be more susceptible to COVID_19 compared to other patients in other health facilities because they often share common therapy rooms, dining, and bathroom spaces, which increase patient to patient contact (28). In addition impaired mental state, poor self-control and self-care, and lack of insight, mentally ill patients have challenges practicing infection control measures to protect themselves such as hand hygiene and wearing of masks. According to the hospital records, most admissions comprise of severely ill patients with Schizophrenia and bipolar mood disorders, who often do not understand the need to wear masks or keep a distance. This has resulted in persistent fear of infection among staff and patients which is worsened by the limited testing capacity meaning that we do not have the luxury of testing each patient who comes into the unit.

Staff Shortages: There is a general shortage of mental health care providers in many low and middle income countries. This is the situation even in Kenya and MTRH. We have had instances of quarantining of staff exposed to confirmed patients with COVID-19. When this has occurred, staffing shortages with increased workload and fatigue for the remaining staff has been experienced.

Limited access to addiction services: In order to ensure adequate distancing, the unit only admits eight persons at a time. This has resulted in long waiting times for patients requiring specialized treatment for substance use disorder.

Suggested Way Forward

Governments should put all efforts to ensure that mental healthcare is minimally disrupted during this season given the ramifications of untreated mental illness. First, they could consider providing a financial support, though a mental health stimulus package in order to enable the institutions and families meet the rising cost of care. This we believe is possible as it has been done in other sectors that have been deemed in need by the government. For example, the government of Kenya was able to promote maternal and child health by investing in a free maternal health program in the country which resulted in more mothers accessing care (29) demonstrating that cost is a major hindrance to seeking care. Second they should explore ways of providing basic mental health care in primary care facilities which are more accessible to communities, in order to reduce the need to travel over long distance (30). The need for community based mental healthcare has been suggested as one of the ways to increase access to care especially in rural in Africa as this reduces the need to travel over long distances (31). For this to take place in a context with gross shortage of human resource, there will be need to consider supporting primary care workers to provide care while providing them with adequate training and continuous supervision (32). Facilitating short trainings to enable healthcare workers in peripheral hospitals deliver basic mental health care can reduce the need to refer everyone to major hospitals which are already burdened by COVID-19. Third they should explore ways of strengthening community pharmacists who may play a key role not only in dispensing medication in spaces within the community but also monitoring patient symptoms, hence reducing the burden in major hospitals (33). Fourth, there is need to explore ways of partnering with other stakeholders to increase access to mental health care. These includes partnerships between the public, government owned healthcare service working with Non-Governmental organizations as well as private facilities to promote care. Such a comprehensive partnership model was demonstrated in Nepal when *Possible* an NGO partnered with various public and community based institutions as well as academic institutions, to deliver quality, culturally acceptable mental health care to many otherwise unreached people in rural Nepal (34).

CONCLUSION

COVID-19 pandemic has disrupted continuity of mental healthcare especially in low resource settings, and this is likely to affect outcomes. It has brought to sharp focus the need to decentralize mental health care and promote community based services. In the mean time Institutions and governments have a duty to put efforts to minimize interruption of care while exploring feasible alternatives to major hospitals whose access is complicated by the current pandemic.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

AUTHOR CONTRIBUTIONS

EK, FJ, and JK conceptualized the manuscript. EK drafted the manuscript. EN collected the data on the trends of service utilization. KR provided information on reasons patients gave for not coming to clinic, as he was the one contacting them. All authors revised the manuscript and approved submission.

ACKNOWLEDGMENTS

The authors are grateful to Moi Teaching and Referral Hospital leadership led by Dr. Wilson Aruasa for supporting the efforts to ensure continuity of mental health care at MTRH. We would also like to acknowledge the support of the Indiana University and the Astellas Global Health foundation who are supporting the community mental health work in Western Kenya.

REFERENCES

1. United Nations. *Everyone Included: Social Impact of COVID-19 | DISD*. (2020). Available online at: https://www.un.org/development/desa/dspd/everyone-included-covid-19.html (cited July 23, 2020).

2. Guo Y-R, Cao Q-D, Hong Z-S, Tan Y-Y, Chen S-D, Jin H-J, et al. The origin, transmission and clinical therapies on coronavirus disease 2019 (COVID-19) outbreak - an update on the status. *Mil Med Res*. (2020) 7:11. doi: 10.1186/s40779-020-00240-0

3. Osuchowski MF, Aletti F, Cavaillon J-M, Flohé SB, Giamarellos-Bourboulis EJ, Huber-Lang M, et al. SARS-CoV-2/COVID-19: evolving reality, global response, knowledge gaps, and opportunities. *Shock Augusta Ga.* (2020). doi: 10.1097/SHK.0000000000001565
4. Chu DK, Akl EA, Duda S, Solo K, Yaacoub S, Schünemann HJ. Physical distancing, face masks, and eye protection to prevent person-to-person transmission of SARS-CoV-2 and COVID-19: a systematic review and meta-analysis. *Lancet Lond Engl.* (2020) 395:1973–87. doi: 10.1016/j.jvs.2020.07.040
5. Güner R, Hasanoglu I, Aktaş F. COVID-19: prevention and control measures in community. *Turk J Med Sci*. (2020) 50:571–7. doi: 10.3906/sag-2004-146
6. Søreide K, Hallet J, Matthews JB, Schnitzbauer AA, Line PD, Lai PBS, et al. Immediate and long-term impact of the COVID-19 pandemic on delivery of surgical services: impact of COVID-19 pandemic on delivery of surgical services. *Br J Surg.* (2020) 107:1250–61. doi: 10.1002/bjs.11670
7. Spinelli A, Pellino G. COVID-19 pandemic: perspectives on an unfolding crisis. *BJS Br J Surg.* (2020) 107:785–7. doi: 10.1002/bjs.11627
8. Ren S-Y, Gao R-D, Chen Y-L. Fear can be more harmful than the severe acute respiratory syndrome coronavirus 2 in controlling the corona virus disease 2019 epidemic. *World J Clin Cases.* (2020) 8:652–7. doi: 10.12998/wjcc.v8.i4.652
9. Kretchy IA, Asiedu-Danso M, Kretchy J-P. Medication management and adherence during the COVID-19 pandemic: perspectives and experiences from low-and middle-income countries. *Res Soc Adm Pharm.* (2021) 17:2023–6. doi: 10.1016/j.sapharm.2020.04.007
10. Chisholm D, Docrat S, Abdulmalik J, Alem A, Gureje O, Gurung D, et al. Mental health financing challenges, opportunities and strategies in low- and middle-income countries: findings from the Emerald project. *BJPsych Open.* (2019) 5:e68. doi: 10.1192/bjo.2019.24
11. Nation Media Group. *High Risk Patients have it Rough in Covid-19 War*. Daily Nation (2020). Available online at: https://www.nation.co.ke/kenya/news/high-risk-patients-have-it-rough-in-covid-19-war-284448 (cited July 27, 2020).
12. Ahmed SAKS, Ajisola M, Azeem K, Bakibinga P, Chen Y-F, Choudhury NN, et al. Impact of the societal response to COVID-19 on access to healthcare for non-COVID-19 health issues in slum communities of Bangladesh, Kenya, Nigeria and Pakistan: results of pre-COVID and COVID-19 lockdown stakeholder engagements. *BMJ Glob Health.* (2020) 5:e003042. doi: 10.1136/bmjgh-2020-003042
13. Shalev D, Shapiro PA. Epidemic psychiatry: the opportunities and challenges of COVID-19. *Gen Hosp Psychiatry.* (2020) 64:68–71. doi: 10.1016/j.genhosppsych.2020.03.009
14. Moreno C, Wykes T, Galderisi S, Nordentoft M, Crossley N, Jones N, et al. How mental health care should change as a consequence of the COVID-19 pandemic. *Lancet Psychiatry.* (2020) 7:813–24. doi: 10.1016/S2215-0366(20)30307-2
15. Reay RE, Looi JC, Keightley P. Telehealth mental health services during COVID-19: summary of evidence and clinical practice. *Austr Psychiatry.* (2020) 28:514–6. doi: 10.1177/1039856220943032
16. Trizer M. *2019 Kenya Population and Housing Census Results*. Kenya National Bureau of Statistics (2019). Available online at: https://www.knbs.or.ke/?p=5621 (cited July 27, 2020).
17. Kwobah E, Epstein S, Mwangi A, Litzelman D, Atwoli L. PREVALENCE of psychiatric morbidity in a community sample in Western Kenya. *BMC Psychiatry.* (2017) 17:30. doi: 10.1186/s12888-017-1202-9
18. Ndetei DM, Khasakhala LI, Kuria MW, Mutiso VN, Ongecha-Owuor FA, Kokonya DA. The prevalence of mental disorders in adults in different level general medical facilities in Kenya: a cross-sectional study. *Ann Gen Psychiatry.* (2009) 8:1. doi: 10.1186/1744-859X-8-1
19. Republic of Kenya. Office of the Auditor General. Performance audit report on Provision of Mental Healthcare Services in Kenya. (2018).
20. Suchman L. Accrediting private providers with National Health Insurance to better serve low-income populations in Kenya and Ghana: a qualitative study. *Int J Equity Health.* (2018) 17:179. doi: 10.1186/s12939-018-0893-y
21. Standard Media Group. *This is How Expensive It is to Access Mental Healthcare in Kenya*. The Standard (2018). Available online at: https://www.standardmedia.co.ke/business/article/2001300897/this-is-how-expensive-it-is-to-access-mental-healthcare-in-kenya (cited July 27, 2020).
22. *INTERIM-GUIDANCE-ON-CONTINUITY-OF-MENTAL-HEALTH-SERVICES-DURING-THE-COVID-19-PANDEMIC_compressed-2.pdf*. Available online at: https://www.health.go.ke/wp-content/uploads/2020/05/INTERIM-GUIDANCE-ON-CONTINUITY-OF-MENTAL-HEALTH-SERVICES-DURING-THE-COVID-19-PANDEMIC_compressed-2.pdf (cited July 26, 2020).
23. World Health Oganization. *mhGAP Intervention Guide 2.0. mhGAP Intervention Guide for Mental, Neurological and Substance Use Disorders in Non-Specialized Health Settings: Mental Health Gap Action Programme (mhGAP): Version 2.0.* World Health Organization (2016). Available online at: https://www.ncbi.nlm.nih.gov/books/NBK390815/ (cited May 29, 2020).
24. Mobarak AM, Barnett-Howell Z. *Poor Countries Need to Think Twice About Social Distancing During Coronavirus*. (2020). Available online at: https://foreignpolicy.com/2020/04/10/poor-countries-social-distancing-coronavirus/ (cited July 22, 2020).
25. Habibov N. Determinants of out-of-pocket expenditures on prescribed medications in Tajikistan: implications for healthcare sector reform. *J Health Organ Manag.* (2009) 23:170–82. doi: 10.1108/14777260910960911
26. Chen JA, Chung W-J, Young SK, Tuttle MC, Collins MB, Darghouth SL, et al. COVID-19 and telepsychiatry: Early outpatient experiences and implications for the future. *Gen Hosp Psychiatry.* (2020) 66:89–95. doi: 10.1016/j.genhosppsych.2020.07.002
27. Kavoor AR, Chakravarthy K, John T. Remote consultations in the era of COVID-19 pandemic: preliminary experience in a regional Australian public acute mental health care setting. *Asian J Psychiatry.* (2020) 51:102074. doi: 10.1016/j.ajp.2020.102074
28. Xiang Y-T, Zhao Y-J, Liu Z-H, Li X-H, Zhao N, Cheung T, et al. The COVID-19 outbreak and psychiatric hospitals in China: managing challenges through mental health service reform. *Int J Biol Sci.* (2020) 16:1741–4. doi: 10.7150/ijbs.45072
29. Gitobu CM, Gichangi PB, Mwanda WO. The effect of Kenya's free maternal health care policy on the utilization of health facility delivery services and maternal and neonatal mortality in public health facilities. *BMC Pregnancy Childbirth.* (2018) 18:77. doi: 10.1186/s12884-018-1708-2
30. Kohrt BA, Asher L, Bhardwaj A, Fazel M, Jordans MJD, Mutamba BB, et al. The role of communities in mental health care in low- and middle-income countries: a meta-review of components and competencies. *Int J Environ Res Public Health.* (2018) 15:1279. doi: 10.3390/ijerph15061279
31. Alem A, Jacobsson L, Hanlon C. Community-based mental health care in Africa: mental health workers' views. *World Psychiatry*. (2008) 7:54–7. doi: 10.1002/j.2051-5545.2008.tb00153.x
32. Kakuma R, Minas H, van Ginneken N, Dal Poz MR, Desiraju K, Morris JE, et al. Human resources for mental health care: current situation and strategies for action. *Lancet.* (2011) 378:1654–63. doi: 10.1016/S0140-6736(11)61093-3
33. Hedima EW, Adeyemi MS, Ikunaiye NY. Community pharmacists: on the frontline of health service against COVID-19 in LMICs. *Res Soc Adm Pharm.* (2020) 17:1964–6. doi: 10.1016/j.sapharm.2020.04.017
34. Acharya B, Maru D, Schwarz R, Citrin D, Tenpa J, Hirachan S, et al. Partnerships in mental healthcare service delivery in low-resource settings: developing an innovative network in rural Nepal. *Glob Health.* (2017) 13:2. doi: 10.1186/s12992-016-0226-0

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Public Health

POLICY AND PRACTICE REVIEWS
published: 20 January 2021
doi: 10.3389/fpubh.2020.589264

Mental Health in Lebanon's Triple-Fold Crisis: The Case of Refugees and Vulnerable Groups in Times of COVID-19

Fouad M. Fouad[1]*, *Andres Barkil-Oteo*[2] and *Jasmin Lilian Diab*[3]

[1] Faculty of Health Sciences, American University of Beirut, Beirut, Lebanon, [2] Faculty of Medicine, American University of Beirut, Beirut, Lebanon, [3] Refugee Health Program, Global Health Institute, American University of Beirut, Beirut, Lebanon

Lebanon's management of the COVID-19 pandemic is largely being maneuvered amid the country's escalating triple fold crisis. As the country continues to grapple with political stagnation, a dwindling economy and currency, all while working through an ongoing refugee crisis, mental health in times of Coronavirus in Lebanon remains unaddressed. This piece explores the effects of this triple fold crisis upon the mental health of the country's refugees and most vulnerable groups, and provides room for discussions on the potential benefits of telemental health as an intervention in low-income and conflict settings. Although the implementation of TMH services in Lebanon among vulnerable communities in times of COVID-19 is not a priority, this piece insists it would ultimately fill a substantial mental health gap during the country's ongoing difficult transitory period.

Keywords: mental health, COVID−19, refugees, conflict, Lebanon, policy, political economy

OPEN ACCESS

Edited by:
Joanna Lai,
UNICEF United Nations International Children's Emergency Fund, United States

Reviewed by:
Julie De Barbeyrac,
UNICEF United Nations International Children's Emergency Fund, United States
Kiran Kaur Manku,
University of Oxford, United Kingdom

***Correspondence:**
Fouad M. Fouad
mm157@aub.edu.lb

Specialty section:
This article was submitted to Public Mental Health, a section of the journal Frontiers in Public Health

Received: *30 July 2020*
Accepted: *21 December 2020*
Published: *20 January 2021*

Citation:
Fouad FM, Barkil-Oteo A and Diab JL (2021) Mental Health in Lebanon's Triple-Fold Crisis: The Case of Refugees and Vulnerable Groups in Times of COVID-19. Front. Public Health 8:589264. doi: 10.3389/fpubh.2020.589264

INTRODUCTION: LEBANON'S TRIPLE-FOLD CRISIS

With ∼2,775 cases to this date (1), Lebanon has managed (for now) to contain the spread with an initial strict lockdown, and confinement measures amid an already struggling economy (2). Prior to the COVID-19 pandemic, Lebanon was struggling under the weight of political stagnation, a dwindling economy and currency tarnished by corrupt management and leadership, all while managing an ongoing refugee crisis. A viral outbreak such as Coronavirus, ultimately places additional pressure on the already vulnerable country and its population.

The minister of Public Health declared Lebanon in Phase 4 of the outbreak with 40 have reportedly died from the infection (2). Experts in the field are in consistent fear that the health sector, which is already plagued by medical equipment shortages and dwindling foreign currency reserves, will be overwhelmed if a second wave of infections might hit the country (3). In March 2020, Human Rights Watch warned that Lebanon's overwhelming financial crisis is contributing to "the scarcity of medical supplies necessary to fight the outbreak" (4). Lebanon took "early preventive measures," such as enforced social distancing, to slow the infection rate (5). Nonetheless, with the reopening of the airport, there has been a surge in infection rates, partly driven by expats and the other by the apathy among the public to maintain social distance measures to wear masks. Top health officials are warning about the possibility of having to enforce lockdown measures again[1], however it remains to be

[1] Available online at: https://www.dailystar.com.lb/News/Lebanon-News/2020/Jul-16/509094-two-deaths-and-57-virus-cases-confirmed-total-2599.ashx

seen whether or not Lebanon is in fact capable of reinforcing this strict level of compliance, particularly if financial support is not provided to the most vulnerable and poor factions of Lebanon's general public. The country would need to provide continued support to the 300,000 families that live below the poverty line in Lebanon as of 2019, with the latest estimates unavailable (6).

A World Bank Report from 2019 expects that 50% of the Lebanese population will fall on, or below the poverty line if the economic crisis is not swiftly addressed (7). The economic crisis combined with the COVID-19 pandemic bring additional strains upon an already-strained population. Since October 2019, the country has grappled with mass protests denouncing the incompetence and corruption of the serving political class as well as their inability to respond justify the country's debt, and address the severe economic recession (8). According to Human Rights Watch, over 220,000 people (9) lost their jobs this year and others are victim to pay cuts and a declining Lebanese pound value, which has lost over 80% of its value on the black market (10). Estimates on unemployment in Lebanon range between 25 and 40% (11).

COVID-19 essentially serves as the country's third level of constraint amid ongoing political and economic challenges. While violence has remained sporadic and scattered more recently, with small clashes and protests erupting across the country since the lockdown has eased, it is only anticipated to increase as the economic situation deteriorates further, and more people struggle to make ends meet. Lebanese political parties are attempting to rebuild their reputation by opening medical centers in their respective regions, but they lack the financial support their sponsors once gave them amid riots breaking out more violently as time passes (12).

LEBANON'S REFUGEES ARE ADDITIONALLY VULNERABLE

In the 9 years since the conflict in Syria began, an estimated 1 million Syrian refugees have sought safety in Lebanon, ultimately making it the largest concentration of refugees per capita in the world (13). Lebanon's deep economic crisis has rendered Syrian refugees more economically vulnerable, with 75% living under the poverty line, according to VASyR[2]. The majority of refugees do not have regular access to basic water, sanitation, hygiene services or infrastructure (14). Absence of permanent solutions to access to water and sanitation structures, such as connection to municipal water and sanitation networks, contribute to their dire situation (14). This increases refugees' risk of exposure to infectious and preventable diseases, as well as other health issues.

When the first case of COVID-19 was diagnosed in Lebanon, citizens were requested to improve their hygiene practices and follow social distancing protocols in order to "flatten the curve" of the virus (15). However, the implementation of these practices in refugee settlements, where water is scarce and people depend on humanitarian organizations for water supplies, proved to be particularly difficult (16). Furthermore, overcrowding and poor sanitation in settlements make physical distancing difficult, exposing refugees to enormous health risks (16). Action Against Hunger adapted their programming to support the severely vulnerable Syrian refugees in informal settlements throughout the crisis, attempting to provide the settlements with as much clean water as possible, but the amount is far from enough to cover all household needs for personal hygiene, disinfection of tents, washing of clothes, cooking, and more (16).

According to the UNHCR, since the beginning Lebanon's economic deterioration more and more Syrian refugees are reportedly resorting to negative measures such as spending less on food (17). One-third of adult refugees restrict their food consumption in order to ensure their children can eat (17), and a reported 3/4 refugees reduce the number of daily meals (17). Several individuals residing in settlements rely mainly on loans and credit purchases from shops and neighbors, but even this has been increasingly impossible (17).

OBSTACLES TO MENTAL HEALTH: STRESS AND TRAUMA IN CONFLICT AMONG REFUGEE COMMUNITIES

Across the MENA region, the COVID-19 pandemic is taking a significant toll on the mental health and psychosocial well-being of individuals from all factions of society. Among the most vulnerable, are refugees, asylum-seekers, internally displaced and stateless people, all of whom grapple with their own traumas and health concerns amid worrying about their uncertain legal and economic statuses. UNHCR reports that the COVID-19 pandemic has exacerbated old vulnerabilities while steadily increasing the intensity of these realities among vulnerable groups, and triggering a wide range of mental health conditions, which may lead long-term psychosocial consequences' (18). Fear of deportation or eviction, discrimination, as well as loss or reduced livelihoods remain major sources of psychosocial distress according to their report (18). Additionally, these fears have laid the foundation for negative social reactions, including but not limited to: panic, stigma and discrimination in the communities (18). Reports additionally highlight the fact that some of the most vulnerable are exhibiting high levels of psychological distress (18). This includes individuals and families with pre-existing mental health conditions or substance abuse issues, as well as other particular cases the UNHCR highlights as persons of concern like older refugees and refugees with disabilities (18).

Syrian refugees in Lebanon are subject to a number of stressors which are the direct result of traumatic events in conflict situations or the daily hurdles being a refugee. The mere fact of struggling to uphold essential living conditions as well as living through the uncertainty about their legal standing and livelihood are but the tip of the iceberg of everyday challenges for Syrian refugee communities. War-related traumas, coupled with daily stressors have major implications upon the long-term psychosocial well-being of refugees. The UNHCR and its partners state that social distress, cognitive problems, chronic pain, and PTSD are typical documented reactions from prolonged stress situations among refugees in Lebanon (18). The UN agency

[2]Available online at: https://reliefweb.int/report/lebanon/vasyr-2019-vulnerability-assessment-syrian-refugees-lebanon

along with grassroots organizations have insisted that mental health services are necessary to elevate the living standards of displaced Syrians across Lebanon and the region. Despite the need for mental health and psychosocial support (MHPSS) being alarmingly high and options in the region are scarce in the areas of mental health in general. In addition to the lack of supply, challenges exist to accessing the available MHPSS services (18).

Mental health and psychosocial support (MHPSS) activities are being stepped up by the UNHCR and a number of grassroots and international organizations with the aim of addressing this new escalating trend before it is no longer repairable. In Lebanon more specifically, multiple incidents of suicide were reported among refugees in 2020 (19). Refugee settlements across the country have witnessed a hike in instances of threats to self-harm and harm to others while family disputes, domestic violence, and divorce cases have increased (20). Family members and young children are those primarily at risk of domestic violence, in particular women and young girls (20). Unable to pay rent and facing evictions, refugees reportedly resorting to sharing accommodation, further increasing the risk of sexual, and gender-based violence (SGBV) and strained mental health implications (20).

A study conducted in a joint effort by the Danish Refugee Council and partners in 2018 found that there is a large gap between the need of MHPSS among Syrian refugees and quality of services they actually receive. Of the 1,082 Syrian refugee participants who took part in the comprehensive study, 62% expressed that they needed assistance to deal with physical pain and distress (21). Additionally, 55% of the sample suffer from distress and 28.5% feel severely or extremely emotionally affected by their health issues (21). In the areas of "trauma," 32.5% of respondents reported being exposed to one or multiple traumatic events (21). There traumatic events included loss of a close family member, exposure to violence and/or being arrested, detained or imprisoned (21). Additionally, the study highlighted that those who had lost a close family member, had a much higher risk of experiencing pain and distress, having functionality difficulties in their everyday life and having poor self-rated health (21). Separate factors influencing distress, pain, functionality and self-rated health were age, gender, exposure to violence coupled with unmet basic needs (21). The study further highlighted the strong positive correlations between pains, self-rated health and being emotionally affected by health problems, and established that psychosocial challenges and pain occur simultaneously and reinforce each other (21). The study further touched upon basic needs, such as food, shelter, security, and employment and how they played a fundamental role in the experience of distress (21).

Across Lebanon, refugee outreach volunteers have been able to reach over 4,000 persons with community-based psychosocial support messaging since the beginning of the COVID-19 pandemic (22). Since February, outreach volunteers, community groups and other structures have reached more than 332,000 individuals (over 50% women) through virtual information and awareness sessions, including on general COVID-19 prevention messages, community-based MHPSS, and parenting skills, among others (22). Awareness sessions with some of the most vulnerable groups to reach are being conducted through social media platforms, WhatsApp and Zoom, and follow-up sessions are conducted through phone calls (22). Tele-mental health (TMH) efforts have proven to be a successful route during these difficult periods, as international organizations, UN agencies and their partners continue to provide individual psychosocial support sessions remotely, via voice or video call (22). Psychosocial support sessions are taking place face-to-face only for high-risk urgent cases, including but not limited to refugees with suicide ideation, survivors of SGBV, children in the worst forms of child labor, and persons of concern with pre-existing mental health or psychosocial distress, while taking precautionary measures for the safety of refugees and frontline workers (22).

TELEMENTAL HEALTH AS AN INTERVENTION IN LOW-INCOME SETTINGS

Amidst the need for social distancing as well as prevention measures in the times of COVID-19, a tele-mental health (TMH) approach would be suitable to bridge the mental health gap in vulnerable communities across Lebanon and the region. TMH is a form of telemedicine that provides mental health assessment and treatment at a distance, and can provide valuable assistance in light of extremely limited mental health services on the ground. Several studies have shown that TMH could be effective in the diagnosis, assessments, and treatment of a broad range of clinical conditions, and in different practice settings, often comparable to face-to-face outcomes (23). TMH can be successfully used in clinical work and education initiatives alike, it enables clinical consultations and the possibility of providing training and supervision (24). TMH has been shown to be cost-effective (25) with good clinical outcomes mainly as it increases access to care (26). It is a flexible modality that could be adapted to be used in different settings and types of practice (27).

There are two main modalities of communication technologies in the implementation of TMH. One is "synchronous or interactive" and the other is "asynchronous or store-and-forward." Synchronous services usually provide a live, two-way interactive connection between a provider and a patient who are in distinct physical locations. This modality is commonly used in providing direct clinical services, it could be seen as a "replacement" of the clinical encounter, however, it requires a reliable internet connection and dedicated available staff. The store-and-forward (S&F) mode of connection takes the form of capturing and then send the clinical information via secured emails/websites for a review by a specialist at a later time. Unlike direct (synchronous) forms of connection, an indirect (asynchronous) connection does not require the presence of both parties at the same time. This modality is often used in providing clinical consultations by an expert (second opinion) to a provider who has clinical questions regarding a clinical condition. The advantage of this model is that could be done over a low or unreliable connection, it is very suitable in doing clinical training and supervision for low skilled staff, however, it

can't be used to deliver direct services and requires a healthcare staff who is the primary provider for the patient.

TMH initiatives among refugee settings have been growing over the last years, one initiative with Syrian refugees in Turkey showed that it is feasible and could lead to better clinical outcomes and increase satisfaction among providers and patients (28). In Denmark, TMH was studied among groups of asylum seekers, refugees, and migrants who received services from providers who spoke their language. Patients reported a high level of satisfaction and acceptance of the service and stated that they will advise others to use it (29). In the Lebanese context specifically, it has been recently suggested that TMH could be very helpful to increase access to MH services namely through National primary healthcare centers network as a way to leverage the spread of primary care network in Lebanon with specialists input who are largely concentrated in Beirut (30). However, as the region is ill-equipped in the areas of mental health on a broader level, a move toward tele-mental health brings forth pivotal barriers toward its proper implementation on cultural, technical, financial, and regulatory levels in the Lebanese case specifically (31).

In Lebanon, as interpersonal relationships are valued and direct doctor–patient interaction is expected, barriers to using technology in delivering medical services would typically arise. In Lebanon, as in the region, patients are concerned with their physician's background and culture as well as the privacy during encounters in more sensitive cases such as that of undocumented individuals, or unregistered refugees. In a study conducted by Jefee-Bahloul, Syrian refugees were asked about their acceptance of mental and TMH. Reluctance toward a technological approach presented themselves in the form of concerns for privacy, distrust, distortions to the doctor-patient relationship, and unfamiliarity with the technology itself (31). However, despite these early concerns (as shown by several projects), people were open to seeking mental health services using this modality, and once they do they are generally satisfied by the experience.

Additional obstacles to a successful move toward tele-mental health, is the existing infrastructure barriers in Lebanon, which include electricity and internet access (32). Electricity is a prerequisite for tele-medicine and TMH, and must be coupled with high bandwidth capacity to ensure picture and voice clarity (32). These elements are pivotal to ensure a healthy therapeutic relationship between the patient and their physician (32). The availability of trained technical support personnel and medical support for remote/conflict settings represents another obstacle in areas suffering from a shortage of technical and medical services to begin with (32). Given this limitation, implementing an asynchronous (store & forward) modality for clinical consultations may be much more effective than the synchronous modality.

Funding is another fundamental obstacle in the Lebanese case. Amid the country's ongoing economic crisis, although the private sector may pioneer TMH projects and implement the technology faster than public facilities, sustainability remains an issue. While cost effectiveness of TMH has been established in "developed" states, doubts and question marks about it in the MENA region—and in Lebanon more specifically—do exist. Until more studies demonstrate cost effectiveness of TMH in Lebanon and the region, convincing the government, investors and stakeholders to invest in this process will prove to be difficult and far reaching.

In addition to the financial barriers Lebanon currently faces, the policy frameworks are another. It is often the case that public policy is driven by various approaches and philosophies in the areas of health care, which essentially vary depending on the serving political class and its agenda. This would ultimately vary by region as well. As TMH remains "outside" health systems in the region, there are essentially no concrete guiding regulations or policies to frame such practices. Medico-legal issues, licensing requirements, regulation, and quality assurance issues would naturally arise soon after such implementation—and with the extensive hits to the health system in Lebanon since the Civil War, coupled with the current COVID-19 spread, priorities are most definitely not headed in this direction (32). Additionally, confidentiality, data protection, and patient privacy are essential issues in TMH. Fear of political persecution is a threat unique to, and commonly seen in, the region and Lebanon (33). These fears coupled with the "vague" legal frameworks surrounding the country's refugee community and the internally displaced may impact their acceptance to the technology, as well as open up the debates surrounding policies to protect information transmitted electronically (33). Despite all these challenges, and as seen in other settings, COVID-19 has facilitated an explosion in telemedicine and tele mental health applications, proving that many policy hurdles were largely due to inertia rather than having any specific objections to TMH. One example in Lebanon is the relaxing of prescription guidelines by MOH to accommodate for the medical and psychiatric sessions that took place remotely when patients were not able to come to clinics due to the lockdown. Major crises like COVID-19 or the upcoming political and economic crisis could also prove an opportunity to create models of care out of necessity that was not possible previously.

CONCLUDING REMARKS

The implementation of TMH services in Lebanon among vulnerable communities in times of COVID-19 is not a priority, but would ultimately fill a substantial mental health gap. TMH is a feasible solution to increase access of quality mental health services among vulnerable communities in conflict settings; however, its implementation in Lebanon currently stands in the face of multiple intersectional barriers on the political, economic and health levels. In the past, Lebanon has not expressed its readiness to adopt policies to foster the mental health of these communities as well as the staff that assists them, let alone its readiness to delve into the technological requirements to build TMH systems. Approaches to building these systems should be based on preliminary assessment of the specific cultural, financial, legal, and infrastructural needs of Lebanon—a reality currently hindered by the corruption the system is attempting to overcome amid its dwindling currency. Additionally, overcoming the cultural barriers associated with mental health services in

general, and TMH services more specifically, requires strategies for training providers and increasing their exposure to the technology and their awareness of its applicability. In order to be effective, this strategy needs to be coupled with an increasing public awareness campaign on the use and effectiveness of technology in order to facilitate patients' acceptance of services of this nature. Additionally, public consultation in all stages of developing TMH, and ensuring the innovations are contextually appropriate and relevant is essential. As the saying goes: "Find the opportunity that lies in every crisis," the current crisis in Lebanon will have long-term effect, and requires long term planning. Despite the obstacles, investment in TMH system could help citizens and refugees alike, given the successful implementation of TMH in other low-income settings (34). We do believe that instead of keep trying the same service model repeatedly, maybe it is time to create a new service delivery system that could help Lebanon not just sustain but significantly improve their mental health delivery system.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

REFERENCES

1. Ministry of Health, Lebanon. *Coronavirus COVID-19 Lebanon Cases.* (2020). Retrieved at: https://www.moph.gov.lb/maps/covid19.php (accessed October 2020).
2. Dia F. *Lebanon's Success in Containing COVID-19: What is the Inevitability of a Second Wave? An-Nahar English.* (2020). Retrieved from: https://en.annahar.com/article/1224682-lebanons-success-in-containing-covid19-w19-what-is-the-inevitability-of-a-second (accessed October 2020).
3. Reuters. Lebanon fears second *Coronavirus Wave as New Infections Surge.* (2020). Retrieved from: https://www.reuters.com/article/us-health-coronavirus-lebanon/lebanon-fears-second-coronavirus-wave-as-new-infections-surge-idUSKBN22N1PE (accessed October 2020).
4. Human Rights Watch. *Lebanon: COVID-19 Worsens Medical Supply Crisis.* (2020). Retrieved from: https://www.hrw.org/news/2020/03/24/lebanon-covid-19-worsens-medical-supply-crisis (accessed October 2020).
5. Global Health Institute. *Rate of Growth of COVID-19 Cases in Lebanon, American University of Beirut.* (2020). Retrieved at: https://ghi.aub.edu.lb/COVID-19/index.html (accessed October 2020).
6. Gemayel F. *More Than One Million Lebanese in Poverty, Le Commerce.* (2019). Retrieved from: https://www.lecommercedulevant.com/article/29443-more-than-one-million-lebanese-in-poverty (accessed October 2020).
7. World Bank. *Lebanon's Economic Update.* (2019). Retrieved from: https://www.worldbank.org/en/news/press-release/2019/11/06/world-bank-lebanon-is-in-the-midst-of-economic-financial-and-social-hardship-situation-could-get-worse (accessed October 2020).
8. Al-Jazeera. *Lebanon Protests: All the Latest Updates.* (2019). Retrieved from: https://www.aljazeera.com/news/2019/10/lebanon-protests-latest-updates-191021080734203.html (accessed October 2020).
9. Human Rights Watch. *Life for Lebanon's Migrant Domestic Workers Worsens Amid Crisis.* (2020). Retrieved from: https://www.hrw.org/news/2020/03/06/life-lebanons-migrant-domestic-workers-worsens-amid-crisis (accessed October 2020).
10. Reuters. *Collapsing Lebanese Pound Hits New Lows, Food Imports Reduced.* (2020). Retrieved from: https://www.reuters.com/article/us-lebanon-crisis-pound/collapsing-lebanese-pound-hits-new-lows-food-imports-reduced-idUSKBN23X1KZ#:~:text=BEIRUT%20(Reuters)%20%2D%20The%20Lebanese,currency%20collapse%20was%20hitting%20imports (accessed October 2020).
11. Hamadi G. *Unemployment: The Paralysis of Lebanese Youth, An-Nahar English.* (2020). Retrieved from: https://en.annahar.com/article/1004952-unemployment-the-paralysis-of-lebanese-youth (accessed October 2020).
12. Mouawad J. *How Lebanon's Political Parties are Using Coronavirus to Seize Back Control, Ya Libnan.* (2020). Retrieved from: https://yalibnan.com/2020/04/14/how-lebanons-political-parties-are-using-coronavirus-to-seize-back-control/ (accessed October 2020).
13. UNHCR. *Global Focus: Lebanon.* (2020). Retrieved from: https://reporting.unhcr.org/node/2520?y=2020#year (accessed October 2020).
14. UNHCR. *Global Focus: Lebanon.* (2020). Retrieved from: https://reporting.unhcr.org/node/2520 (accessed October 2020).
15. Knowledge to Policy Center. *Informing Lebanon's Response to the COVID-19 Pandemic, American University of Beirut.* (2020). Retrieved from: https://www.aub.edu.lb/k2p/Documents/Final-K2P%20Corona%20Rapid%20Response%20March%2017%202020%20%281%29.pdf (accessed October 2020).
16. Diab JL. *Syrian Refugees in Lebanon amid Confinement, Health Scares and Escalating Needs, Refugee Hosts.* (2020). Retrieve at: https://bit.ly/3e4Dstn (accessed October 2020).
17. UNHCR. *Assessing the Impact of the Economic and COVID-19 Crises in Lebanon.* (2020). Retrieved from: https://data2.unhcr.org/en/documents/download/77304 (accessed October 2020).
18. UNHCR Regional Bureau for MENA. *Mental Health and Psychosocial Response during COVID-19 Outbreak.* (2020). Retrieved from: https://data2.unhcr.org/en/documents/download/77112 (accessed October 2020).
19. Sewell A. *Syrian Refugee in Lebanon Sets Himself on Fire Over Dire Economy Amid Coronavirus, Al Arabiya.* (2020). Retrieved from: https://english.alarabiya.net/en/features/2020/04/06/Syrian-refugee-in-Lebanon-sets-himself-on-fire-over-dire-economy-amid-coronavirus (accessed October 2020).
20. Plan International. *Covid-19: Girls in Lebanon Left Struggling for Food, Sanitary Pads.* (2020). Retrieved from: https://plan-international.org/news/2020-04-28-covid-19-girls-lebanon-left-struggling (accessed October 2020).
21. Danish Refugee Council, Dignity Danish Institute Against Torture. *Needs and Barriers for Mental Health and Psychosocial Support Among Syrian Refugees in Lebanon: Perspectives for Future Interventions.* (2018). Retrieved from: https://drc.ngo/media/4665743/mhpss-report.pdf (accessed October 2020).
22. UNHCR. *Refugee Call Centre Fills Gap Amid Lebanon's Coronavirus Shutdown.* (2020). Available online at: https://www.unhcr.org/news/stories/2020/4/5e980e8c4/refugee-call-centre-fills-gap-amid-lebanons-coronavirus-shutdown.html (accessed October 2020).
23. Hilty DM, Ferrer DC, Parish MB, Johnston B, Callahan EJ, Yellowlees PM. The effectiveness of telemental health: a 2013 review. *Telemed J E Health.* (2013) 19:444–54. doi: 10.1089/tmj.2013.0075
24. Jefee-Bahloul H, Barkil-Oteo A, Shukair N, Alraas W, Mahasneh W. Using a store-and-forward system to provide global telemental health supervision and training: a case from syria. *Acad Psychiatry.* (2016) 40:707–9. doi: 10.1007/s40596-015-0423-9
25. Hyler SE, Gangure DP. A review of the costs of telepsychiatry. *Psychiatr Serv.* (2003) 54:976–80. doi: 10.1176/appi.ps.54.7.976
26. García-Lizana F, Muñoz-Mayorga I. Telemedicine for depression: a systematic review. *Perspect Psychiatr Care.* (2010) 46:119–26. doi: 10.1111/j.1744-6163.2010.00247.x
27. Langarizadeh M, Tabatabaei MS, Tavakol K, Naghipour M, Rostami A, Moghbeli F. Telemental health care, an effective alternative to conventional mental care: a systematic review. *Acta Inf Med..* (2017) 25:240–6. doi: 10.5455/aim.2017.25.240-246
28. Almoshmosh N, Jefee-Bahloul H, Abdallah W, Barkil-Oteo A. Use of store-and-forward tele-mental health for displaced Syrians. *Intervention.* (2020) 18:66–70. doi: 10.4103/INTV.INTV_53_19

29. Mucic D. International telepsychiatry: a study of patient acceptability. *J Telemed Telecare*. (2008) 14:241–3. doi: 10.1258/jtt.2008.080301
30. Naal H, Whaibeh E, Mahmoud H. Guidelines for primary health care-based telemental health in a low-to middle-income country: the case of Lebanon. *Int Rev Psychiatry*. (2020) 1–9. doi: 10.1080/09540261.2020.1766867
31. Jefee-Bahloul H. Telemental health in the middle east: overcoming the barriers. *Front Public Health*. (2014) 2:86. doi: 10.3389/fpubh.2014.00086
32. Healthit.gov. *What are the Technical Infrastructure Requirements of Telehealth?*. Retrieved from: https://www.healthit.gov/faq/what-are-technical-infrastructure-requirements-telehealth (accessed October 2020).
33. Pocock L. *Mental Health Issues in the Middle East - An Overview, Middle East Journal of Psychiatry and Alzheimers*. (2017) Retrieved at: http://www.me-jpa.com/WEB/June2017/Mental%20Health.pdf (accessed October 2020).
34. Augusterfer EF, Barkil-Oteo A, Jefee-Bahloul H. *Telemental Health in Resource-Limited Global Settings, Oxford Medicine Online*. (2017). Retrieved from: https://global.oup.com/academic/product/telemental-health-in-resource-limited-global-settings-9780190622725?cc=es&lang=en& (accessed October 2020).

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychiatry

PERSPECTIVE
published: 22 January 2021
doi: 10.3389/fpsyt.2020.604949

The "Labeled" Side of COVID-19 in India: Psychosocial Perspectives on Islamophobia During the Pandemic

Kanika K. Ahuja[1] *and Debanjan Banerjee*[2]*

[1] Department of Psychology, Lady Shri Ram College for Women, New Delhi, India, [2] Department of Psychiatry, National Institute of Mental Health and Neurosciences (NIMHANS), Bengaluru, India

The Coronavirus disease 2019 (COVID-19) has emerged as a global public health threat over the last few months. Historically, infectious disease outbreaks like the plague, Influenza, cholera, HIV, etc. have generated stigma, prejudice, "othering" and xenophobia, against certain communities. One such prevalent form of xenophobia, is Islamophobia or "fear and discrimination against the Muslims." Though debated over its various facets and definitions, it is on the rise worldwide. India, being a socio-politically diverse and populous nation, has been facing unique challenges during COVID-19. Considering Hinduism and Islam are the two major religious communities, the subcontinent has witnessed complex dynamics in their relationship throughout history. The pandemic has further instigated Islamophobia, and consequent discrimination, as well as unrest. This can have significant effect of public behavior and health. In the recent past, few legislations in India were interpreted to be Islamophobic and generated nation-wide protest, which provided a fertile backdrop against the discriminative effects of the pandemic. Keeping this in background, this commentary highlights the social contexts of increase in Islamophobia in India during the pandemic, discusses the possible psychological explanations and public health impact, as well as outlines some ways to mitigate it focusing on collectivism.

Keywords: COVID-19, coronavirus, pandemic, India, xenophobia, islamophobia

OPEN ACCESS

Edited by:
Manasi Kumar,
University of Nairobi, Kenya

Reviewed by:
Shifa Haq,
Ambedkar University Delhi, India
Karthik Subbaraman,
citiesRISE, India
Sabah Siddiqui,
Flame University, India

***Correspondence:**
Debanjan Banerjee
dr.djan88@gmail.com

Specialty section:
This article was submitted to Public Mental Health, a section of the journal Frontiers in Psychiatry

Received: *10 September 2020*
Accepted: *28 December 2020*
Published: *22 January 2021*

Citation:
Ahuja KK and Banerjee D (2021) The "Labeled" Side of COVID-19 in India: Psychosocial Perspectives on Islamophobia During the Pandemic. Front. Psychiatry 11:604949. doi: 10.3389/fpsyt.2020.604949

INTRODUCTION

The world has faced a new public health threat over the last few months. The Coronavirus disease 2019 (COVID-19) has affected nearly 69 million and claimed the lives of more than 1.57 million, around the world (World Health Organization COVID-19 Situation Report, as on December 10, 2020). As the major focus of management gets shifted to exploring the biological cure for the virus, the social effects get largely neglected. Pandemics of such large-scale are not merely biological phenomena; they also have socio-economic and psychological offshoots that can outlast the infection itself. Efforts to address epidemics have historically been hindered by the failure to take into account the psychosocial aspects of these diseases. Besides the direct psychological impact of the infection secondary to the uncertainty and fear of an unknown infection, the social implications can be immense. Mass panic, agitation, competition for access to health care and discrimination based on social classes, religion or ethnicities are common (1). This leads to societal stigma and certain minority populations being targeted amidst the already enhanced crisis. It has been seen that earlier epidemics such as Ebola exacerbated structural inequities, such as gender

(2) and prejudice toward outgroup members (3). Biological disasters have been shown to influence human behavior, increasing illogical, irrational, provocative, polarized and aggressive behavior (4). Misinformation and misinterpretation of social media can further compound these reactions. From the very time COVID-19 was declared to be a pandemic, it has been labeled as "Kung Flu" or "Chinese virus," thus sparking international tensions and blame (5). Every nation has been facing their unique psychosocial challenges and India, being one of the socio-culturally and religion-wise diverse and populous country, specific issues have been faced by certain "outgroups." One such outgroup in the Indian context are the Muslims, who have time and gain come under accusations and harassment related to the infection. Keeping this in background, this article provides some perspectives for rising Islamophobia in India, in the context of COVID-19 pandemic and briefly draws implications for policy and practice. The authors would like to provide an open disclaimer for their neutral viewpoints in this commentary as mental health professionals, and not endorsing any specific political ideology. Being researchers in the field of mental health, the authors would like to emphasize on their neutral stance and aim to critically analyze the psychosocial and cultural contexts during the pandemic based on factual data rather than opine about any particular ideas, religion or governance.

ISLAMOPHOBIA AND INDIA: SITUATIONAL CONTEXTS PRECEDING COVID-19

Hinduism and Islam are the two most prevalent religions in India. Hindus and Muslims have had a complex co-existence (6), at times characterized by violent conflicts, such as the partition of the country in 1947, 1989 Kashmir violence, 2002 Gujarat riots, and 2013 Muzaffarnagar riots. The relationship, however, has not always been fraught with violence. In this socio-culturally dynamic and secular sub-continent, both these religious groups have also harmoniously co-habited most of the times, mutually respecting each other's rituals and traditions. Islamophobia or "fear and suspicion" against Muslims though rising in legal literature, has been a matter of major debate and discussion. It has been defined in various ways based on the varied schools of thought, and typified as private, structural and dialectic Islamophobia (7). Irrespective of the different aspects to the "fear," the concerns for Islamophobia have always been on the civil liberties and human right threats posed to a particular religious community. Legally, usage of this term has been debated on similar lines as of the term "homophobia," to denote the "fear" against any community or groups to be more irrational and aberrant, rather than structural and strategic (8). Islamophobia has reached record highs in some Western countries in the recent past (9). Sirgy et al. (10) showed an inverse relationship between subjective well-being and islamophobia (considering it as a type of xenophobia). Similarly, the National Well-Being Index in South Africa was reported to have a significant relationship with attitudes toward immigrants (11). Such prejudiced attitudes against certain "communities" amplified during crisis situations can fuel social chaos, stigma, agitation, mutual blame and panic that in turn predispose to psychological stress and trauma. Social justice and welfare might be impaired because of these attributes (12).

The situation in India in the preceding months of the COVID-19 infection has, however, been contextually significant. The Citizenship Amendment Act (CAA) was enacted by the Indian Government on December 12, 2019. The Act amends the Indian citizenship to illegal migrants from the neighboring countries, who entered India before 2014, subsequent to the religious prosecutions. It does not, however, mention about the Muslim communities, who had fled from these countries due to the same reason. The amendment was widely criticized as discrimination against Muslims, and protests broke out rapidly across the country, though the agenda and intentions of the protestors were widely heterogenous (13). The associated proposal of the National Register of Citizens (NRC) further added to the agitation. This sparked concerns among the Indian Muslims and people of lower socio-economic classes if they would be denied citizenship and rendered stateless (14). The state forms a major part of "collective identity" and consequently, when protests were already widespread related to the perceived loss of political rights, culture and land, the pandemic outbreak simply snowballed the ongoing communal turmoil. Pandemics have been historically politicized and laws implemented accordingly, like at times of HIV in Africa or Influenza in Europe (15). This time, certain legislations and the resultant public reaction provided a fertile ground for the genesis of existent xenophobia, with the virus acting as the catalyst.

In fact, the site of Shaheen Bagh, one of the major foci of anti-CAA protests, was cleared as late as March 24, 2020, when the number of confirmed coronavirus cases stood at 564 (14). As mentioned before, during the initiation of COVID-19 pandemic in India, the communal atmosphere was tense. Rising anti-Islamic rhetoric, hate crimes, violation of human rights, and mutual blame have been on the rise in context of the protests mentioned above (13). In this background of communal strife, it is not surprising that the stage was already set for Islamophobia, fear, hatred of, or prejudice against the Muslims in general. All India needed was a trigger, which was unfortunately provided by an infection like COVID-19.

When COVID-19 started spreading in India, and Delhi, in particular, some media reports started describing the outbreak in Delhi as the "Tablighi spread." On March 31, a police complaint was lodged against seven people, including the emir of the Tablighi Jamaat (who was subsequently booked on April 15 for culpable homicide not amounting to murder by Delhi Police) for holding a gathering of over 3,000 members at its global headquarters in Nizamuddin. This gathering allegedly violated orders against large gatherings and social distancing norms put in place to contain the spread of COVID-19. These members traveled to different states from Delhi after attending the congregation, became the carriers of the virus, infecting hundreds. There were comments mentioning that 30% of all COVID-19 cases in the country, 1,023 of 2,902 reported at the time, were linked to this event.

It has been contended that even though other faith communities hosted similar large-scale gatherings, events held by Muslim associations such as the Tablighi Jamaat were scapegoated (16). While the Tablighi Jamaat congregated between 13 and 15 March, temples like Siddhivinayak and Mahakaleshwar closed on March 16; Shirdi Saibaba Mandir and Shani Shingnapur Temple closed on 17 March; Vaishno Devi on 18 March, and the Kashi Vishwanath Temple was operating until 20 March—a day after the Government had urged the public for "social distancing." Similarly, places of worship pertaining to other religious faiths also hosted community events during this time period. The Tablighi Jamaat meeting in Delhi being singled as the main vector of the coronavirus, led to a significant increase in anti-Islamic sentiments, including boycotts of businesses of those from the Muslim community, separation of patients based on their religion, refusal to admit Muslims, resulting in the alleged deaths of two newborn babies after their mothers were denied admission, randomly quarantining Muslims, and subjecting Muslim healthcare and essential workers to violence and harassment (17).

People were asked not to buy vegetables from Muslims, a video of which went viral. Controversial posters also showed up on fruit shops in Jamshedpur to demarcate the faith of the shopkeepers [(18); www.indiatoday.in, April 27, 2020]. Other fake videos showing how the Muslim missionary group were spitting or coughing on others to spread corona deliberately too became viral. There were also reports that alleged that the Tablighi Jamaat members admitted to a hospital refused to take medicines, spit on their hands and touched staircase railing, and misbehaved with the medical staff (19). Terms such as "Coronajihad" became popular on social media, as an expression of willful misuse of the COVID-19 infection by certain religious communities, in order to establish their superiority. Also termed as "Talibani crime" or "Corona Terrorism," these quotes fueled the fire of Islamophobia and further strained the inter-religious relationships. Since March 28, tweets with the hashtag #CoronaJihad have appeared nearly 3,00,000 times and potentially seen by 165 million people on Twitter, according to the data shared by Equality Labs, a digital human rights group (20). Though the authenticity of the statistics is debatable, such pejorative terms can easily provoke the ongoing political tensions and lead to law-and-order situations, during pandemics.

Iyer and Chakravarty (21) analyzed the media reportage from March 20 to April 27, 2020 using an open-source media analysis platform Media Cloud. 11,074 stories were published from 271 media sources with the term "Tablighi Jamaat" during the period, of which 94 per cent were English stories that appeared in the print media. At its peak, on April 2, Media Cloud tracked as many as 1,451 news articles covering the Tablighi Jamaat case. 1.5-10 per cent of the stories had words with negative connotations such as "violating," "crime," "spitting," "terrorist," and "jihad." These stories fed into an epidemic of Islamophobic fake news and hate speech. Some fact checking websites such as Media Scanner exposed over a 100 instances of Islamophobic misinformation during this period. Aggravated by the atmosphere of fear and uncertainty during the pandemic, it is not surprising that such media narratives demonized the entire Muslim community. Research [e.g., (12)] found the non-Muslim population to indeed report negative attitudes toward the Muslims, which interestingly reduced their own well-being. Participants, especially those who were older, were more likely to believe that the outbreak of COVID-19 in India was primarily due to Muslims. Such incidents, in fact, led the World Health Organization (WHO) to caution against profiling cases based on racial, religious and ethnic lines for the greater good of the community (22, 23).

Anxieties over the coronavirus thus merged with longstanding Islamophobia in India. Infectious diseases are well-known to invoke widespread fear. History shows that such fear can be used to legitimize discrimination and violence against certain segments of the society. Indeed, blaming "the other" is a way to make mysterious and distressing diseases somewhat understandable, and hopefully even controllable (24). "Othering" is a concept, originally having philosophical connotations, which tends to create the "we vs. they" dichotomy, thus attempting to alienate certain "others" from the self and in broader terms, the center of the society (25). It has eventually emerged into a term in social science that encompasses multiple expressions of prejudice based on xenophobic identities. Examples of this are numerous. "Othering" and consequent prejudice have been commonly seen against the peasants in the classical Bubonic plague of the thirteenth Century, the Indians during the Asiatic Cholera at times of the British rule, against the Chinese in Severe Acute Respiratory Syndrome (SARS) outbreak, as racism during Ebola infection and finally against the same-sex men during the Human Immunodeficiency Virus (HIV) upsurge, which has even been labeled as the "Gay Plague" (26).

The notion of "othering" has also been amply explored by Indian writers such as Guru and Nandy. Guru (27), writing on the marginalization and ghettoization of the Dalits uses Ambedkar's conception of the Indian nation. Ambedkar argued that India comprises of two nations: Puruskrut *Bharat* (privileged) that represents the twice-born castes who are spatially, socially, and culturally different from the *Bahiskrut Bharat* (under-privileged), the untouchables, helping to comprehend the claim for social equality that sustains spatial practices of exclusion. Nandy (28), in the context of Hindu-Muslim relations, asserts that religious fundamentalism and religious violence are not merely by-products of, but the burden of modernization and Westernization. He insists that "traditional India" is inherently adaptive and tolerant (p. 79) and most instances of communal violence are the work of people motivated by "entirely secular, political cost-calculations" [(29), p. 72]. Rather than striving to become idealized global citizens who shed all prejudices and perceived differences, Asians living in diverse communities should learn to accept the "otherness of others." In the context of Islamophobia, socio-cultural "othering" has unleashed common processes and conditions that propagate religion-based inequality and marginality.

COVID-19 AND ISLAMOPHOBIA: PSYCHOSOCIAL PERSPECTIVES

Various psychological factors play a role behind rise in Islamophobia as a result of the COVID-19 outbreak. Some of them are discussed below:

Disease Avoidance Model

This proposes that stigmatization of various groups might result either directly or indirectly from an evolved predisposition to avoid diseased conspecifics (30). Such stigmatization includes emotional and cognitive components. The former directly activates disgust and contamination, such as when non-Muslims feel anger and disgust toward Muslims leading to motivation to avoid them; and the latter whereby the label of COVID-19 brings to mind associations with Muslims, irrespective of their accuracy, indirectly activating disgust and contamination. This model contends that psychological mechanisms have evolved to protect people against the threat of infectious diseases. While such disease avoidance has adaptive utility, it results in an overgeneralized prejudice toward people who are perceived to be potential carriers of disease (31).

This model was tested by Huang et al. (32) in their study conducted during the height of the H1N1 swine-flu epidemic. They reported that even temporary exposure to a disease-related threat, by making participants read a passage about the swine- flu epidemic, was associated with increased anti-immigrant prejudice. Interestingly, people who were vaccinated and therefore felt protected from disease, reported less prejudice than do people who are not vaccinated. They also found that simple interventions like having some participants wash their hands significantly influenced participants' perceptions of out-group members.

Faulkner et al. (33), on similar lines, found that chronic and temporarily aroused feelings of vulnerability to disease contributed to negative attitudes toward foreign (but not familiar) immigrants. They, however, did not find significant xenophobic tendencies toward outgroups who were subjectively familiar. Extending this further, it is possible that Islamophobic attitudes in India could be currently held by those who did not have much interaction with this religious group in the first place. Culturally discordant beliefs and religious ideas might give rise to discomfort and consequent hostility. It seems clear that perceived vulnerability to infectious diseases moderates prejudice toward the "out" group. This has significant implications for both policy and practice.

The Pathogen Prevalence Hypothesis

This is another theory which suggests that people living in regions with a high prevalence of pathogens show increased collectivistic behaviors. This leads to greater conformity and higher xenophobia (34). Research has indeed provided evidence of a positive association between country-wide measures of pathogen prevalence, collectivism and xenophobia (35). Cashdan and Steele (36) also substantiated a relationship between disease prevalence and collectivist values—especially those values pertaining to adherence to group norms. It seems that people do respond to perceived vulnerability by becoming more collectivistic. It has been contended that as many disease-causing pathogens are invisible, and their actions mysterious, adhering to ritualized behavioral practices has historically reduced the risk of infection (37). Individuals who fail to conform to these behavioral traditions, on one hand, pose a health threat to self and others. On the other hand, a collective behavioral tendency toward obedience and conformity can lead to disease-specific benefits, such as mitigating the spread of disease (by maintaining one's distance from the outgroup).

Kim et al. (3) also tested the influence of individualism and collectivism on xenophobic response to the threat of Ebola. They found that those who perceived themselves to be more vulnerable to Ebola were more xenophobic and displayed greater prejudice toward West Africans and immigrants, although this association was weaker among people who were more collectivistic. Perhaps, the more individualism is rising in urban spaces in India, the more the fear of COVID-19 is leading to Islamophobia. This highlights an important gap that researchers should move quickly to fill in the coming weeks and months, to manage the impact of the pandemic. The conceptualization of xenophobia (Islamophobia in the current context) needs to be considered as an important component of public health and psychological preparedness for the post-pandemic aftermath.

Terror Management Theory

This provides yet another angle to understand xenophobia. The terror management theory (38) posits that awareness of the inevitability of death exerts a significant influence on various aspects of human emotion, thought, motivation, and behavior. The uncertainty and possibility of death evokes strong fear in people. Applying the terror management theory, it may be postulated that the costs associated with failing to detect a contagious individual (e.g., getting infected yourself, or even death) outweigh the costs of misidentifying a healthy person as a disease carrier. As a result, disease-avoidance mechanisms occasionally act out at targets who are not legitimate sources of disease (31). Individuals stand to gain by keeping away from those social groups, whom they perceive as carriers of the disease, Muslims in the current context. This acts as a psychological defense of feeling "safe" and "assured" at the face of a crisis, by attributing the onus of the problem to the "other." Social attribution theories support this model, as attributing an external locus of control to an unprecedented disaster, not only decreases the uncertainty but also helps in "misperceived sense of assurance" (39).

Other cases of racially oriented stigmatization have been noted in earlier outbreaks. For instance, in 1993, when an outbreak of an unexplained pulmonary illness occurred in the southwestern United States, the term "Navajo disease" was used in reference to the patient zero, a Novajo woman. Even after the specific hantavirus that caused this outbreak was isolated, the term "Navajo disease" continued to be used, ignoring the fact that non-Navajos were also becoming ill. This led to fears of disease coupled with anti-Indian racism (40).

Fear of death also led to disproportionate stigmatization in the 1994 plague outbreak in Surat, India. Within a week after the infection had been identified publicly, half a million people fled Surat, many of whom were turned away from neighboring communities and cities. Trains and International flights to India were canceled, outgoing passengers were quarantined (including Mother Teresa). The stigmatization was clearly disproportionate to the extent of the outbreak, resulting in severe economic losses and major health and social problems (41). The potent

effect of stigmatization was seen yet again during the SARS epidemic. The perceived linkage between SARS and ethnicity led to the irrational avoidance of Asians (especially Chinese) in many parts of the world. Many countries imposed excessively stringent restrictions on travelers from Asia (42).

Shift Toward Conservatism and Dogmatism

This proposition explains hatred toward other religious communities at times of crises. Previous research has shown that uncertainty, fear of death, instability of social systems, and the potential to evoke disgust promotes socially conservative attitudes (43). In fact, people in the United States (U.S.) were found to report more conservative attitudes after the terrorist attacks of 9/11/01 than before, regardless of whether they identified themselves as liberal vs. conservative (44). Similarly, the Ebola epidemic in 2014 was found to influence voter behavior in two psychologically distinct ways: increased inclination to vote for politically conservative candidates and increased inclination to conform to popular opinion (45). While research on the socio-political aspects of COVID-19 is still upcoming, an investigation (46) assessed political ideology, gender role conformity, and gender stereotypes among 695 U.S. adults before (2 months preceding) vs. during the pandemic. Their findings suggested that the pandemic promoted preference for traditional gender roles.

It is believed that adopting a conservative ideology enables individuals to manage feelings of threat and anxiety that environmental uncertainty evokes (47). All of us caught in the midst of this pandemic not only face uncertainty but also the threat of contracting the COVID-19 virus from our surrounding social and physical environments. This leads to people getting primed with an exponentially growing pathogen threat—a prime that is likely to activate disgust to motivate pathogen avoidance. And considering that Muslims in the present context represented pathogen threat, the feelings of disgust and motivation to avoid them became a natural by-product, in a population that was already showing signs of Islamophobia. As people become more conservative, they might show greater signs of prejudice toward the out-group.

The Way Forward: Implications for Policy and Practice

Stigma is much more than just a negative outcome of a certain disease or a pandemic; it is an illness in itself, comorbid with respect to its marked physical conditions (41). A large body of research has shown being the target of discrimination causes both psychological and physical suffering [e.g., (48, 49)]. To discuss the Indian scenario, the case fatality rate of COVID-19 is lower than many other countries. However, given its ethno-religious diversity, political polarizations, influence of social media and above all, the mere population surge, there are more worrisome issues than just the statistics of infection (50). The new forms of Islamophobia in India in the wake of COVID-19 could have far-reaching political, social, and health implications. The increased alienation of the Muslim community could increase the rates of infections and mortality, as infected individuals would be too afraid to come forward due to fear of being attacked (51). It could also lead to ghettoization of Muslims, where they feel safe to live in overcrowded places with "their own," but would find it difficult to practice social distancing. Further, Islamophobia in the minds of the majority community could promote vigilante violence, resulting in deepening religious fault lines. Communalism and Islamophobia can provoke mass agitation, violence, panic, non-compliance to precautionary measures and public chaos, all of which can be detrimental for the overall well-being, especially when the viral cases are rising each day.

Understanding how to improve prejudicial attitudes while promoting other social benefits is therefore of critical importance. Paradoxically, denying the existence of negative attitudes only deepens divisions. The hiding and mistrust of health care workers and police officials among the Muslim community derives from stigma, fear, and lack of information. The more COVID-19 is stigmatized, the more it will aggravate marginalization of these communities, and divide the country along religious lines. Media, especially social media, plays an important part to play in such situations. In a digital era, when COVID-19 is literally an "infodemic," content related to conspiracy theories and graphic yet selective video content from some anecdotal events turn viral (52). At times of pandemics, the need for information rises and people due to their anxiety tend to consume any form of news, irrespective of their authenticity. During the lockdown, the internet usage in India has tripled and thus the surge of misinformation (53). All that it takes, is one senseless forward to wrong hands, to snowball the fear and stigma. There is also a pressing need to assess the impact of repeated media consumption around COVID-19. Media across the world has reported misleading and discriminatory information which can cause deterioration in mental health and well-being. It may be argued that, labels like "Wuhan Virus" or "Chinese virus pandemonium" linking COVID-19 to a race outside or "Tablighi outbreak" in Delhi are divisive, inflammatory and counterproductive (5). It will result in unrest and further brew feelings of Islamophobia. Positive reports in media such as members of the Tablighi Jammat, perceived to be responsible for the spread of COVID, later volunteered to donate blood for plasma therapy into COVID-19 patients should be highlighted. Other positive stories of how Muslims celebrated their festival Eid with self-restrictions, and practiced social distancing need to be highlighted. In fact, social media is also a uniquely powerful tool to promote social awareness against discrimination by health education about the virus and information-education-communication (IEC) activities for communal harmony.

Since Islamophobia is associated with increased vulnerability of disease, the Government has already taken proactive steps toward assuring public to mitigate their fears. In April, 2020 it had issued an advisory to address the social stigma associated with the pandemic, urging people not to label any community or area for the spread of the virus. The advisory also aptly highlighted how fear and anxiety caused by infectious disease outbreaks can lead to social isolation, stigma and marginalization of certain communities (54). Fear of COVID-19 begets prejudice. If the threat of the contagion can be eliminated, the mental responses associated with disease-related threats will follow suit.

The legal and administrative authorities have tried their best to contain the infection, maintain the regulations of lockdown and preserve public harmony (55). However, sometimes the perceived importance of comments related to religious content might need to be monitored, which can easily trigger human sentiments. Allaying the anxiety due to the pandemic itself can be a good starting point. Perhaps the low mortality rates of COVID-19, despite its highly infectious nature, could be highlighted. People's fears could also be reduced by reinforcing preventive measures that lower the risk of contracting COVID-19, such as repetitive hand washing, precautions when buying essentials, wearing of masks in a proper manner, continued social distancing, etc. Healthy hygiene habits will have to be incorporated into our new normal for a long time. This will lead to increased perceptions of protection from disease, thereby not only reducing prejudice toward people who are not legitimate carriers of disease, but also enhance well-being. Authentic sources of information from the official websites of the World Health Organization (WHO), Center for Disease Prevention and Control (CDC), Indian Council of Medical Research (ICMR) and the Ministry of Health and Family Welfare (MoHFw), Government of India (GOI) can be harnessed for awareness. Assessment and understanding of the sentiments at grass-root levels are necessary to prevent Islamophobia. Certain religious minorities might feel cornered in general, that gets amplified by crisis, which can be mitigated by promoting their social inclusion and integration (56). Social security and belongingness go a long way in assuring people and decreasing their agitation. The Indian Pandemic Act of 1897 needs a total overhaul, in the context of COVID-19 and legal provisions and penalties for any form of religious discrimination or fake news related to the same, especially during such disasters, need to be incorporated.

CONCLUSION

India is gradually pacing up in the rate of COVID-19 infection. As cases rise daily, the virus does not discriminate between social classes, race, ethnicity or religion. Every potential case and fatality are a concern for the nation's public health, all the more due to the disproportionate population compared to the available resources. It is ironic that civilization has always dealt with a disaster better in medical, than in social terms. Xenophobia increases individualism and hate in some, whereas perceived stigma, loneliness and polarization in others (57). Both, can lead to stress, add to the burden of psychological disorders and post-traumatic stress, for years to come. Once again, the authors would like to reiterate their neutral stance and lack of affiliation to any particular religious schools or ideologies. The pandemic will eventually be over, but the phobic attitudes toward certain religious communities might get strengthened. For any nation, especially India which has been declared secular by its Constitution, such Islamophobic sentiments can harm the community at a large, irrespective of class or religion (58). The Government has tried its best to preserve harmony and solidarity, especially during the ongoing and trying times. Understanding and appreciating the socio-cultural contexts of islamophobia through the psychological lens will only refine it for a more collectivistic approach, that is a necessity during a global threat such as COVID-19. Religions have co-existed and supported each other mutually for decades, and that has added to the remarkable resilience of the subcontinent against various other threats in past. Humanity is in this crisis together, and inter-group solidarity can foster positivism and hope, that can boost psychological well-being, as well as immunity. COVID-19 gives the nation yet another chance to dwell deep into the problem of Islamophobia and adopt options to mitigate it.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

AUTHOR CONTRIBUTIONS

All authors have contributed equally to the planning, conceptualizing, literature review, drafting, editing, read and approved the final version of the manuscript.

REFERENCES

1. Pfefferbaum B, North CS. Mental health and the Covid-19 pandemic. *N Engl J Med.* (2020) 83:510–12. doi: 10.1056/NEJMp2008017
2. Onyango M, Resnick K, Davis A, Shah R. Gender-based violence among adolescent girls and young women: a neglected consequence of the west african ebola outbreak. In: Schwartz D, Anoko J, Abramowitz S, editors. *Pregnant in the Time of Ebola: Women and Their Children in the 2013–2015 West African Epidemic. Global Maternal and Child Health Book Series*. Cham: Springer (2019). p. 121–32.
3. Kim HS, Sherman DK, Updegraff JA. Fear of ebola: the influence of collectivism on xenophobic threat responses. *Psychol Sci.* (2016) 27:935–44. doi: 10.1177/0956797616642596
4. Oliver-Smith A. Anthropological research on hazards and disasters. *Ann Rev Anthropol.* (1996) 25:303–28. doi: 10.1146/annurev.anthro.25.1.303
5. Lin CY. Social reaction toward the 2019 novel coronavirus (COVID-19). *Soc Health Behav.* (2020) 3:1. doi: 10.4103/SHB.SHB_11_20
6. Khandelwal K, Dhillon M, Kalyani A, Papneja D. The ultimate attribution error: does it transcend conflict? An investigation amongst Muslim adolescents in Kashmir and Delhi. *Psychol Stud.* (2014) 59:427–35. doi: 10.1007/s12646-014-0240-3
7. Allen C. *Islamophobia*. Farnham: Ashgate Publishing Ltd (2010).
8. Rana J. The story of Islamophobia. *Souls.* (2007) 9:148–61. doi: 10.1080/10999940701382607
9. Amnesty International. *Choice and Prejudice: Discrimination Against Muslims in Europe*. Amnesty International (2012). Available online at: https://www.amnesty.org/en/documents/EUR01/001/2012/en/ (accessed July 30, 2020)
10. Sirgy MJ, Kim MY, Joshanloo M, Bosnjak M. Is subjective ill-being related to Islamophobia in Germany? *J Happiness Stud.* (2019) 20:2655–75. doi: 10.1007/s10902-018-0063-3
11. Gordon S. The relationship between national well-being and xenophobia in a divided society: the case of South Africa. *Afr Rev Econ Finance.* (2015) 7:80–103.
12. Ahuja KK, Banerjee D, Chaudhary K, Gidwani C. Fear, xenophobia and collectivism as predictors of well-being during Coronavirus disease

2019: an empirical study from India. *Int J Soc Psychiatry*. (2020). doi: 10.1177/0020764020936323. [Epub ahead of print].
13. Varma PK. *Don't Polarise By Religion: Authorities Must Listen to the Secular and Inclusive Message Coming From Anti CAA-NRC Protesters.* (2020). Available online at: https://timesofindia.indiatimes.com/blogs/toi-edit-page/dont-polarise-by-religion-authorities-must-listen-to-the-secular-and-inclusive-message-coming-from-anti-caa-nrc-protesters/ (accessed January 04, 2020).
14. Nigam S. Many dimensions of shaheen bagh movement in India. *SSRN*. (2011). doi: 10.2139/ssrn.3543398. [Epub ahead of print].
15. Aaltola M. *Understanding the Politics of Pandemic Scares: An Introduction to Global Politosomatics*. Milton Park; Abingdon, VA: Routledge (2011).
16. Kapur R. *Covid-19 in India and Srilanka: New forms of Islamophobia [Blog Post]. Middle East Institute*. (2020). Available online at: https://www.mei.edu/publications/covid-19-india-and-sri-lanka-new-forms-islamophobia (accessed December 8, 2020).
17. Tazamal M. *COVID-19 is Exacerbating Islamophobia in India. Bridge Initiative*. (2020). Available online at: https://bridge.georgetown.edu/research/covid-19-is-exacerbating-islamophobia-in-india/ (accessed January 01, 2021).
18. Singh RP. *Do Not Buy Vegetables From Muslims, Deoria BJP MLA Kicks Up Row With Communal Remarks. India Today*. (2020). Available online at: https://www.indiatoday.in/india/story/do-not-buy-vegetables-from-muslims-deoria-bjp-mla-suresh-tiwari-1671961-2020-04-28 (accessed July 30, 2020).
19. PTI, Kanpur. *Tablighi Jamaat Members 'Misbehave' With Hospital Staff in Kanpur*. (2020). Available online at: https://www.indiatoday.in/india/story/tablighi-jamaat-members-misbehave-with-hospital-staff-in-kanpur-1663250-2020-04-04 (accessed July 30, 2020).
20. Perrigo B. *It Was Already Dangerous to Be Muslim in India. Then Came the Coronavirus. Time*'. (2020). Available online at: https://time.com/5815264/coronavirus-india-islamophobia-coronajihad/ (accessed 30 July 2020).
21. Iyer S, Chakravarty S. *Tablighi Jamaat: Impact of media narratives. Business Line*. (2020). Available online at: https://www.thehindubusinessline.com/opinion/tablighi-jamaat-impact-of-media-narratives/article32297022.ece (accessed January 01, 2021).
22. World Health Organization. *Coronavirus Disease 2019 (COVID-19): Situation Report*. (2020). Available online at: https://covid19.who.int (accessed December 10, 2020).
23. World Health Organization. *Mental Health and Psychosocial Considerations During the COVID-19 Outbreak*. World Health Organization (2020). Available online at: https://apps.who.int/iris/handle/10665/331490 (accessed July 30, 2020).
24. Nelkin D, Sander G. Placing blame for devastating disease. *Soc Res.* (1988) 55:361–78.
25. Dervin F. Cultural identity, representation and othering. In: Jackson J, editor. *The Routledge Handbook of Language and Intercultural Communication*. Florida: Routledge & CRC Press (2012).
26. Hays JN. *Epidemics and Pandemics: Their Impacts on Human History*. Santa Barbara, CA: Abc-clio (2005).
27. Guru G. The Indian nation in its egalitarian conception. In: Rawat RS, Satyanarayana K, editors. *Dalit Studies*. Durham, NC: Duke University Press (2016). p. 31–49.
28. Nandy A. *Time Warps: The Insistent Politics of Silent and Evasive Pasts*. London: Hurst (2002).
29. Nandy A. *Talking India: Ashis Nandy in Conversation with Ramin Jahanbegloo*. New Delhi: Oxford University Press (2006).
30. Oaten M, Stevenson RJ, Case TI. Disease avoidance as a functional basis for stigmatization. *Philos Trans R Soc Lond B Biol Sci.* (2011) 366:3433–3452. doi: 10.1098/rstb.2011.0095
31. Kurzban R, Leary MR. Evolutionary origins of stigmatization: the functions of social exclusion. *Psychol Bull.* (2001) 127:187–208. doi: 10.1037/0033-2909.127.2.187
32. Huang J, Sedlovskaya A, Ackerman J, Bargh J. Immunizing against prejudice: effects of disease protection on attitudes toward out-groups. *Psychol Sci.* (2011) 22:1550–6. doi: 10.1177/0956797611417261
33. Faulkner J, Schaller M, Park JH, Duncan LA. Evolved disease-avoidance mechanisms and contemporary xenophobic attitudes. *Group Process Intergroup Relat.* (2014) 7:333–53. doi: 10.1177/1368430204046142
34. Murray DR, Schaller M, Suedfeld P. Pathogens and politics: further evidence that parasite prevalence predicts authoritarianism. *PLoS ONE.* (2013) 8:e62275. doi: 10.1371/journal.pone.0062275
35. Fincher CL, Thornbill R, Murray SR, Schaller M. Pathogen prevalence predicts human cross-cultural variability in individualism/collectivism. *Biol Sci.* (2008) 275:1279–85. doi: 10.1098/rspb.2008.0094
36. Cashdan E, Steele M. Pathogen prevalence, group bias, and collectivism in the standard cross-cultural sample. *Hum Nat.* (2013) 24:59–75. doi: 10.1007/s12110-012-9159-3
37. Fabrega H Jr. Earliest phases in the evolution of sickness and healing. *Med Anthropol Q.* (1997) 11:26–55. doi: 10.1525/maq.1997.11.1.26
38. Greenberg J, Pyszczynski T, Solomon S. The causes and consequences of a need for self-esteem: a terror management theory. In: Baumeister RF, editor. *Public Self and Private Self.* New York, NY: Springer-Verlag (1986). p. 189–212.
39. Corrigan PW. Mental health stigma as social attribution: Implications for research methods and attitude change. *Clin Psychol.* (2000) 7:48–67. doi: 10.1093/clipsy.7.1.48
40. Garrett L. *The Coming Plague: Newly Emerging Diseases in a World out of Balance*. New York: Penguin (1995).
41. Barrett R, Brown PJ. Stigma in the time of influenza: social and institutional responses to pandemic emergencies. *J Infect Dis.* (2008) 197:S34–7. doi: 10.1086/524986
42. Singer PA, Benatar SR, Bernstein M, Daar AS, Dickens BM, MacRae SK, et al. Ethics and SARS: lessons from Toronto. *Br Med J.* (2003) 327:1342–4. doi: 10.1136/bmj.327.7427.1342
43. Jost JT, Glaser J, Kruglanski AW, Sulloway FJ. Political conservatism as motivated social cognition. *Psychol Bull.* (2003) 129:339–75. doi: 10.1037/0033-2909.129.3.339
44. Nail PR, McGregor I. Conservative shift among liberals and conservatives following 9/11/01. *Soc Justice Res.* (2009) 22:231–40. doi: 10.1007/s11211-009-0098-z
45. Beall AT, Hofer MK, Schaller M. Infections and elections: did an ebola outbreak influence the 2014 U.S. federal elections (and if so, how)? *Psychol Sci.* (2016) 27:595–605. doi: 10.1177/0956797616628861
46. Rosenfeld DL, Tomiyama AJ. Can a pandemic make people more socially conservative? Longitudinal evidence from COVID-19. *PsyArXiv [Preprint].* (2020). doi: 10.31234/osf.io/zg7s4
47. Wilson GD. A dynamic theory of conservatism. In: Wilson GD, editor. *The Psychology of Conservatism*. London: Academic Press (1973). p. 257–65.
48. Every D, Perry R. The relationship between perceived religious discrimination and self-esteem for muslim Australians. *Aust J Psychol.* (2014) 66:241–8. doi: 10.1111/ajpy.12067
49. Jasperse M, Colleen W, Jose PE. Identity, perceived religious discrimination, and psychological well-being in muslim immigrant women. *Appl Psychol.* (2012) 61:250–71. doi: 10.1111/j.1464-0597.2011.00467.x
50. Singhal T. A review of coronavirus disease-2019 (COVID-19). *Indian J Pediatr.* (2020) 87:281–86. doi: 10.1007/s12098-020-03263-6
51. Ghosal A, Saaliq S, Schmall, E. *Indian Muslims Face Stigma, Blame for Surge in Infections, ABC News*. (2020). Available online at: https://abcnews.go.com/Health/wireStory/islamophobia-large-cluster-affects-indias-virus-fight-70344026 (accessed December 7, 2020).
52. Cinelli M, Quattrociocchi W, Galeazzi A, Valensise CM, Brugnoli E, Schmidt AL, et al. The covid-19 social media infodemic. *Sci Rep.* (2020) 10:16598. doi: 10.1038/s41598-020-73510-5
53. Kadam AB, Atre SR. Social media panic and COVID-19 in India. *J Travel Med.* (2020) 27:taaa057. doi: 10.1093/jtm/taaa057
54. Ministry of Health and Family Welfare (MoHFw), Government of India. (2020). Available online at: https://www.mohfw.gov.in/pdf/AddressingSocialStigmaAssociatedwithCOVID19.pdfG (accessed December 10, 2020).
55. Tanne JH, Hayasaki E, Zastrow M, Pulla P, Smith P, Rada AG. Covid-19: how doctors and healthcare systems are tackling coronavirus worldwide. *BMJ.* (2020) 368:m1090. doi: 10.1136/bmj.m1090
56. Devakumar D, Shannon G, Bhopal SS, Abubakar I. Racism and discrimination in COVID-19 responses. *Lancet.* (2020) 395:1194. doi: 10.1016/S0140-6736(20)30792-3
57. Eaton G. *A History of Civilization in 50 Disasters (History in 50).* Maine, ME: Tilbury House Publishers and Cadent Publishing (2015).

58. Sayyid S, Vakil A. *Thinking Through Islamophobia: Global Perspectives*. London, UK: Hurst (2010).

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychiatry

POLICY AND PRACTICE REVIEWS
published: 27 January 2021
doi: 10.3389/fpsyt.2021.602614

Mental Health Consequences for Healthcare Workers During the COVID-19 Pandemic: A Scoping Review to Draw Lessons for LMICs

Modhurima Moitra[1,2], Muhammad Rahman[1], Pamela Y. Collins[1,3], Fatima Gohar[4], Marcia Weaver[1,2], John Kinuthia[1,5], Wulf Rössler[6], Stefan Petersen[7], Jurgen Unutzer[1,3], Shekhar Saxena[8], Keng Yen Huang[9], Joanna Lai[4] and Manasi Kumar[1,10,11]*

[1] Department of Global Health, University of Washington, Seattle, WA, United States, [2] Department of Health Metrics Sciences, University of Washington, Seattle, WA, United States, [3] Department of Psychiatry and Behavioral Sciences, University of Washington, Seattle, WA, United States, [4] United Nations International Children's Emergency Fund (UNICEF), New York City, NY, United States, [5] Kenyatta National Hospital, Nairobi, Kenya, [6] Department of Psychiatry, Psychotherapy and Psychosomatics, University Hospital of Psychiatry, University of Zurich, Zurich, Switzerland, [7] Department of Women's and Children's Health, Uppsala University, Uppsala, Sweden, [8] Department of Global Health and Population, Harvard T H Chan School of Public Health, Harvard University, MA, United States, [9] Department of Population Health & Child and Adolescent Psychiatry, New York University, New York City, NY, United States, [10] Department of Psychiatry, University of Nairobi, Nairobi, Kenya, [11] Department of Clinical, Educational and Health Psychology, University College London, London, United Kingdom

OPEN ACCESS

Edited by:
Umberto Volpe, Marche Polytechnic University, Italy

Reviewed by:
David Ayuku, Moi University, Kenya
Rahul Shidhaye, Pravara Institute of Medical Sciences, India

***Correspondence:**
Modhurima Moitra
moitra@uw.edu

Specialty section:
This article was submitted to Public Mental Health, a section of the journal Frontiers in Psychiatry

Received: *03 September 2020*
Accepted: *04 January 2021*
Published: *27 January 2021*

Citation:
Moitra M, Rahman M, Collins PY, Gohar F, Weaver M, Kinuthia J, Rössler W, Petersen S, Unutzer J, Saxena S, Huang KY, Lai J and Kumar M (2021) Mental Health Consequences for Healthcare Workers During the COVID-19 Pandemic: A Scoping Review to Draw Lessons for LMICs. Front. Psychiatry 12:602614. doi: 10.3389/fpsyt.2021.602614

Background: The COVID-19 pandemic has had a significant impact on the mental health of healthcare workers (HCWs) particularly in low and middle-income countries (LMICs). This scoping review provides a summary of current evidence on the mental health consequences of COVID on HCWs.

Methods: A scoping review was conducted searching PubMed and Embase for articles relevant to mental health conditions among HCWs during COVID-19. Relevant articles were screened and extracted to summarize key outcomes and findings.

Results: A total of fifty-one studies were included in this review. Depressive symptoms, anxiety symptoms, psychological trauma, insomnia and sleep quality, workplace burnout and fatigue, and distress were the main outcomes reviewed. Most studies found a high number of symptoms endorsed for depression, anxiety, and other conditions. We found differences in symptoms by sex, age, and HCW role, with female, younger-aged, frontline workers, and non-physician workers being affected more than other subgroups.

Conclusion: This review highlights the existing burden of mental health conditions reported by HCWs during COVID-19. It also demonstrates emerging disparities among affected HCW subgroups. This scoping review emphasizes the importance of generating high quality evidence and developing informed interventions for HCW mental health with a focus on LMICs.

Keywords: COVID-19, healthcare worker, mental health conditions, global health, depressive symptoms, anxiety symptoms, distress

INTRODUCTION

From January to August 2020, over 800,000 people have died due to the COVID-19 pandemic, and health departments confirmed more than 24 million cases worldwide (1). The high transmission rate of SARS-CoV-2 and the severity of illness associated with COVID-19 have severely strained healthcare systems globally. The media and researchers continue to monitor and report the availability of hospital space, equipment, and treatment supplies (2). Shortages of personal protective equipment (PPE) and ventilators have been widely discussed in the literature (3, 4). The World Health Organization (WHO) has also issued guidance around managing such shortages by recommending reasonable and appropriate usage of PPE (5).

An equally important issue is the severe threat to the well-being of healthcare workers (HCWs) during this pandemic. HCWs currently comprise the most critical sector of the workforce at the frontlines of testing and treatment for COVID-19 as well as covering other essential health services. They are at an unusually high risk of exposure to infection, and they are also at high risk of developing mental and behavioral disorders due to the high psychological toll of their intensive work in managing this highly infectious virus and grieving deaths of their colleagues (6, 7). Several studies and reviews have examined the psychological effects of the COVID-19 pandemic on HCWs (8, 9). HCWs experience symptoms of depression and anxiety, sleep problems, burnout, and general psychological distress (10–12). Understandably, at this stage in the pandemic existing studies show considerable variation in sampling methods and measurement of mental health outcomes. Nevertheless, emerging differences in mental disorder prevalence by sex and worker type may be of public health significance and warrant closer review (12).

Although HCWS across the world are currently overwhelmed by the demands of care for COVID-19 patients, the impact of the pandemic on the mental health of HCWs holds significance for low and middle-income countries (LMICS) in particular. Health systems in LMICs typically do not effectively incorporate continued care modalities for chronic conditions in comparison to high-income countries (HICs). Mental healthcare services for HCWs in particular are also far less accessible in LMICs than in HICs. The onset of COVID-19 has now resulted in a tremendous increase in demand for care in health systems that are already taxed with a higher burden of acute care compared to HICs. Adequate equipment and infrastructure to treat those with complex and intensive care needs are limited in supply. Therefore, LMICs have to navigate a complex trade-off—preventing transmission, managing existing cases, as well as keeping their health systems and economies on track. Given these challenges LMICs face, supporting the well-being of HCWs is essential to maximizing benefits to those who need their services in both the short and long term.

Given the rapidly evolving nature of the evidence, we provide an update of the current evidence base on HCW mental health in LMICs. We review evidence from all locations but use our findings to guide recommendations for LMICs. This scoping review aims to (a) summarize emerging themes and results from key quantitative and qualitative evidence published between December 2019 and June 2020 on the psychological consequences of COVID-19 on HCWs, and (b) use the updated evidence base to provide a set of broad recommendations for mental health support for HCWs in LMICs. Findings highlighted here may guide the implementation of workplace interventions in low-resourced healthcare settings and help policymakers and health ministries develop mitigation policies and programs supporting the mental health of HCWs.

METHODS

HCW Case Definition

For the purpose of this scoping review, we adhered to the Centers for Disease Control and Prevention (CDC) definition of HCWs which includes physicians, nurses, emergency medical personnel, dental professionals and students, medical and nursing students, laboratory technicians, pharmacists, hospital volunteers, and administrative staff (13).

Search Strategy

A scoping review was conducted using PubMed and Embase (Dec 2019–June 2020) to broadly search for studies relevant to mental health in the context of COVID-19. Details of the search strings are in the **Appendix**. Papers on mental health conditions among HCWs were then screened and selected for this review. According to out inclusion criteria, papers were included if they reported any quantitative or qualitative data on mental disorders or symptoms and other related conditions among healthcare workers such as psychological trauma, distress, and workplace burnout. According to our exclusion criteria, papers were excluded if they did not provide pertinent information on mental health outcomes among HCWs or were not relevant to mental health during COVID-19. Selected studies were screened and information on study characteristics and outcomes reported were extracted. Findings from our review were then summarized by study methodology, outcomes, and HCW group in the results section below. MM, MR, and MK screened studies. MM and MR extracted data from selected studies. Any questions around study eligibility were jointly discussed and resolved by MM, MR, and MK. MM summarized findings from the final list of studies. The PRISMA study selection flowchart is provided in **Figure 1**.

RESULTS

A total of 51 studies were selected for this review. **Table 1** shows the countries represented in these studies. A majority, 61% of selected studies, originated from China. Based on World Bank Income level classifications, 72.5% of the studies were from Low and Middle Income Countries (LMICs). The sample size of included studies ranged from 52 to 14825 with a median sample size of 548. Of the 39 studies that reported data on the distribution of HCWs by sex, the median proportion of female HCWs was 64%. However, more than half the sample comprised female HCWs in 79% of these studies. All HCWs (physicians, nurses, and other workers) were represented in 78% of studies. Approximately 6% of studies reported exclusively

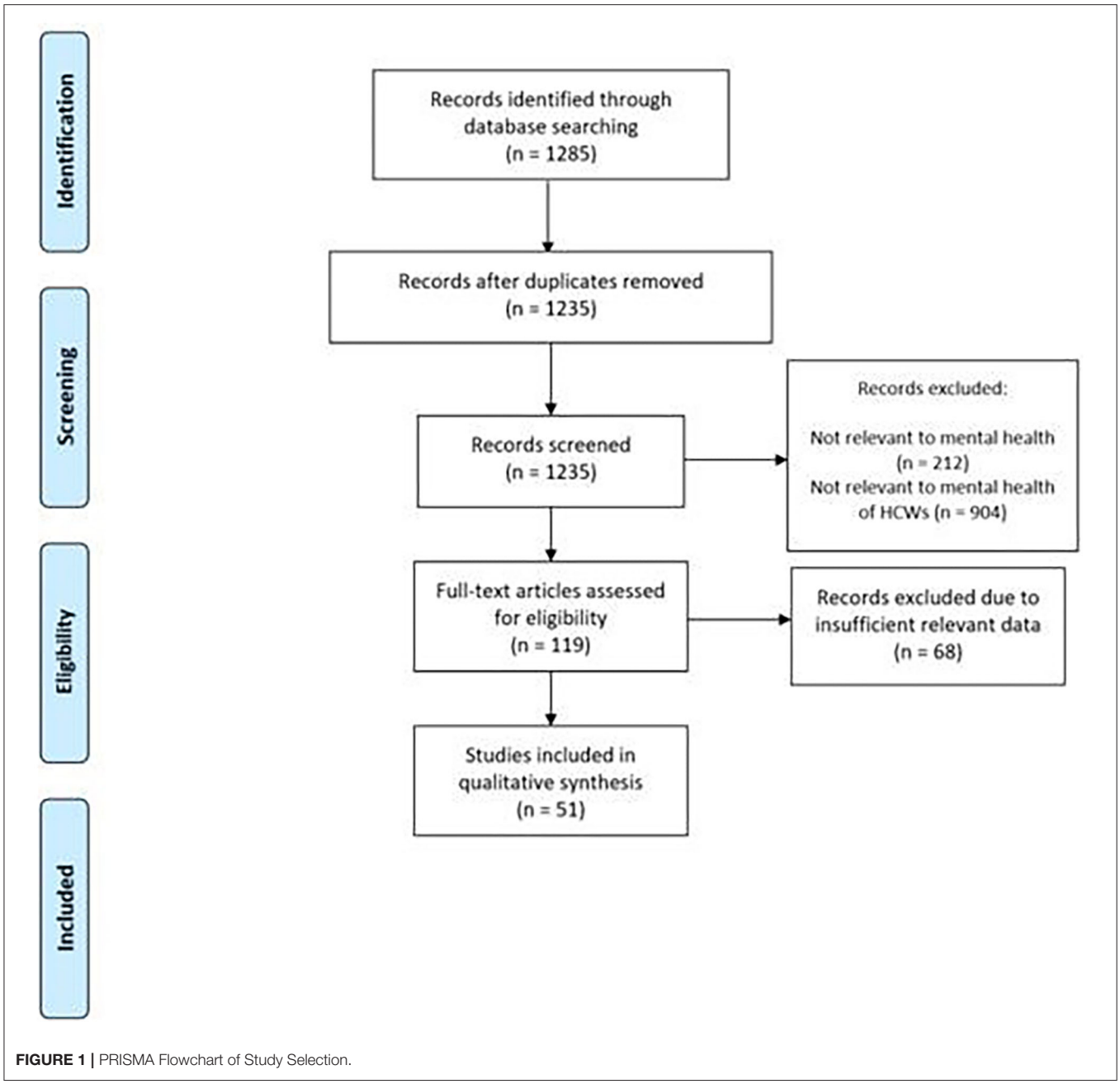


FIGURE 1 | PRISMA Flowchart of Study Selection.

on non-physician samples (example nurses, therapists) and 16% reported exclusively on physicians. Frontline or first-line medical workers (FMW), who typically are first responders to COVID-19 crises, are mentioned in the sample descriptions of nine studies.

The studies predominantly made use of a cross-sectional study design (88% of studies). Nearly all studies used a convenience sampling strategy and online data collection methods. Symptoms of anxiety (65% of studies), depression (57% of studies), and distress (37% of studies) were the most commonly studied conditions. The Patient Health Questionnaire (PHQ) (33% of studies) and the Generalized Anxiety Disorder Scale (GAD) (29% of studies) were the most commonly used instruments to measure symptoms of depression and anxiety, respectively.

Anxiety Symptoms

HCWs frequently reported symptoms of anxiety (14, 39, 47, 50, 57, 60). Anxiety was frequently associated with lowered sleep quality and insomnia and was common among those living with infants or elderly family members (32, 47, 58, 61). Severe anxiety was associated with being in direct treatment contact with COVID-19 and the lack of adequate personal protective equipment (PPE) (32, 36). Differences by age were also reported, with younger HCWs experiencing higher levels of

TABLE 1 | List of Selected Studies and Study Characteristics.

References	Country	World bank income level	Healthcare worker sample description	Mental health conditions/stressors included
Alhaj et al. (14)	Multi-country: Canada, the United States, Kuwait, Saudi Arabia, Serbia, and Italy	High income and upper middle income	Neurosurgery residents	Mental health, workplace stress (lack of social life)
Amerio et al. (15)	Italy	High income	General practitioners	Depressive symptoms, anxiety symptoms, insomnia, distress
Cai et al. (16)	China	Upper middle income	Healthcare workers who provided treatment during outbreak	Mental health
Chen et al. (17)	China	Upper middle income	Doctors and nurses	Depressive symptoms, anxiety symptoms, distress, insomnia
Chen et al. (18)	China	Upper middle income	Medical workers	Mental health
Chen et al. (19)	Taiwan	High income	Healthcare workers in a tertiary referral center	Mental health
Chowdhury et al. (20)	United Kingdom	High income	Physicians, nurses, and other professionals	Depressive symptoms, anxiety symptoms, distress, workplace burnout
Chung and Yeung (21)	China	Upper middle income	All healthcare workers	Depressive symptoms
Civantos et al. (22)	United States	High income	Otolaryngology physicians and residents	Depressive symptoms, anxiety symptoms, distress, workplace burnout
Dimitriu et al. (23)	Romania	High income	First-Line medical residents in emergency unit, ICU, radiology, general surgery, gynecology, and orthopedics	Workplace burnout
Du et al. (24)	China	Upper middle income	Frontline workers	Depressive symptoms, anxiety symptoms, distress, sleep quality
Fawaz and Samaha (25)	Lebanon	Upper middle income	Nurses and physicians caring for COVID patients	Anxiety symptoms (worry related to infection)
Feng et al. (26)	Taiwan	High income	Nurses	Anxiety symptoms (worry related to infection, caring for others, social isolation)
Fernandez et al. (27)	Spain	High income	Physicians, nurses, and other professionals	Anxiety symptoms, depressive symptoms, distress
Guo et al. (28)	China	Upper middle income	Physicians, nurses, medical students, medical assistants, administrative positions, frontline workers	Anxiety symptoms, depressive symptoms
Huang and Zhao (29)	China	Upper middle income	Doctors, nurses, and health administrators	Depressive symptoms, anxiety symptoms, and sleep quality
Huang et al. (30)	China	Upper middle income	First-Line medical staff	Anxiety symptoms, psychological trauma symptoms
Khanna et al. (31)	India	Lower middle income	Ophthamologists and ophthamology trainees	Depressive symptoms
Khusid et al. (32)	United States	High income	Urology residents	Anxiety symptoms, depressive symptoms
Lai et al. (33)	China	Upper middle income	Healthcare workers in fever clinics or COVID wards	Anxiety symptoms, depressive symptoms, distress, insomnia
Li et al. (34)	China	Upper middle income	First-Year training physicians	Anxiety symptoms, depressive symptoms, mood valence, workplace violence
Liang et al. (35)	China	Upper middle income	Doctors and nurses	Depressive symptoms, anxiety symptoms
Liu et al. (36)	China	Upper middle income	Medical staff	Anxiety symptoms

(Continued)

TABLE 1 | Continued

References	Country	World bank income level	Healthcare worker sample description	Mental health conditions/stressors included
Lu et al. (37)	China	Upper middle income	Doctors, nurses, and administrative staff	Anxiety symptoms, depressive symptoms
Morgantini et al. (38)	60 countries including Brazil, Sweden, Italy, and USA	Various including high and upper middle income	Healthcare professionals	Workplace burnout
Ni et al. (39)	China	Upper middle income	Community-based adults and healthcare professionals	Anxiety symptoms
Poddar et al. (40)	India	Lower middle income	Dermatologists and non-dermatologists (internists, pediatricians, otorhinolaryngologists, respiratory medicine specialists, psychiatrists, and general physicians)	Perceived stress
Qi et al. (41)	China	Upper middle income	Frontline medical workers	Depression and anxiety symptoms, insomnia, sleep quality
Liu et al. (42)	China	Upper middle income	Physicians and nurses	Anxiety symptoms, burnout
Ramaci et al. (43)	Italy	High income	Doctors and nurses	Workplace burnout and fatigue, self-worth, fear
Rossi et al. (44)	Italy	High income	Healthcare workers	Anxiety symptoms, depressive symptoms, distress, insomnia, psychological trauma
Salman et al. (45)	Pakistan	Lower middle income	Medical doctors, nurses, pharmacists	Anxiety symptoms, depressive symptoms, coping strategies
Shariati et al. (46)	Iran	Upper middle income	Psychiatric trainees	Distress
Sheng et al. (47)	China	Upper middle income	Nursing interns	Anxiety symptoms, depressive symptoms, sleep quality
Song et al. (48)	China	Upper middle income	Medical staff in emergency departments	Depressive symptoms, psychological trauma symptoms
Sun et al. (49)	China	Upper middle income	Nurses	Distress
Temsah et al. (50)	Saudi Arabia	High income	Physicians, interns, nurses, midwives, auxiliary services in acute care, general care, auxiliary services, outpatient clinics, and academic units	Anxiety symptoms
Tian et al. (51)	China	Upper middle income	Frontline health professionals	Anxiety symptoms, depressive symptoms, distress, insomnia severity
Wang et al. (52)	China	Upper middle income	Pediatric healthcare workers	Anxiety symptoms, depressive symptoms, sleep quality
Zhang et al. (53)	China	Upper middle income	Medical and non-medical healthcare workers	Anxiety symptoms, depressive symptoms, insomnia
Wu et al. (54)	China	Upper middle income	Medical staff and college students	Distress
Wu and Wei (55)	China	Upper middle income	Frontline medical staff	Anxiety symptoms, depressive symptoms, insomnia, mental health status
Xing et al. (56)	China	Upper middle income	Medical personnel	Medical personnel
Xu et al. (57)	China	Upper middle income	Surgical medical staff	Anxiety symptoms, depressive symptoms
Yang et al. (58)	South Korea	High income	Physical therapists	Anxiety symptoms, depressive symptoms
Yin et al. (59)	China	Upper middle income	Frontline healthcare workers	Sleep quality, psychological trauma symptoms

(Continued)

TABLE 1 | Continued

References	Country	World bank income level	Healthcare worker sample description	Mental health conditions/stressors included
Zhang et al. (60)	Iran	Upper middle income	Depressive symptoms, distress, anxiety symptoms, job satisfaction	Doctors, nurses, radiologists, technicians
Zhang et al. (61)	China	Upper middle income	Hospital staff	Anxiety symptoms, depressive symptoms, insomnia
Liu et al. (62)	China	Upper middle income	Doctors and nurses	Anxiety symptoms, depressive symptoms, distress
Zhou et al. (63)	China	Upper middle income	Frontline medical workers	Distress, mental health status, sleep quality
Zhu et al. (64)	China	Upper middle income	Doctors, nurses, and medical technicians	Anxiety symptoms. Depressive symptoms, distress

anxiety compared to older age groups (30, 44, 45). Differences between male and female HCWs were also found, with women experiencing more symptoms of anxiety compared to men (20, 22, 24, 30, 32, 44, 45, 64). Studies that examined mental health outcomes before and during the COVID-19 outbreak found a significant increase in reported anxiety symptoms in the outbreak period compared to the non-outbreak period (19, 34, 57).

Differences by HCW role: Differences in anxiety symptoms were also reported by HCW role and proximity to patients with COVID-19. In a study examining mental health conditions among physicians, nurses, and other professionals, nurses, and trainees reported higher anxiety than physicians (27). Similar findings are reported elsewhere with HCWs in non-physician roles such as nurses experiencing greater anxiety than those in physician roles (20, 29, 62, 64). Front-line medical workers who are typically required to respond to COVID-19 emergencies experience higher levels of anxiety compared to non-frontline HCWs (28, 51, 55). HCWs in patient care roles experience higher anxiety than those in non-patient care roles or administrative roles (37, 53). Similarly, those working in ICU wards reported greater anxiety compared to those who worked in isolation wards or other departments (45).

Depressive Symptoms

Symptoms of depression are highly prevalent among HCWs. Similar to anxiety symptoms, depressive symptoms were also associated with poor sleep quality and insomnia (47, 52, 61). Moderate to severe depressive symptoms were also linked to higher access to COVID information, lack of adequate PPE, and treating more COVID-19 patients (15). Studies that prospectively evaluated mental health outcomes found a significant increase in symptoms of depression in the outbreak period compared to the non-outbreak period (19, 34, 57).

Several studies showed that younger age was associated with a higher number of reported depressive symptoms (31, 35, 44, 45, 48). Female HCWs reported experiencing a higher severity of depressive symptoms than males in several studies that examined differences by sex (24, 31–33, 44, 45, 64) with the exception of one study that reported higher depressive symptom severity in male HCWs compared to female counterparts (20). A study of otolaryngology physicians found no sex differences in depressive symptoms among HCWs (22).

Reported depressive symptoms also differed by healthcare roles and level of professional experience. A prospective cohort of first-year trainee physicians in China reported significant increases in depressive symptom severity during the COVID-19 outbreak (34). Nurses and other HCWs in non-physician roles experienced greater depressive symptom severity compared to HCWs in physician roles (20, 27, 28, 33, 62, 64). Those in government health services reported more depressive symptoms compared to other sectors such as private practice or NGOs (31). Proximity to COVID-19 crises also affect depression severity (45). A study of frontline medical workers (FMWs) in China found that over 45% of FMWs experienced symptoms of depression (51). Several studies showed that FMWs reported greater depressive symptom severity when compared to non-FMWs (28, 33, 55). Similarly, HCWs in medical roles experience greater depression symptom severity than those in non-medical roles in healthcare (53).

Insomnia and Sleep Quality

Insomnia and poor sleep quality were commonly reported by HCWs alongside depression, anxiety and stress (15, 17, 33, 47, 59). Similar to depression and anxiety, there are differences that emerged by sex and occupational role. A study conducted among hospital staff in China between January and February 2020 showed that females reported higher rates of insomnia compared to males (61). The same study also found that nurses experienced greater insomnia severity (ascertained using the Insomnia Severity Index–which measures the severity and frequency of the sleep disorder insomnia) compared to doctors and other medical staff (61). Similar findings were also reported in a study of mental health outcomes among HCWs in Italy: nurses and healthcare assistants reported greater insomnia severity than physicians, general practitioners and other medical professions (44). Proximity to COVID-19 cases was also associated with poor sleep quality (ascertained using the Pittsburgh Sleep Quality Index–which measures recent deviances in usual sleeping habits) and insomnia. Frontline workers and medical HCWs

TABLE 2A | Mental health of HCWS during COVID-19: recommendations for research.

Recommendations for Research on COVID related consequences on HCWs and mitigation strategies
Better delineation of study samples–which worker roles are included or not and how those may impact study findings
Assess any reporting bias that may be due to data collection methods (e.g., online vs. in-person data collection)
Use of culturally informed screening instruments to assess mental health conditions
Addressing stigma-reduction on an urgent basis, intersectional nature of stigma, public health measures to educate populations about distress associated with increased stigma
Prospective assessment of samples to determine changes in duration and severity of symptoms
Continued examination of socioeconomic factors, including gender, race, and ethnic identity, that may affect mental health of HCWs
Continued examination of workplace factors that may influence the mental health of HCWs
Evaluation of intervention efficacy using appropriate measures based in evaluation science principles
Evaluation of policies and human resource management plans enacted to support HCWs and workplace mental health policy development and evaluation in LMICs and enhanced training, research and support to those working in humanitarian context

TABLE 2B | Mental health of HCWs during COVID-19: recommendations for policy and practice.

Recommendations for policy and practice
Addressing emerging disparities by worker role, age, sex, socioeconomic status, race, and ethnic identity; Policies focused on equity and more egalitarian workplace culture
Developing strategies to deal with protracted stress, grief, bereavement and using team science principles to improve organizational climate and leadership skills in managers and senior staff; routine assessment of stress, burn out and other mental health indicators and provision of timely, holistic support
Decision support system to help HCW address mental health and well-being of diverse at-risk populations and those with multimorbidity; inclusion of self-care modules to attend to their own stress and strains; especially enhanced support for the well-being and work performance of HCWs in humanitarian settings and those working directly with COVID-19 response and with key populations
Human rights-based and social justice services and training of HCWs who are embedded within ongoing emergency response
Development of brief, low intensity interventions addressing resilience, emergency preparedness and improved mental health outcomes, looking at short and long term mental health outcomes
Social and family needs of HCWs to be addressed at health systems level

experienced worse sleep quality and higher insomnia severity than non-frontline workers and non-medical HCWs (41, 53, 55).

Other Related Conditions (Distress, Psychological Trauma, and Burnout)

The studies in this review also reported additional outcomes such as distress, psychological trauma, and workplace burnout. High levels of workplace exhaustion and fatigue were prevalent (38, 42). Younger HCWs reported higher prevalence of symptoms of psychological trauma and distress compared to older HCWs (44, 48). Females, more than males, reported psychological trauma, burnout due to stressful work conditions, and distress (22, 29, 40, 59, 64) though one study reported greater psychological trauma symptoms among male HCWs (48). These sex differences also existed among physicians, with female physicians reporting higher burnout than their male counterparts (22, 43). Differences by HCW role were reported with nurses and healthcare assistants reporting greater distress than those in physician roles (44, 48). Nurses, trainees, and non-physicians reported also higher stress (20, 27, 59, 64). Among physician roles, resident physicians experienced greater burnout than attending physicians and physicians in branches of general surgery, gynecology, and orthopedics also reported higher burnout (22, 23). In terms of work duration, permanent workers reported greater burnout and fatigue compared to temporary workers (43).

DISCUSSION

Our findings highlight the high prevalence frequency of anxiety, depressive symptoms, insomnia, burnout, and distress that HCWs have experienced during the COVID-19 pandemic and are consistent with existing reviews (12, 65–70). Reviews published on this topic either cover shorter timeframes compared to this current review or report on studies only from China. Meta-analytic approaches used by some reviews may be subject to important methodological limitations. For instance, an earlier meta-analysis by Pappa et al. synthesized results from 13 studies to provide prevalence estimates of depression, anxiety, and insomnia (12). However, the paper also highlights limited data availability and important methodological sources of variation that contribute to between-study heterogeneity. Similar concerns around the lack of validated mental health outcome measures and appropriate comparisons to pre-outbreak time periods are also cited by Thombs et al. (71).

Our current review includes 51 studies with substantial variation in methodology and results reported which precluded the use of a meta-analytic approach and made a narrative review of results most suitable for this work. These studies employed a variety of instruments and used different cutoff thresholds to assess severity. Notably, the magnitude and severity of reported mental health outcomes may vary based on the validity and sensitivity of the measurement tools. The selection criteria of HCW samples also varied between studies, and HCWs' degree of exposure to patients with COVID-19 care also differed. It is likely that the degree of proximity to COVID-19 treatment may determine the extent to which HCWs experience grief, fear, anxiety, or concerns about their personal safety.

Some limitations are important to note. First, our search was conducted from December 2019 to June 2020 which covers ∼7 months of the COVID-19 pandemic. Given the rapidly evolving literature in this area at present, it is possible that new studies may have been indexed later that we were unable to include in

this review. Second, the timeline for this rapid review allowed for the search of only two electronic databases. Finally, there were very few studies from lower-middle income countries that could be used in our report indicating a need for more studies from these locations to improve the quality of available evidence.

Despite the methodological variation present in the studies reviewed, there are important themes that are predominant in the evidence thus far. Significant differential patterns by age, sex, and HCW role have emerged. Younger, female, non-physician HCWS, and frontline workers appear to be more vulnerable to poor mental health as seen in several studies reported above. Workplace burnout is also highly prevalent among these subgroups and is important to study further as it co-occurs with other mental health conditions such as depression (72). These differences based on demographics and work role are also observed in earlier reviews (12). It is important to note that the majority of non-physician HCWs are typically female, and it will be useful to disentangle the effects of sex and HCW role in future work. In our review, only 9 studies reported inclusion of frontline workers in their samples and 3 studies sampled non-physicians exclusively. Therefore, gaining a more comprehensive understanding of mental health in these subgroups will require additional studies. Nonetheless, such differences as seen in our review and elsewhere are likely to have varying consequences for HCWs in the larger context of workplace equity during major global health crises.

Support of HCW mental health in LMICs must be tailored from the perspective of these differences that could be potential harbingers of emerging disparities. These could likely place specific HCW subgroups (female HCWs, younger HCWs, non-physician workers) at a disproportionately higher risk for developing mental disorders. LMICs are known to experience challenges in investment in healthcare resources including inadequate personnel. Adaptations in healthcare delivery models such as repurposing of health facilities, task shifting without competency based trainings and supportive supervision, and redeployment from different departments to accommodate high patient volumes will inevitably place a greater burden on already vulnerable HCW subgroups. In addition to the burden of these stressors, HCWs are also likely to face economic changes such as exacerbated poverty and inequality that are projected to take place in LMICs due to the pandemic (73). Therefore, these have important implications for future research and intervention development. International institutes have developed guidelines to address mental health burden of HCWs. The United Nations and WHO published guidelines and recommendations on mitigating the mental health impact of COVID-19 on HCWs (74, 75). The National Academy of Medicine has also published strategies to support mental health of HCWs and clinicians during COVID-19 (76). In the context of the evidence presented above and by these major organizations, some general guidelines and recommendations are provided below in **Tables 2A**, **B**. These are aimed at improving both the generation of high quality evidence through research as well as intervention strategies to implement in practice for the support of HCWs' mental health in LMICs.

CONCLUSION

HCWs experience considerable adverse mental health outcomes in the context of COVID-19. Findings summarized in this review can inform approaches to monitoring and data collection for mental health outcomes among HCWs in LMICs. These findings can aid the tailoring of interventions and support strategies implemented at the institutional and national levels to mitigate and manage mental health conditions among HCWs in LMICs with a specific focus on vulnerable HCW subgroups.

AUTHOR CONTRIBUTIONS

MM, MR, and MK searched and screened studies. MM and MK extracted data from selected studies. MM wrote first draft of manuscript. All authors reviewed and edited manuscript.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyt.2021.602614/full#supplementary-material

REFERENCES

1. Dong E, Du H, Gardner L. An interactive web-based dashboard to track COVID-19 in real time. *Lancet Infect Dis.* (2020) 20:533–4. doi: 10.1016/S1473-3099(20)30120-1
2. COVID I, Murray CJ. Forecasting COVID-19 impact on hospital bed-days, ICU-days, ventilator-days and deaths by US state in the next 4 months. *MedRxiv.* (2020).
3. Ranney ML, Griffeth V, Jha AK. Critical supply shortages—the need for ventilators and personal protective equipment during the Covid-19 pandemic. *N Engl J Med.* (2020) 382:e41. doi: 10.1056/NEJMp2006141
4. Lancet T. COVID-19: protecting health-care workers. *Lancet.* (2020) 395:922. doi: 10.1016/S0140-6736(20)30644-9
5. World Health Organization. *Rational Use of Personal Protective Equipment (PPE) for Coronavirus Disease (COVID-19): Interim Guidance, 19 March 2020.* Geneva: World Health Organization (2020).
6. Xiao J, Fang M, Chen Q, He B. SARS, MERS and COVID-19 among healthcare workers: a narrative review. *J Infect Public Health.* (2020). 13:843–8. doi: 10.1016/j.jiph.2020.05.019
7. Danielle Renwick SD. *Exclusive: Over 900 Health Workers Have Died of COVID-19. And the Toll Is Rising.* Kaiser Health News. (2020). Retrieved from: https://khn.org/news/exclusive-over-900-health-workers-have-died-of-covid-19-and-the-toll-is-rising/
8. Greenberg N. Mental health of health-care workers in the COVID-19 era. *Nat Rev Nephrol.* (2020). 16:425–6. doi: 10.1001/jamahealthforum.2020.0397
9. Gold JA. Covid-19: adverse mental health outcomes for healthcare workers. *BMJ.* 369:m1815. doi: 10.1136/bmj.m1815
10. Greenberg N, Docherty M, Gnanapragasam S, Wessely S. Managing mental health challenges faced by healthcare workers during covid-19 pandemic. *BMJ.* (2020) 368:m1211. doi: 10.1136/bmj.m1211

11. Park JS, Lee EH, Park NR, Choi YH. Mental health of nurses working at a government-designated hospital during a MERS-CoV outbreak: a cross-sectional study. *Arch Psychiatr Nurs.* (2018) 32:2–6. doi: 10.1016/j.apnu.2017.09.006
12. Pappa S, Ntella V, Giannakas T, Giannakoulis VG, Papoutsi E, Katsaounou P. Prevalence of depression, anxiety, and insomnia among healthcare workers during the COVID-19 pandemic: a systematic review and meta-analysis. *Brain Behav Immun.* (2020). 88:901–7. doi: 10.2139/ssrn.3594632
13. CDC. *National Center for Immunization and Respiratory Diseases.* CDC (2020)Available online at: https://www.cdc.gov/vaccines/adults/rec-vac/hcw.html
14. Alhaj AK, Al-Saadi T, Mohammad F, Alabri S. Neurosurgery residents perspective on the COVID-19: knowledge, readiness, and impact of this pandemic. *World Neurosurg.* (2020) 139:e848–58. doi: 10.1016/j.wneu.2020.05.087
15. Amerio A, Bianchi D, Santi F, Costantini L, Odone A, Signorelli C, et al. Covid-19 pandemic impact on mental health: a web-based cross-sectional survey on a sample of Italian general practitioners. *Acta Biomed.* (2020) 91:83–8. doi: 10.23750/abm.v91i2.9619
16. Cai W, Lian B, Song X, Hou T, Deng G, Li H. A cross-sectional study on mental health among health care workers during the outbreak of corona virus disease 2019. *Asian J Psychiatry.* (2020) 51:102111. doi: 10.1016/j.ajp.2020.102111
17. Chen Q, Liang M, Li Y, Guo J, Fei D, Wang L, et al. Mental health care for medical staff in China during the COVID-19 outbreak. *Lancet Psychiatry.* (2020) 7:e15–6. doi: 10.1016/S2215-0366(20)30078-X
18. Chen Y, Jin YL, Zhu LJ, Fang ZM, Wu N, Du MX, et al. The network investigation on knowledge, attitude and practice about Novel coronavirus pneumonia of the residents in Anhui Province. *Zhonghua Yu Fang Yi Xue Za Zhi.* (2020) 54:E004. doi: 10.3760/cma.j.issn.0253-9624.2020.0004
19. Chen NH, Wang PC, Hsieh MJ, Huang CC, Kao KC, Chen YH, et al. Impact of severe acute respiratory syndrome care on the general health status of healthcare workers in Taiwan. *Infect Control Hosp Epidemiol.* (2007) 28:75–9. doi: 10.1086/508824
20. Choudhury T, Debski M, Wiper A, Abdelrahman A, Wild S, Chalil S, et al. Covid-19 pandemic: looking after the mental health of our healthcare workers. *J Occup Environ Med.* (2020) 62:e373–6. doi: 10.1097/JOM.0000000000001907
21. Chung JP, Yeung WS. Staff mental health self-assessment during the COVID-19 outbreak. *East Asian Arch Psychiatry.* (2020) 30:34. doi: 10.12809/eaap2014
22. Civantos AM, Byrnes Y, Chang C, Prasad A, Chorath K, Poonia SK, et al. Mental health among otolaryngology resident and attending physicians during the COVID-19 pandemic: national study. *Head Neck.* (2020) 42:1597–1609. doi: 10.1002/hed.26292
23. Dimitriu MC, Pantea-Stoian A, Smaranda AC, Nica AA, Carap AC, Constantin VD, et al. Burnout syndrome in romanian medical residents in time of the COVID-19 pandemic. *Med Hypothes.* (2020) 144:109972. doi: 10.1016/j.mehy.2020.109972
24. Du J, Dong L, Wang T, Yuan C, Fu R, Zhang L, et al. Psychological symptoms among frontline healthcare workers during COVID-19 outbreak in Wuhan. *Gen Hosp Psychiatry.* (2020) 67:144–5. doi: 10.1016/j.genhosppsych.2020.03.011
25. Fawaz M, Samaha A. The psychosocial effects of being quarantined following exposure to COVID-19: a qualitative study of Lebanese health care workers. *Int J Sock Psychiatry.* (2020) 66:560–5. doi: 10.1177/0020764020932202
26. Feng MC, Wu HC, Lin HT, Lei L, Chao CL, Lu CM, et al. Exploring the stress, psychological distress, and stress-relief strategies of Taiwan nursing staffs facing the global outbreak of COVID-19. *Hu Li Za Zhi.* (2020) 67:64–74. doi: 10.6224/JN.202006_67(3).09
27. García-Fernández L, Romero-Ferreiro V, López-Roldán PD, Padilla S, Calero-Sierra I, Monzó-García M, et al. Mental health impact of COVID-19 pandemic on Spanish healthcare workers. *Psychol Med.* (2020) 1–3. doi: 10.1017/S0033291720002019
28. Guo J, Liao L, Wang B, Li X, Guo L, Tong Z, et al. Psychological effects of COVID-19 on hospital staff: a national cross-sectional survey of China mainland. *Preprints Lancet.* (2020). doi: 10.2139/ssrn.3550050
29. Huang Y, Zhao N. Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. *Psychiatry Res.* (2020) 288:112954. doi: 10.1016/j.psychres.2020.112954
30. Huang JZ, Han MF, Luo TD, Ren AK, Zhou XP. Mental health survey of 230 medical staff in a tertiary infectious disease hospital for COVID-19. *Zhonghua Lao Dong Wei Sheng Zhi Ye Bing Za Zhi.* (2020) 38:192–5. doi: 10.3760/cma.j.cn121094-20200219-00063
31. Khanna RC, Honavar SG, Metla AL, Bhattacharya A, Maulik PK. Psychological impact of COVID-19 on ophthalmologists-in-training and practising ophthalmologists in India. *Indian J Ophthalmol.* (2020) 68:994–8. doi: 10.4103/ijo.IJO_1458_20
32. Khusid JA, Weinstein CS, Becerra AZ, Kashani M, Robins DJ, Fink LE, et al. Well-being and education of urology residents during the COVID-19 pandemic: results of an American national survey. *Int J Clin Pract.* (2020). 74:1–8. doi: 10.22541/au.158981507.73370840
33. Lai J, Ma S, Wang Y, Cai Z, Hu J, Wei N, et al. Factors associated with mental health outcomes among health care workers exposed to coronavirus disease (2019). *JAMA Netw Open.* (2020) 3:e203976. doi: 10.1001/jamanetworkopen.2020.3976
34. Li W, Frank E, Zhao Z, Chen L, Wang Z, Burmeister M, et al. Mental health of young physicians in china during the novel coronavirus disease 2019 outbreak. *JAMA Network Open.* (2020) 3:e2010705. doi: 10.1001/jamanetworkopen.2020.10705
35. Liang Y, Chen M, Zheng X, Liu J. Screening for Chinese medical staff mental health by SDS and SAS during the outbreak of COVID-19. *J Psychosom Res.* (2020) 133:110102. doi: 10.1016/j.jpsychores.2020.110102
36. Liu CY, Yang YZ, Zhang XM, Xu X, Dou QL, Zhang WW, et al. The prevalence and influencing factors in anxiety in medical workers fighting COVID-19 in China: a cross-sectional survey. *Epidemiology Infect.* (2020) 148:e98. doi: 10.1017/S0950268820001107
37. Lu W, Wang H, Lin Y, Li L. Psychological status of medical workforce during the COVID-19 pandemic: a cross-sectional study. *Psychiatry Res.* (2020) 288:112936. doi: 10.1016/j.psychres.2020.112936
38. Morgantini LA, Naha U, Wang H, Francavilla S, Acar Ö, Flores JM, et al. Factors contributing to healthcare professional burnout during the COVID-19 pandemic: a rapid turnaround global survey. *medRxiv.* (2020). doi: 10.1101/2020.05.17.20101915
39. Ni MY, Yang L, Leung CM, Li N, Yao XI, Wang Y, et al. Mental health, risk factors, and social media use during the COVID-19 epidemic and cordon sanitaire among the community and health professionals in Wuhan, China: cross-sectional survey. *JMIR Ment Health.* (2020) 7:e19009. doi: 10.2196/19009
40. Podder I, Agarwal K, Datta S. Comparative analysis of perceived stress in dermatologists and other physicians during home-quarantine and COVID-19 pandemic with exploration of possible risk factors-A web-based cross-sectional study from Eastern India. *Dermatol Ther.* (2020). 33:1–7. doi: 10.1111/dth.13788
41. Qi J, Xu J, Li BZ, Huang JS, Yang Y, Zhang ZT, et al. The evaluation of sleep disturbances for Chinese frontline medical workers under the outbreak of COVID-19. *Sleep Med.* (2020). 72:1–4. doi: 10.1101/2020.03.06.20031278
42. Liu Q, Luo D, Haase JE, Guo Q, Wang XQ, Liu S, et al. The experiences of health-care providers during the COVID-19 crisis in China: a qualitative study. *Lancet Global Health.* (2020) 8:e790–8. doi: 10.1016/S2214-109X(20)30204-7
43. Ramaci T, Barattucci M, Ledda C, Rapisarda V. Social stigma during COVID-19 and its impact on HCWs outcomes. *Sustainability.* (2020) 12:3834. doi: 10.3390/su12093834
44. Rossi R, Socci V, Pacitti F, Di Lorenzo G, Di Marco A, Siracusano A, et al. Mental health outcomes among frontline and second-line health care workers during the coronavirus disease 2019 (COVID-19) Pandemic in Italy. *JAMA Netw Open.* (2020) 3:e2010185. doi: 10.1001/jamanetworkopen.2020.10185
45. Salman M, Raza MH, Mustafa ZU, Khan TM, Asif N, Tahir H, et al. The psychological effects of COVID-19 on frontline healthcare workers and how they are coping: a web-based, cross-sectional study from Pakistan. *medRxiv.* (2020). doi: 10.1101/2020.06.03.20119867
46. Shariati B, Ardebili ME, Shalbafan M. Working in the emergency and inpatient COVID-19 special wards: a different experience for Iranian psychiatric trainees amid the outbreak. *Asian J Psychiatry.* (2020) 51:102157. doi: 10.1016/j.ajp.2020.102157

47. Sheng X, Liu F, Zhou J, Liao R. Psychological status and sleep quality of nursing interns during the outbreak of COVID-19. *Nan Fang Yi Ke Da Xue Xue Bao.* (2020) 40:346–50. doi: 10.12122/j.issn.1673-4254.2020.03.09
48. Song X, Fu W, Liu X, Luo Z, Wang R, Zhou N, et al. Mental health status of medical staff in emergency departments during the coronavirus disease 2019 epidemic in China. *Brain Behav Immun.* (2020) 88:60–5. doi: 10.1016/j.bbi.2020.06.002
49. Sun N, Wei L, Shi S, Jiao D, Song R, Ma L, et al. A qualitative study on the psychological experience of caregivers of COVID-19 patients. *Am J Infect Contr.* (2020) 48:592–8. doi: 10.1016/j.ajic.2020.03.018
50. Temsah MH, Al-Sohime F, Alamro N, Al-Eyadhy A, Al-Hasan K, Jamal A, et al. The psychological impact of COVID-19 pandemic on health care workers in a MERS-CoV endemic country. *J Infect Public Health.* (2020) 13:877–82. doi: 10.1016/j.jiph.2020.05.021
51. Tian T, Meng F, Pan W, Zhang S, Cheung T, Ng CH, et al. Mental health burden of frontline health professionals treating imported patients with COVID-19 in China during the pandemic. *Psychol Med.* (2020) 1–2. doi: 10.1017/S0033291720002093
52. Wang S, Xie L, Xu Y, Yu S, Yao B, Xiang D. Sleep disturbances among medical workers during the outbreak of COVID-2019. *Occup Med.* (2020) 70:364–9. doi: 10.1093/occmed/kqaa074
53. Zhang WR, Wang K, Yin L, Zhao WF, Xue Q, Peng M, et al. Mental health and psychosocial problems of medical health workers during the COVID-19 epidemic in China. *Psychother Psychosom.* (2020) 89:242–50. doi: 10.1159/000507639
54. Wu W, Zhang Y, Wang P, Zhang L, Wang G, Lei G, et al. Psychological stress of medical staffs during outbreak of COVID-19 and adjustment strategy. *J Med Virol.* (2020) 92:1962–70. doi: 10.1002/jmv.25914
55. Wu K, Wei X. Analysis of psychological and sleep status and exercise rehabilitation of front-line clinical staff in the fight against COVID-19 in China. *Med Sic Monit Basic Res.* (2020) 26:e924085. doi: 10.12659/MSMBR.924085
56. Xing J, Sun N, Xu J, Geng S, Li Y. Study of the mental health status of medical personnel dealing with new coronavirus pneumonia. *PloS ONE.* (2020) 15:e0233145. doi: 10.1371/journal.pone.0233145
57. Xu J, Xu QH, Wang CM, Wang J. Psychological status of surgical staff during the COVID-19 outbreak. *Psychiatry Res.* (2020) 288:112955. doi: 10.1016/j.psychres.2020.112955
58. Yang S, Kwak SG, Ko EJ, Chang MC. The mental health burden of the COVID-19 pandemic on physical therapists. *Int J Environ Res Public Health.* (2020) 17:3723. doi: 10.3390/ijerph17103723
59. Yin Q, Sun Z, Liu T, Ni X, Deng X, Jia Y, et al. Posttraumatic stress symptoms of health care workers during the corona virus disease 2019 (COVID-19). *Clin Psychol Psychother.* (2020) 27:384–95. doi: 10.1002/cpp.2477
60. Zhang SX, Liu J, Jahanshahi AA, Nawaser K, Yousefi A, Li J, et al. At the height of the storm: healthcare staff's health conditions and job satisfaction and their associated predictors during the epidemic peak of COVID-19. *Brain Behav Immun.* (2020) 87:144–6. doi: 10.1016/j.bbi.2020.05.010
61. Zhang C, Yang L, Liu S, Ma S, Wang Y, Cai Z, et al. Survey of insomnia and related social psychological factors among medical staff involved in the 2019 novel coronavirus disease outbreak. *Front Psychiatry.* (2020) 11:306. doi: 10.3389/fpsyt.2020.00306
62. Liu Z, Han B, Jiang R, Huang Y, Ma C, Wen J, et al. Mental health status of doctors and nurses during COVID-19 epidemic in China. *MedRxiv.* (2020). doi: 10.2139/ssrn.3551329
63. Zhou Y, Zhou Y, Song Y, Ren L, Ng CH, Xiang YT, et al. Tackling the mental health burden of frontline healthcare staff in the COVID-19 pandemic: China's experiences. *Psychol Med.* (2020) 1–5. doi: 10.1017/S0033291720001622
64. Zhu Z, Xu S, Wang H, Liu Z, Wu J, Li G, et al. COVID-19 in Wuhan: immediate psychological impact on 5062 health workers. *MedRxiv.* (2020). doi: 10.1101/2020.02.20.20025338
65. Spoorthy MS, Pratapa SK, Mahant S. Mental health problems faced by healthcare workers due to the COVID-19 pandemic–a review. *Asian J Psychiatry.* (2020) 51:102119. doi: 10.1016/j.ajp.2020.102119
66. Rajkumar RP. COVID-19 and mental health: a review of the existing literature. *Asian J Psychiatry.* (2020) 52:102066. doi: 10.1016/j.ajp.2020.102066
67. Bohlken J, Schömig F, Lemke MR, Pumberger M, Riedel-Heller SG. COVID-19 pandemic: stress experience of healthcare workers-a short current review. *Psychiatr Praxis.* (2020) 47:190–7. doi: 10.1055/a-1159-5551
68. de Pablo GS, Serrano JV, Catalan A, Arango C, Moreno C, Ferre F, et al. Impact of coronavirus syndromes on physical and mental health of health care workers: Systematic review and meta-analysis. *J Affect Disord.* (2020) 275:48–57. doi: 10.1016/j.jad.2020.06.022
69. da Silva FC, Neto ML. Psychiatric symptomatology associated with depression, anxiety, distress, and insomnia in health professionals working in patients affected by COVID-19: A systematic review with meta-analysis. *Prog Neuro Psychopharmacol Biol Psychiatry.* (2020) 104:110057. doi: 10.1016/j.pnpbp.2020.110057
70. Paiano M, Jaques AE, Nacamura PA, Salci MA, Radovanovic CA, Carreira L. Mental health of healthcare professionals in China during the new coronavirus pandemic: an integrative review. *Rev Brasil de Enfermagem.* (2020) 73:e20200338. doi: 10.1590/0034-7167-2020-0338
71. Thombs BD, Bonardi O, Rice DB, Boruff JT, Azar M, He C, et al. Curating evidence on mental health during COVID-19: a living systematic review. *J Psychosom Res.* (2020). 133:1–3. doi: 10.1016/j.jpsychores.2020.110113
72. Matsuo T, Kobayashi D, Taki F, Sakamoto F, Uehara Y, Mori N, et al. Prevalence of health care worker burnout during the coronavirus disease 2019 (COVID-19) pandemic in Japan. *JAMA Network Open.* (2020) 3:e2017271. doi: 10.1001/jamanetworkopen.2020.17271
73. Manasi Kumar PK. (2020). *Impact of Pandemic on Mental Health in Lower-and-Middle Income Countries (LMICs).* Cambridge University Press
74. United States. *United Nations Policy Brief: COVID-19 and the Need for Action on Mental Health.* United Nations (2020).
75. World Health Organization. *Mental health and psychosocial considerations during the COVID-19 outbreak, 18 March 2020.* World Health Organization (2020).
76. National Academy of Medicine. *Clinician Wellbeing Resources during COVID-19.* National Academy of Medicine (2020). Available online at: https://nam.edu/initiatives/clinician-resilience-and-well-being/clinician-well-being-resources-during-covid-19/ (accessed December 26, 2020).

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Public Health

METHODS
published: 04 February 2021
doi: 10.3389/fpubh.2020.590002

Identification and Management of COVID-19 Related Child and Adolescent Mental Health Problems: A Multi-Tier Intervention Model

Gunjan Dhonju, Arun Raj Kunwar, Utkarsh Karki, Narmada Devkota, Isha Bista and Rampukar Sah*

Child and Adolescent Psychiatry Unit, Kanti Children's Hospital, Kathmandu, Nepal

Nepal is a low and medium-income country (LMIC), situated in South-east Asia, with a population of 29 million, of which, 40–50% are children and adolescents. The Coronavirus Disease 2019 (COVID-19) pandemic has affected the lives of people around the world, including Nepal. The child and adolescent mental health (CAMH) needs and services in Nepal have a significant gap. CAMH in Nepal suffers from lack of specialized training in this field as well as scarcity of human resources and services. There is only one full-time child and adolescent psychiatry (CAP) out-patient clinic in the country. Some recent activities have focused on CAMH in Nepal but the COVID-19 pandemic has produced new challenges. Access to mental health services for children and adolescents (C&A) across Nepal has been adversely affected. Factors such as closure of schools, confinement at home, lockdown, transportation problems, uncertainty, loss of usual routine and fear of infection have affected the mental health of C&A. This has highlighted a need to build capacity of available local human resources, enhance community support, teach measures of coping with stress and improve CAMH service delivery by strengthening the referral system, but these have to be addressed overcoming problems of travel restrictions and limited resources. To address these needs, online platform can be a suitable approach. With this view, a multi-tier CAMH intervention model was developed, which utilizes online platform for training mental health professionals across Nepal, who would then facilitate sessions for C&A, teachers, parents and caregivers; and link them to CAMH services locally, and remotely through teleconsultation. This started as a pilot from June 2020 and will continue till end of February 2021, with the aim to reach 40,000 C&A, parents, teachers and caregivers. As of Nov 2020, this model has been used to successfully conduct 1,415 sessions, with 28,597 population reached. Among them, 16,571 are C&A and 12,026 are parents, teachers and caregivers, across all 7 provinces of Nepal. In this paper, the multi-tier intervention to address the COVID-19 related CAMH problems has been discussed as a feasible framework for resource limited settings and LMICs like Nepal.

Keywords: COVID-19, capacity building, system level intervention, child and adolescent mental health, teleconsultation

OPEN ACCESS

Edited by:
Joanna Lai,
UNICEF United Nations International Children's Emergency Fund, United States

Reviewed by:
Sarah Forthal,
Columbia-WHO Center for Global Mental Health, United States
Sarah Watts,
World Health Organization, Switzerland

****Correspondence:***
Gunjan Dhonju
gunjanb2@gmail.com

Specialty section:
This article was submitted to Public Mental Health, a section of the journal Frontiers in Public Health

Received: *31 July 2020*
Accepted: *07 December 2020*
Published: *04 February 2021*

Citation:
Dhonju G, Kunwar AR, Karki U, Devkota N, Bista I and Sah R (2021) Identification and Management of COVID-19 Related Child and Adolescent Mental Health Problems: A Multi-Tier Intervention Model. Front. Public Health 8:590002. doi: 10.3389/fpubh.2020.590002

INTRODUCTION

Nepal is one of the low and middle-income countries (LMICs), situated in South-east Asia, between India and China, with a population of around 29 million. Children and adolescents (C&A) make up 40–50% of Nepal's population, 87% of which live in rural settings (1). With <5% of the national budget spent on health, and only 1% of the national health budget allocated to mental health, investment in child and adolescent mental health (CAMH) remains scarce in Nepal (2). The country's C&A health programme largely focuses on management of diarrhoeal diseases, malnutrition, malaria, respiratory illness, and adolescent reproductive health. There is only one full-time child and adolescent psychiatry (CAP) service provider available in the country, as part of the out-patient department (OPD) of Kanti Children's Hospital (KCH), situated in the capital city Kathmandu, established in 2015 after the major earthquake in Nepal (3). This CAP OPD provides CAMH services to C&A from all parts of Nepal and has been the focal point of CAMH services for Nepal.

In December 2019, the Ministry of Health and Population (MoHP) endorsed and disseminated the "Child and Adolescent Mental Health Training Manual for Doctors, Nurses and Paramedical Professionals," as module 3 of community mental health care package (4). This was developed in collaboration with the CAP team at KCH and United Nations Children's Fund (UNICEF), under the leadership of MoHP, Government of Nepal. This CAMH module is a 5-day on-site training of doctors and paramedical professionals across Nepal. The roll-out of this training aims to build capacity of medical and paramedical professionals to improve task-shifting, early identification, local intervention and referral of CAMH problems. However, implementation of this CAMH training was put on hold due to the COVID-19 pandemic.

A study on early career psychiatrists' (ECPs) perspective in child and adolescent psychiatry training in Nepal showed that 44% reported CAP training exposure as inadequate and 74% desired for additional training (5). Additionally, they reported that on a 10-point scale, their confidence in management of CAP cases was 4.58 ± 1.59.

Nationwide lockdown due to COVID-19 pandemic began in Nepal during March 2020, with restriction of both air and road travels, as well as closure of borders with India and China (6). All people including C&A were confined to their homes, and schools were closed. The government lifted the lockdown and businesses opened, but schools still remained physically closed as of November, 2020. Some schools, mostly those privately run, resumed classes through online platforms while schooling remains disrupted for the majority of students in Nepal. In Nepal, deficient funding for mental health services, increased social media use, suddenly imposed lockdown, poor understanding of lockdown restrictions, sudden student-life changes and postponement of exams were stated as risks for COVID-19 related mental health problem for the young population (7).

The COVID-19 pandemic has taken a significant toll on CAMH and access to mental health services have been negatively impacted (8, 9). Based on UNICEF U-Report Poll data collected among adolescents and youth in Nepal during July of 2020, 43% of respondents reported feeling stressed and 19% sad. Additionally, 74% respondents felt fearful that their family members or themselves could become infected with COVID-19. Furthermore, 80% felt that studying during this period was challenging, with 28% being most worried about exams and 18% finding it difficult to study in their home environment (10).

The impact of COVID-19 on CAMH and restricted access to available support systems and services highlight a critical need to reach C&A as well as their caregivers across Nepal. The CAP team of Kanti Children's Hospital responded by developing and piloting a multi-tiered CAMH intervention in partnership with UNICEF Nepal. This paper outlines the key components of the multi-tiered CAMH intervention model and experiences with its implementation till date during the COVID-19 pandemic.

OVERVIEW OF THE MULTI-TIERED CAMH INTERVENTION MODEL

In this intervention model, COVID-19 has been taken as one of the stressors that could adversely affect CAMH. The model incorporates basic psychosocial support for management of stress, tailored more toward COVID- 19 related stress, but is not limited to it. This also includes identification and management of CAMH problems locally, and remotely through link with tele-consultation services. The same framework can be used for management of CAMH issues due to other stressors as well. This is a multi-tier model because it includes training of mental health professionals by master trainers through Training of Trainers (TOTs) sessions, and the TOT recipients will then conduct sessions with C&A, parents, teachers, care givers.

Although the primary target population are C&A who, through these sessions, are empowered to manage their own stress, this model also ensures CAMH awareness and support at levels of teachers, parents, caregivers. Then, there is possibility of a consultation with the mental health professional/ facilitator when needed, as they would have been linked by the session, this may encourage help seeking behavior. This is further linked to the higher center for specialized CAMH services via tele-consultations. Thus, the C&A will be able to manage their mental health at 4 different tiers. The 4 tiers of the intervention model have been summarized in **Table 1** below.

The 3 phases the COVID-19 CAMH Intervention pilot include: (1) *Manual Development*, (2) *Training*, and (3) *Outreach to C&A, Caregivers, and Teachers*, as illustrated in **Figure 1** below. The pilot aims to train 20 master trainers, 100 Psychiatrist and Psychologist who would facilitate sessions to reach a total of 40,000 C&A, Caregivers and Teachers from June, 2020 to February, 2021.

PHASE 1: DEVELOPMENT OF A MANUAL ON COVID-19 RELATED CAMH PROBLEMS IDENTIFICATION AND MANAGEMENT

Considering the limitations in the context of the COVID-19 pandemic, yet immediate demands, there was need for a simple but impactful intervention model that could be implemented

TABLE 1 | Multi-tiered CAMH Intervention.

Tiers	Description
One	Children and adolescents in different parts of Nepal
Two	Parents, Teachers, and Caregivers in different parts of Nepal.
Three	Mental health professionals: psychiatrists and psychologists working in different parts of Nepal. They have an MD degree in Psychiatry or Master's degree in Psychology. Their work includes mental health services primarily targeting adults.
Four	Child and Adolescent Psychiatry team at Kanti Children's Hospital. This comprises a team of child and adolescent psychiatrists, and clinical psychologists. They have post-MD degrees of specialization in Child and Adolescent Psychiatry and Post-master's degrees of specialization in clinical psychology, respectively. This team exclusively works in the field of CAMH.

over a short period of time and reach different parts of the country. There was also the need to train mental health professionals on CAMH. This led to development of a COVID-19 related CAMH Training Manual in a Training of Trainer's (TOT) format. This has two modules: (a) Module for Session with Teachers, Parents, and Caregivers; (b) Module for Session with Children and Adolescents.

After the development of the initial draft of the manual, trail sessions were conducted. One trial session, via online platform through Zoom application, was done for 10 teachers from various schools at Kailali District, which is a remote district in Nepal. Online trial sessions were also conducted in a school in Kathmandu, the capital city of Nepal, with 80 teachers and 600 students, including parents for younger children. Similarly, other online trial sessions were conducted for C&A and staff in child-care homes and Child Helplines in the capital city. Based on our observations, and feedback received from participants (including C&A), the Training of Trainer's manual was updated. This second draft of the manual was used to conduct online trial TOT sessions for mental health professionals comprising of 19 psychiatrists and psychologists. Then, the manual was further updated and finalized based on the inputs from these professionals. The session content of the COVID-19 related CAMH training manual is summarized in **Table 2**.

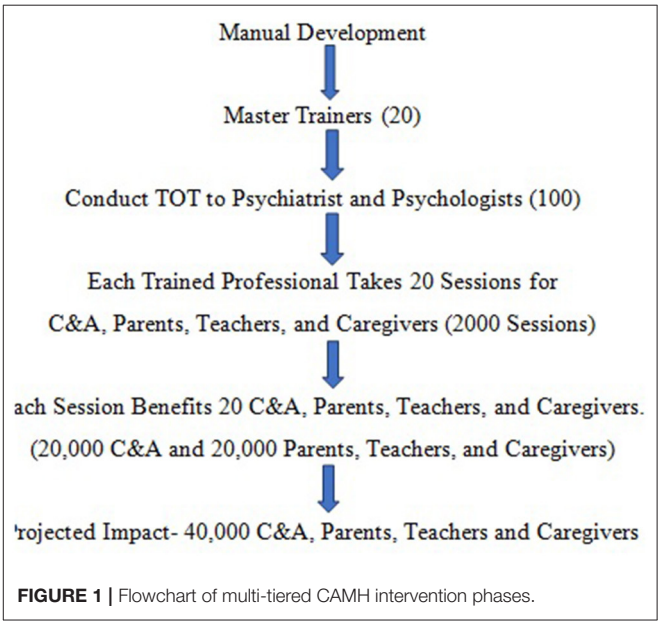


FIGURE 1 | Flowchart of multi-tiered CAMH intervention phases.

PHASE 2: TRAINING

Master Trainers

The master trainers consist of Child and Adolescent Psychiatrists, and Clinical psychologists from CAP team at KCH, and some mental health professionals involved in development of the manual. The pool of master trainers can later be increased by including some of the TOT recipients after observation of their sessions.

Training of Trainers (TOT)

The TOT sessions are provided by master trainers to mental health professionals such as psychiatrists and psychologists from different parts of Nepal.

The announcements for TOTs were made on social media platforms like Facebook groups associated with the mental health professionals and via email correspondence. These mental health professionals were recruited for TOTs through online registrations via applications like Google Forms. After registration, email correspondences were made about details of TOT session schedules.

The TOTs are conducted online, through tele-video platforms such as Zoom application, with participants from different parts of country. Each module of the manual is discussed over a period of 3 h; the TOT takes 2 days with a total of 6 h.

PHASE 3: OUTREACH TO C&A, TEACHERS, PARENTS, AND CAREGIVERS

Parents are reached out through schools or through community organizations. Teachers and students are reached out through school administrations. Caregivers here refer to staff of child care institutions and organizations, such as- orphanages, child-care homes, child helplines, etc., who work with children, The Caregivers are reached out through respective organizations.

Each of the 100 TOT recipients can conduct sessions for teachers, parents and caregivers on COVID-19 related CAMH issues identification and management through one and half hour sessions. Each of the 100 TOT recipients can provide sessions for C&A on identifying and managing COVID-19 related CAMH issues through one and half hour sessions. Tele-supervision

TABLE 2 | COVID-19 CAMH training manual content.

SN	Heading	Content
i	Introduction	The facilitator introduces oneself to the participants and the participants introduce themselves.
ii	Privacy and Confidentiality	No participant is forced to speak, if they wish to not share anything, this is respected. Also, it is mentioned that any personal information shared within the session, will remain within the session and not shared to others. If anyone wishes to contact the facilitator to discuss some issues in private, this opportunity is given by providing contact details at the end of the session.
iii	Ventilation	This session allows the participants to express their thoughts, feelings and worries related to the COVID-19 pandemic.
iv	Clarification of COVID-19 related queries	These are done through discussions, stories, or informational videos.
v	Discussion of COVID-19 Pandemic as a Stressor	Discussions on how COVID-19 pandemic is affecting mental health of C&A, teachers, parents and caregivers.
vi	First Level Response (11)	These refer to the first verbal responses provided to the C&A, parents, teachers or caregivers for the concerns they express. This follows the steps of *Acknowledgment, Universalization, Validation and Empathy*. These headings are discussed in brief to provide a clear concept. Role plays are done with volunteers from the participants, and also demonstrations by facilitator, to practice first level response to the problems expressed by C&A or those perceived by teachers, parents and caregivers.
vii	Identification of Symptoms of Stress Related to COVID-19	These are discussed in three general categories as emotional symptoms, behavioral symptoms and physical symptoms.
viii	CAMH Intervention Phases	These include discussions on maintaining a structured routine, proper diet, regular exercise, learning activities, indoor games, creative and fun activities. Besides these, relaxation exercises and breathing exercises are practiced in the session.
ix	Identification of Need to Seek Help, Promotion of Help-seeking Behavior and Referral	This focuses on identifying socio-occupational dysfunction, and any high-risk situations such as self-harm, suicidal tendencies or risk of harm to others. If identified or suspected, then referral to a mental health practitioner or medical facility is advised.
x	Link with Tele-consultation Services, Supervised by CAP team at Kanti Children's Hospital	In case, there is a need for consultation with specialized child and adolescent psychiatry team, these are arranged via zoom platforms. The CAP team can also provide assistance to the local mental health professionals for management of such cases through tele-consultation. The session provides the participants with contact numbers for local mental health services, as well as child helpline number, other mental health hotline numbers, and CAP OPD hotline numbers.
xi	Materials and Methods	Videos on COVID-19, presentation slides, stories, workbooks, role plays, and discussions are used during the sessions to make the sessions interesting. These materials are also provided to participants via mails or downloadable links.

and monitoring of these sessions by master trainers ensure quality of sessions by the TOT recipients, and constructive feedbacks are given to facilitators. After few sessions, they conduct session independently.

Each TOT recipient is expected to conduct around 20 sessions, although some may take more and some less. The target is to conduct 2,000 sessions, with around 20 participants in each session. This would amount to 40,000 total population reached, with roughly 20,000 C&A, and 20,000 teachers, parents and caregivers at the end of the pilot in February, 2021.

DELIVERY PLATFORM

Given COVID-19 social distancing requirements, this intervention model uses the online platform, while also allowing for in person delivery. Online sessions were used for conducting training of trainers (TOT) sessions for mental health professionals, as well as sessions for C&A, teachers, parents or caregiver groups. Various applications such as Zoom, Microsoft Teams, Google Hangouts were utilized. Some of these are also available in free versions, so do not have financial implications.

Sessions could also be conducted in physical setting with appropriate COVID-19 related safety measures in place. This is a necessity in settings where online platforms are not feasible due to internet or device unavailability. This can also be continued in schools as sessions for C&A and teachers, once schools resume. The school platform is an important entry point for providing support to C&A with COVID-19 related stress and for assistance in adjustment with school re-entry. Similarly, sessions can be conducted in community spaces for parent groups, youth clubs, mothers' groups, childcare institutions and other community-based organizations.

INCENTIVES

Incentives are provided to the TOT recipients for participating in the TOTs, these are in the form of mobile-phone top-ups of NRS 500 (Nepalese Currency), equivalent to 4.23 US dollars, to cover the internet cost for attend the sessions. Incentives are also provided to TOT recipients for facilitating sessions with C&A, teachers, parents and caregivers. Financial incentive of NRS 1,500, equivalent to 12.70 US dollars, was provided to the TOT recipients for each session facilitated by them. It is hoped that this would have sensitized them for sustainable continuation of such sessions in future by collaboration at local levels.

TELE-CONSULTATION WORKSPACE

Tele-consultations with C&A patients are currently being conducted through the CAP OPD at KCH or home settings. A separate workspace is being established which will have the required equipment to ensure smooth running of the sessions and a back-up of the data will be set up to ensure safe storage. This will help to reduce the technical problems of occasional internet connectivity problems or power cuts.

REACH AND COVERAGE

Since the project commencement in June, 2020 there has been encouraging progress in reaching the targeted population. TOT sessions have been completed for 100 mental health professionals. At the end of November, 2020, within a period of 5 months, the TOT recipients have conducted 1,415 sessions, with 28,597 population reached. Among them, 16,571 are C&A, and 12,026 are parents, teachers and caregivers. With this pattern, it seems possible to reach 40,000 in the next 3 months by end of February, 2021. The project has successfully reached C&A, teachers and parents across all 7 provinces in Nepal, although there are variabilities in distribution of sessions due to availability of internet connection and remoteness of some places.

DISCUSSION

The COVID-19 CAMH intervention model provides a suitable framework for the current scenario of the COVID-19 pandemic, where physical distancing has to be maintained, and groups have to be avoided. It overcomes the risk of contracting infection with COVID-19, while still providing mental health support. This model can be useful to generate awareness on mental health, identify mental health problems, teach measures to manage the problems locally, and become aware of available mental health services. This creates a local network of supporting elements to safeguard mental health of children and adolescents. This also builds the capacity of the existing mental health professionals and enhances their collaboration on promoting CAMH. This type of project can be conducted in low resource settings like Nepal. It helps to overcome issues of scarce manpower and lack of funds. Being a short training, both for TOT sessions as well as for sessions for C&A, teachers and parents, there is less risk of discontinuation of participation. The session content and flow has been made simple, for ease of conduct as well as ease of understanding for the participants; yet, it can have an important role on safeguarding mental health of children and adolescents as well as that of parents, teachers and caregivers.

The COVID-19 CAMH intervention model developed out of desperate necessity. Although the current numbers reached are only a fraction of the total C&A population of Nepal, this has presented as a useful model that can be scaled up to reach more C&A nationwide. Collaboration with local NGOs, community organizations and mental health fraternities have been extremely important for the project, and have made it progress with more ease than anticipated. However, hiring of personnel for logistics is necessary to handle the paperwork, keep records of sessions, provide renumerations and other managerial aspects of the project.

Reaching out to the mental health professionals was initially difficult; however, with time the number of required professionals were met. It is difficult to reach the population of remote places where internet connection is poor, and the availability of smart-devices is also variable. Minor issues with internet connectivity, break in voice and lag time to buffer have been experienced occasionally. Arranging a convenient time for all participants might be difficult, so number of participants in sessions may vary from those who have registered. Some of the participants were using zoom for the first time, so unfamiliarity with the online setting and application use may be an issue initially. The online experience may be different from in-person training. There are less opportunities for the participants to interact with each other besides during the training.

While many schools in the urban areas have started online platforms, these can be utilized for conducting the sessions, but online platforms are still not available in majority of the schools in the rural settings and also some schools in urban settings. So, for many, a physical setting has to be utilized after the school resumes.

Sometimes, these training sessions may present as extra burden on parents, teachers and caregivers due to their already busy schedules. Lack of awareness and stigma related to mental health problems, and disinterest in associating with mental health professionals may also be present.

NEED FOR EVALUATION OF THE INTERVENTION MODEL

Although the COVID-19 intervention model has been applied to reach the target population, it is important to evaluate the impact of the model and intervention provided to understand its effectivity in the long run. In order to achieve this, after the end of the project at February, 2021, an evaluation will be undertaken.

CONCLUSION

Incorporation of tele-consultation services and remote CAMH services can help to bridge the gap in needs and services, thus addressing the problems with availability, accessibility, as well as affordability of these CAMH services. With cooperation from schools, community, local authorities and coordination with other partner organizations working in mental health, this could be implemented in a larger scale.

If the evaluation of the intervention model shows good effectiveness, this model can be considered for a scale-up to be used in all schools in Nepal by coordinating with the health and education sectors at government levels. This can be continued even after the COVID-19 pandemic subsides, such as in situations of natural calamities like earthquake, landslides, floods as well as stressful situations in home, school and community; thus, promoting the overall child and adolescent mental health.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Since the intervention model described is a programme implementation model and not a study or a research, ethical approval from an Institutional Review Board (IRB) was not needed. However, practices of ethical conduct are advised to be followed by all mental health professionals facilitating the sessions, along with others in the team.

AUTHOR CONTRIBUTIONS

GD and AK contributed in conceptualization and design of the COVID-19 CAMH intervention model, development of the training manual, drafting and editing of this manuscript. UK contributed in development of the training manual, drafting and editing this manuscript. IB, ND, and RS contributed in development of the training manual discussed in the manuscript.

FUNDING

The funding for the project on COVID-19 related child and adolescent mental health intervention was received from UNICEF, Nepal.

REFERENCES

1. Central Bureau of Statistics of Nepal. *Statistical Yearbook Nepal 2015*. (2016). Available online at: https://cbs.gov.np/wp-content/upLoads/2019/02/Statistical-Year-Book-2015.pdf (accessed December 13, 2020).
2. Chaulagain A, Kunwar A, Watts S, Guerrero APS, Skokauskas N. Child and adolescent mental health problems in Nepal: a scoping review. *Int. J. Mental Health Syst*. (2019) 13:53. doi: 10.1186/s13033-019-0310-y
3. Kunwar A, Dhonju G, Karki U. Child and adolescent mental health in Nepal. *IACAPAP Bull*. (2019) 57. Available online at: https://iacapap.org/child-and-adolescent-mental-health-in-nepal/ (accessed 13 November, 2020).
4. EDCD/NHTC D. *Child and Adolescent Mental Health Training of medical doctors, Nurses and Paramedics, Module 3, Facilitator's Guide*. Kathmandu: Department of Health Services (2020).
5. Karki U, Rai Y, Dhonju G, Sharma E, Jacob P, Kommu JVS, et al. Child and adolescent psychiatry training in Nepal: early career psychiatrists' perspective. *Child Adolesc Psychiatry Ment Health*. (2020) 14:13. Available online at: https://capmh.biomedcentral.com/articles/10.1186/s13034-020-00319-5 (accessed 13 November, 2020).
6. Pradhan TR. Nepal goes under lockdown for a week starting 6am Tuesday. *The Kathmandu Post*. (March 23, 2020). Available online at: https://kathmandupost.com/national/2020/03/23/nepal-goes-under-lockdown-for-a-week-starting-6am-tuesday (accessed 13 November, 2020).
7. Sharma V, Reina Ortiz M, Sharma N. Risk and protective factors for adolescent and young adult mental health within the context of COVID-19: a perspective from Nepal. *J Adolesc Health*. (2020) 67:135–7. Available online at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7237905/ (accessed 13 November, 2020).
8. Brunier A, Drysdale C. *COVID-19 Disrupting Mental Health Services in Most Countries, WHO Survey*. World Heal Organ (2020). Available online at: https://www.who.int/news/item/05-10-2020-covid-19-disrupting-mental-health-services-in-most-countries-who-survey (accessed 13 November, 2020).
9. Singh S, Roy D, Sinha K, Parveen S, Sharma G, Joshi G. Impact of COVID-19 and lockdown on mental health of children and adolescents: a narrative review with recommendations. *Psych Res*. (2020) 293:113429. Available online at: /pmc/articles/PMC7444649/?report$=$abstract (accessed 13 November, 2020).
10. *U-Report Nepal*. (2020). Available online at: https://nepal.ureport.in/opinion/4489/ (accessed 13 November, 2020).
11. Community Child and Adolescent Mental Health Service Project. *Mental Health, Psychosocial Care & Protection for Children & Adolescents: Training Series 2 -The Trauma of Loss & Abuse. Banglore*. Available online at: https://www.nimhanschildproject.in/wp-content/uploads/2019/01/Training-Series-2-Trauma-of-Loss-Abuse.pdf (accessed 3 December, 2020).

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychiatry

ORIGINAL RESEARCH
published: 09 February 2021
doi: 10.3389/fpsyt.2020.568929

Impact of the COVID-19 Pandemic on Physical and Mental Health in Lower and Upper Middle-Income Asian Countries: A Comparison Between the Philippines and China

Michael Tee[1†], Cuiyan Wang[2†], Cherica Tee[1], Riyu Pan[1], Patrick W. Reyes[1], Xiaoyang Wan[1], Joseph Anlacan[1], Yilin Tan[1], Linkang Xu[1], Chloe Harijanto[3], Vipat Kuruchittham[4], Cyrus Ho[3,5] and Roger Ho[3,6]*

[1] College of Medicine, University of the Philippines Manila, Manila, Philippines, [2] Faculty of Education, Institute of Cognitive Neuroscience, Huaibei Normal University, Huaibei, China, [3] Department of Psychological Medicine, Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore, [4] Southeast Asia One Health University Network, Chiang Mai, Thailand, [5] Department of Psychological Medicine, National University Health System, Singapore, Singapore, [6] Institute of Health Innovation and Technology (iHealthtech), National University of Singapore, Singapore, Singapore

OPEN ACCESS

Edited by:
Joanna Lai,
UNICEF United Nations International Children's Emergency Fund, United States

Reviewed by:
Tanvi Jain,
UNICEF United Nations International Children's Emergency Fund, United States
Manaswi Sangraula,
Transcultural Psychosocial Organization Nepal, Nepal

***Correspondence:**
Cuiyan Wang
wcy@chnu.edu.cn

[†] These authors share first authorship

Specialty section:
This article was submitted to Public Mental Health, a section of the journal Frontiers in Psychiatry

Received: 02 June 2020
Accepted: 22 December 2020
Published: 09 February 2021

Citation:
Tee M, Wang C, Tee C, Pan R, Reyes PW, Wan X, Anlacan J, Tan Y, Xu L, Harijanto C, Kuruchittham V, Ho C and Ho R (2021) Impact of the COVID-19 Pandemic on Physical and Mental Health in Lower and Upper Middle-Income Asian Countries: A Comparison Between the Philippines and China. Front. Psychiatry 11:568929. doi: 10.3389/fpsyt.2020.568929

Objective: The differences between the physical and mental health of people living in a lower-middle-income country (LMIC) and upper-middle-income country (UMIC) during the COVID-19 pandemic was unknown. This study aimed to compare the levels of psychological impact and mental health between people from the Philippines (LMIC) and China (UMIC) and correlate mental health parameters with variables relating to physical symptoms and knowledge about COVID-19.

Methods: The survey collected information on demographic data, physical symptoms, contact history, and knowledge about COVID-19. The psychological impact was assessed using the Impact of Event Scale-Revised (IES-R), and mental health status was assessed by the Depression, Anxiety, and Stress Scale (DASS-21).

Findings: The study population included 849 participants from 71 cities in the Philippines and 861 participants from 159 cities in China. Filipino (LMIC) respondents reported significantly higher levels of depression, anxiety, and stress than Chinese (UMIC) during the COVID-19 ($p < 0.01$) while only Chinese respondents' IES-R scores were above the cut-off for PTSD symptoms. Filipino respondents were more likely to report physical symptoms resembling COVID-19 infection ($p < 0.05$), recent use of but with lower confidence on medical services ($p < 0.01$), recent direct and indirect contact with COVID ($p < 0.01$), concerns about family members contracting COVID-19 ($p < 0.001$), dissatisfaction with health information ($p < 0.001$). In contrast, Chinese respondents requested more health information about COVID-19. For the Philippines, student status, low confidence in doctors, dissatisfaction with health information, long daily duration spent on health information, worries about family members contracting COVID-19, ostracization, and unnecessary worries about COVID-19 were associated with adverse mental health. Physical symptoms and poor self-rated health were associated with adverse mental health in both countries ($p < 0.05$).

Conclusion: The findings of this study suggest the need for widely available COVID-19 testing in MIC to alleviate the adverse mental health in people who present with symptoms. A health education and literacy campaign is required in the Philippines to enhance the satisfaction of health information.

Keywords: anxiety, China, COVID-19, depression, middle-income, knowledge, precaution, Philippines

INTRODUCTION

The World Health Organization (WHO) declared coronavirus disease 2019 (COVID-19) to be a Public Health Emergency of International Concern on January 30 (1) and a pandemic on March 11, 2020 (2). COVID-19 predominantly presents with respiratory symptoms (cough, sneezing, and sore throat), along with fever, fatigue and myalgia. It is thought to spread through droplets, contaminated surfaces, and asymptomatic individuals (3). By the end of April, over 3 million people have been infected globally (4).

The first country to identify the novel virus as the cause of the pandemic was China. The authorities responded with unprecedented restrictions on movement. The response included stopping public transport before Chinese New Year, an annual event that sees workers' mass emigration to their hometowns, and a lockdown of whole cities and regions (1). Two new hospitals specifically designed for COVID-19 patients were rapidly built in Wuhan. Such measures help slow the transmission of COVID-19 in China. As of May 2, there are 83,959 confirmed cases and 4,637 deaths from the virus in China (4). The Philippines was also affected early by the current crisis. The first case was suspected on January 22, and the country reported the first death from COVID-19 outside of mainland China (5). Similar to China, the Philippines implemented lockdowns in Manila. Other measures included the closure of schools and allowing arrests for non-compliance with measures (6). At the beginning of May, the Philippines recorded 8,772 cases and 579 deaths (4).

China was one of the more severely affected countries in Asia in the early stage of pandemic (7) while the Philippines is still experiencing an upward trend in the COVID-19 cases (6). The gross national income (GNI) per capita of the Philippines and China are USD 3,830 and 9,460, respectively, were classified with lower (LMIC) and upper-middle-income countries (UMIC) by the Worldbank (8). During the COVID-19 pandemic, five high-income countries (HIC), including the United States, Italy, the United Kingdom, Spain, and France, account for 70% of global deaths (9). The HIC faced the following challenges: (1) the lack of personal protection equipment (PPE) for healthcare workers; (2) the delay in response strategy; (3) an overstretched healthcare system with the shortage of hospital beds, and (4) a large number of death cases from nursing homes (10). The COVID-19 crisis threatens to hit lower and middle-income countries due to lockdown excessively and economic recession (11). A systematic review on mental health in LMIC in Asia and Africa found that LMIC: (1) do not have enough mental health professionals; (2) the negative economic impact led to an exacerbation of mental issues; (3) there was a scarcity of COVID-19 related mental health research in Asian LMIC (12). This systematic review could not compare participants from different middle-income countries because each study used different questionnaires. During the previous Severe Acute Respiratory Syndrome (SARS) epidemic, the promotion of protective personal health practices to reduce transmission of the SARS virus was found to reduce the anxiety levels in the community (13).

Before COVID-19, previous studies found that stress might be a modifiable risk factor for depression in LMICs (14) and UMICs (15–17). Another study involving thirty countries found that unmodifiable risk factors for depression included female gender, and depression became more common in 2004 to 2014 compared to previous periods (18). Further, there were cultural differences in terms of patient-doctor relationship and attitudes toward healthcare systems before the COVID-19 pandemic. In China, <20% of the general public and medical professionals view the doctor and patient relationship as harmonious (19). In contrast, Filipino seemed to have more trust and be compliant to doctors' recommendations (20). Patient satisfaction was more important than hospital quality improvement to maintain patient loyalty to the Chinese healthcare system (21). For Filipinos, improvement in the quality of healthcare service was found to improve patients' satisfaction (22).

Based on the above studies, we have the following research questions: (1) whether COVID-19 pandemic could be an important stressor and risk factor for depression for the people living in LMIC and UMIC (23), (2) Are physical symptoms that resemble COVID-19 infection and other concerns be risk factors for adverse mental health? (3) Are knowledge of COVID-19 and health information protective factors for mental health? (4) Would there be any cultural differences in attitudes toward doctors and healthcare systems during the pandemic between China and the Philippines? We hypothesized that UMIC (China) would have better physical and mental health than LMIC (the Philippines). The aims of this study were (a) to compare the physical and mental health between citizens from an LMIC (the Philippines) and UMIC (China); (b) to correlate psychological impact, depression, anxiety, and stress scores with variables relating to physical symptoms, knowledge, and concerns about COVID-19 in people living in the Philippines (LMIC) and China (UMIC).

METHODS

Study Design and Study Population

We conducted a cross-cultural and quantitative study to compare Filipinos' physical and mental health with Chinese during the COVID-19 pandemic. The study was conducted from February 28 to March 1 in China and March 28 to April 7, 2020 in the Philippines, when the number of COVID-19 daily reported cases increased in both countries. The Chinese participants were recruited from 159 cities and 27 provinces. The Filipino participants, on the other hand, were recruited from 71 cities and 40 provinces representing the Luzon, Visayas, and Mindanao archipelago. A respondent-driven recruitment strategy was utilized in both countries. The recruitment started with a set of initial respondents who were associated with the Huaibei Normal University of China and the University of the Philippines Manila; who referred other participants by email and social network; these in turn refer other participants across different cities in China and the Philippines.

Procedure

As both Chinese and Filipino governments recommended that the public minimize face-to-face interaction and isolate themselves during the study period, new respondents were electronically invited by existing study respondents. The respondents completed the questionnaires through an online survey platform ("SurveyStar," Changsha Ranxing Science and Technology in China and Survey Monkey Online Survey in the Philippines). The Institutional Review Board of the University of Philippines Manila Research Ethics Board (UPMREB 2020-198-01) and Huaibei Normal University (China) approved the research proposal (HBU-IRB-2020-002). All respondents provided informed or implied consent. The collected data were anonymous and treated as confidential.

Outcomes

This study used the National University of Singapore COVID-19 questionnaire, and its psychometric properties had been established in the initial phase of the COVID-19 epidemic (24). The National University of Singapore COVID-19 questionnaire consisted of questions that covered several areas: (1) demographic data; (2) physical symptoms related to COVID-19 in the past 14 days; (3) contact history with COVID-19 in the past 14 days; and (4) knowledge and concerns about COVID-19.

Demographic data about age, gender, education, household size, marital status, parental status, and residential city in the past 14 days were collected. Physical symptoms related to COVID-19 included breathing difficulty, chills, coryza, cough, dizziness, fever, headache, myalgia, sore throat, nausea, vomiting, and diarrhea. Respondents also rated their physical health status and stated their history of chronic medical illness. In the past 14 days, health service utilization variables included consultation with a doctor in the clinic, being quarantined by the health authority, recent testing for COVID-19 and medical insurance coverage. Knowledge and concerns related to COVID-19 included knowledge about the routes of transmission, level of confidence in diagnosis, source, and level of satisfaction of health information about COVID-19, the likelihood of contracting and surviving COVID-19 and the number of hours spent on viewing information about COVID-19 per day.

The psychological impact of COVID-19 was measured using the Impact of Event Scale-Revised (IES-R). The IES-R is a self-administered questionnaire that has been well-validated in the European and Asian population for determining the extent of psychological impact after exposure to a traumatic event (i.e., the COVID-19 pandemic) within one week of exposure (25, 26). This 22-item questionnaire, composed of three subscales, aims to measure the mean avoidance, intrusion, and hyperarousal (27). The total IES-R score is divided into 0–23 (normal), 24–32 (mild psychological impact), 33–36 (moderate psychological impact) and >37 (severe psychological impact) (28). The total IES-R score > 24 suggests the presence of post-traumatic stress disorder (PTSD) symptoms (29).

The respondents' mental health status was measured using the Depression, Anxiety, and Stress Scale (DASS-21) and the calculation of scores was based on a previous Asian study (30). DASS has been demonstrated to be a reliable and valid measure in assessing mental health in Filipinos (31–33) and Chinese (34, 35). IES-R and DASS-21 were previously used in research related to the COVID-19 epidemic (26, 36–38).

Statistical Analysis

Descriptive statistics were calculated for demographic characteristics, physical symptom, and health service utilization variables, contact history variables, knowledge and concern variables, precautionary measure variables, and additional health information variables. To analyze the differences in the levels of psychological impact, levels of depression, anxiety and stress, the independent sample *t*-test was used to compare the mean score between the Filipino (LMIC) and Chinese (UMIC) respondents. The chi-squared test was used to analyze the differences in categorical variables between the two samples. We used linear regressions to calculate the univariate associations between independent and dependent variables, including the IES-S score and DASS stress, anxiety, and depression subscale scores for the Filipino and Chinese respondents separately with adjustment for age, marital status, and education levels. All tests were two-tailed, with a significance level of $p < 0.05$. Statistical analysis was performed on SPSS Statistic 21.0.

Findings

Demographic Characteristics and Their Association With Psychological Impact and Adverse Mental Health Status

We received 849 responses from the Philippines and 861 responses from China for 1,710 individual respondents from both countries. The majority of Filipino respondents were women (71.0%), age between 22 and 30 years (26.6%), having a household size of 3–5 people (53.4%), high educational attainment (91.4% with a bachelor or higher degree), and married (68.9%). Similarly, the majority of Chinese respondents were women (75%), having a household size of 3–5 people (80.4%) and high educational attainment (91.4% with a bachelor or higher

degree). There was a significantly higher proportion of Chinese respondents who had children younger than 16 years ($p < 0.001$) and student status ($p < 0.001$; See **Table 1**).

For Filipino respondents, the male gender and having a child were protective factors significantly associated with the lower score of IES-R ($p < 0.05$) and depression ($p < 0.001$), respectively. Single status was significantly associated with depression ($p < 0.05$), and student status was associated with higher IES-R, stress and depression scores ($p < 0.01$) (see **Table 2**). For Chinese respondents, the male gender was significantly associated with a lower score of IES-R but higher DASS depression scores ($p < 0.01$). Notwithstanding, there were other differences between Filipino and China respondents. Chinese respondents who stayed in a household with 3–5 people ($p < 0.05$) and more than 6 people ($p < 0.05$) were significantly associated with a higher score of IES-R as compared to respondents who stayed alone.

Comparison Between the Filipino (LMIC) and Chinese (UMIC) Respondents and Their Mental Health Status

Figure 1 compares the mean scores of DASS-stress, anxiety, and depression subscales and IES-R scores between the Filipino and Chinese respondents. For the DASS-stress subscale, Filipino respondents reported significantly higher stress ($p < 0.001$), anxiety ($p < 0.01$), and depression ($p < 0.01$) than Chinese (UMIC). For IES-R, Filipino (LMIC) had significantly lower scores than Chinese ($p < 0.001$). The mean IES-R scores of Chinese were higher than 24 points, indicating the presence of PTSD symptoms in Chinese respondents only.

Physical Symptoms, Health Status, and Its Association With Psychological Impact and Adverse Mental Health Status

There were significant differences between Filipino (LMIC) and Chinese (UMIC) respondents regarding physical symptoms resembling COVID-19 and health status. There was a significantly higher proportion of Filipino respondents who reported headache ($p < 0.001$), myalgia ($p < 0.001$), cough ($p < 0.001$), breathing difficulty ($p < 0.001$), dizziness ($p < 0.05$), coryza ($p < 0.001$), sore throat ($p < 0.001$), nausea and vomiting ($p < 0.001$), recent consultation with a doctor ($p < 0.01$), recent hospitalization ($p < 0.001$), chronic illness ($p < 0.001$), direct ($p < 0.001$), and indirect ($p < 0.001$) contact with a confirmed diagnosis of COVID-19 as compared to Chinese (see **Supplementary Table 1**). Significantly more Chinese respondents were under quarantine ($p < 0.001$).

Linear regression showed that headache, myalgia, cough, dizziness, coryza as well as poor self-rated physical health were significantly associated with higher IES-R scores, DASS-21 stress, anxiety, and depression subscale scores in both countries after adjustment for confounding factors ($p < 0.05$; see **Table 3**). Furthermore, breathing difficulty, sore throat, and gastrointestinal symptoms were significantly associated with higher DASS-21 stress, anxiety and depression subscale scores in both countries ($p < 0.05$). Chills were significantly associated with higher DASS-21 stress and depression scores ($p < 0.01$) in both countries. Recent quarantine was associated with higher DASS-21 subscale scores in Chinese respondents only ($p < 0.05$).

Perception, Knowledge, and Concerns About COVID-19 and Its Association With Psychological Impact and Adverse Mental Health Status

Filipino (LMIC) and Chinese (UMIC) respondents held significantly different perceptions in terms of knowledge and concerns related to COVID-19 (see **Supplementary Table 2**). For the routes of transmission, there were significantly more Filipino respondents who agreed that droplets transmitted the COVID-19 ($p < 0.001$) and contact via contaminated objects ($p < 0.001$), but significantly more Chinese agreed with the airborne transmission ($p < 0.001$). For the detection and risk of contracting COVID-19, there were significantly more Filipino who were not confident about their doctor's ability to diagnose COVID-19 ($p < 0.001$). There were significantly more Filipino respondents who were worried about their family members contracting COVID-19 ($p < 0.001$). For health information, there were significantly more Filipino who were unsatisfied with the amount of health information ($p < 0.001$) and spent more than three hours per day on the news related to COVID-19 ($p < 0.001$). There were significantly more Chinese respondents who felt ostracized by other countries ($p < 0.001$).

Linear regression analysis after adjustment of confounding factors showed that the Filipino and Chinese respondents showed different findings (see **Table 4**). Chinese respondents who reported a very low perceived likelihood of contracting COVID-19 were significantly associated with lower DASS depression scores ($p < 0.05$). There were similarities between the two countries. Filipino and Chinese respondents who perceived a very high likelihood of survival were significantly associated with lower DASS-21 depression scores ($p < 0.05$). Regarding the level of confidence in the doctor's ability to diagnose COVID-19, both Filipino and Chinese respondents who were very confident in their doctors were significantly associated with lower DASS-21 depression scores ($p < 0.01$). Filipino and Chinese respondents who were satisfied with health information were significantly associated with lower DASS-21 anxiety and depression scores ($p < 0.01$). Chinese and Filipino respondents who were worried about their family members contracting COVID-19 were associated with higher IES-R and DASS-21 subscale scores ($p < 0.05$). In contrast, only Filipino respondents who spent <1 h per day monitoring COVID-19 information was significantly associated with lower IES-R and DASS-21 stress and anxiety scores ($p < 0.05$). Filipino respondents who felt ostracized were associated with higher IES-R and stress scores ($p < 0.05$).

Health Information About COVID-19 and Its Association With Psychological Impact and Adverse Mental Health Status

Filipino (LMIC) and Chinese (UMIC) respondents held significantly different views on the information required about COVID-19. There were significantly more Chinese respondents who needed information on the symptoms related to COVID-19, prevention methods, management and treatment methods, regular information updates, more personalized information, the effectiveness of drugs and vaccines, number of infected by geographical locations, travel

TABLE 1 | Comparison of demographic characteristics between Filipino (LMIC) and Chinese (UMIC) respondents ($N = 1,710$).

Demographics	The Philippines (LMIC) ($N = 849$) *N*(%)	China (UMIC) ($N = 861$) *N*(%)	Chi-square (χ^2)	*p*-value
Gender				
Male	246(29.0)	215(25.0)	3.481	$p = 0.062$
Female	603(71.0)	646(75.0)		
Age				
[12–21]	230(27.1)	358(41.6)	252.337	$p < 0.001$***
[22–30]	226(26.6)	400(46.5)		
[31–40]	178(21.0)	37(4.3)		
[41–49]	129(15.2)	51(5.9)		
≥50	86(10.1)	15(1.7)		
Parental Status				
With child(ren) 16 years or below	132(15.5)	151(17.5)	484.778	$p < 0.001$***
With child(ren) above 16 years	55(6.5)	440(51.1)		
With child(ren) above 16 years, with child(ren) below 16 years	54(6.4)	0(0)		
No children/not applicable	608(71.6)	270(31.4)		
Household Size				
6 people or more	276(32.5)	124(14.4)	155.953	$p < 0.001$***
3–5 people	453(53.4)	692(80.4)		
2 people	67(7.9)	41(4.7)		
1 person	53(6.2)	4(0.5)		
Educational Attainment				
Primary school or below	5(0.6)	61(7.1)	95.986	$p < 0.001$***
Secondary School	68(8.0)	46(5.3)		
Bachelor's degree	544(64.1)	636(73.9)		
Masters/PhD	232(27.3)	118(13.7)		
Employment Status				
Student	296(34.9)	541(62.8)	163.641	$p < 0.001$***
Unemployed	31(3.6)	51(5.9)		
Housewife	26(3.1)	26(3.0)		
Retired	10(1.2)	3(0.4)		
Employed	486(57.2)	240(27.9)		
Marital Status				
Single	585(68.9)	134(15.6)	NA	NA
Married	240(28.3)	719(83.5)		
Divorced/Separated	19(2.2)	5(0.6)		
Widowed	5(0.6)	3(0.3)		

****p < 0.001, NA, due to too small number in one category and cannot perform Chi-square analysis.*

advice and transmission methods as compared to Filipino ($p < 0.01$; See **Supplementary Table 3**). In contrast, there were significantly more Filipino respondents who needed information on other countries' strategies and responses than Chinese ($p < 0.001$).

Information on management methods and transmission methods were significantly associated with higher IES-R scores in Chinese respondents ($p < 0.05$; see **Table 5**). Travel advice, local transmission data, and other countries' responses were significantly associated with lower DASS-21 stress and depression scores in Chinese respondents only ($p < 0.05$). There was only one significant association observed in Filipino respondents; information on transmission methods was significantly associated with lower DASS-21 depression scores ($p < 0.05$).

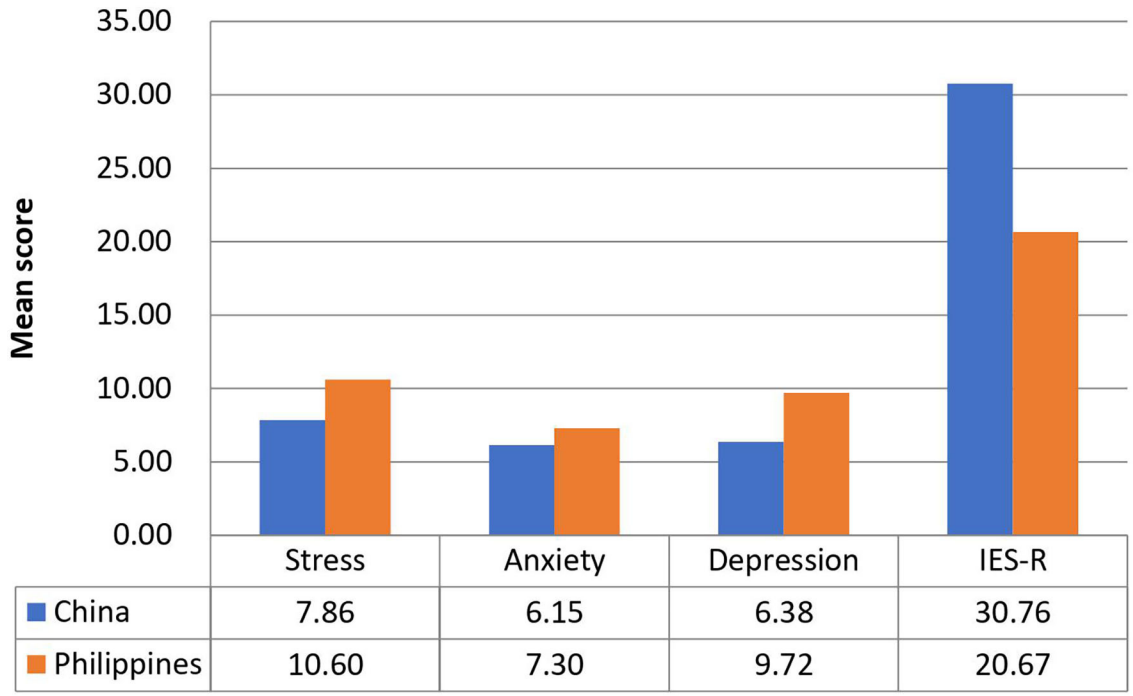
DISCUSSION

To our best knowledge, this is the first study that compared the physical and mental health as well as knowledge, attitude and belief about COVID-19 between citizens from an LMIC (The Philippines) and UMIC (China). Filipino respondents reported significantly higher levels of depression, anxiety and stress

TABLE 2 | Comparison of the association between demographic variables and the psychological impact as well as adverse mental health status between Filipino (LMIC) and Chinese (UMIC) respondents (n = 1,710).

Demographics	The Philippines (LMIC)								China (UMIC)							
	Impact of event		Stress		Anxiety		Depression		Impact of event		Stress		Anxiety		Depression	
	B	*t*	*B*	*t*	*B*	*t*	*B*	*T*	*B*	*t*	*B*	*t*	*B*	*t*	*B*	*t*
Gender																
Male	−0.17	−2.14*	−0.09	−1.40	−0.11	−1.10	−0.08	−0.81	−0.26	−2.61**	0.08	1.38	0.18	1.90	0.22	2.89**
Female	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Age range (years)																
(12–21)	0.39	2.91**	0.28	2.60*	0.48	2.96**	1.09	7.34***	0.77	2.28*	−0.03	−0.16	0.29	0.92	−0.02	−0.07
(22–30)	0.33	2.48*	0.28	2.59*	0.45	2.80**	0.67	4.54***	0.59	1.75	0.02	0.08	0.36	1.17	0.09	0.36
(31–40)	0.21	1.52	0.20	1.81	0.38	2.27*	0.18	1.16	0.63	1.62	−0.03	−0.15	0.29	0.80	0.03	0.12
(41–49)	−0.07	−0.50	−0.11	−0.94	0.04	0.20	−0.02	−0.12	0.26	0.70	−0.15	−0.70	−0.02	−0.05	−0.18	−0.63
>50	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Marital Status																
Single	−0.07	−0.15	0.08	0.21	0.23	0.39	1.08	1.97*	1.06	1.41	0.41	0.94	0.60	0.87	0.48	0.84
Married	−0.25	−0.52	−0.08	−0.19	−0.03	−0.05	0.49	0.89	1.27	1.71	0.46	1.06	0.80	1.17	0.58	1.02
Divorced or separated	−0.12	−0.22	−0.18	−0.41	0.10	0.15	0.53	0.86	1.27	1.35	0.60	1.10	1.00	1.16	0.60	0.84
Widowed	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Parental Status																
With child(ren) 16 years or below	−0.13	−1.30	−0.13	−1.63	−0.22	−1.78	−0.51	−4.39***	0.12	0.94	0.03	0.34	0.11	0.87	0.09	0.88
With child(ren) older than 16 years	−0.13	−0.84	−0.21	−1.73	−0.45	−2.50*	−0.65	−3.78***	0.10	0.96	0.003	0.06	−0.03	−0.34	−0.02	−0.29
No children/not applicable	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Household size																
6 people or more	−0.13	−0.84	0.19	1.46	−0.09	−0.49	0.04	0.23	1.44	2.20*	0.50	1.32	0.84	1.40	0.12	0.24
3–5 people	−0.15	−1.00	0.10	0.78	−0.16	−0.86	0.11	0.58	1.32	2.04*	0.45	1.19	0.77	1.29	0.06	0.13
2 persons	−0.10	−0.49	0.09	0.55	−0.09	−0.57	0.13	0.56	1.19	1.76	0.44	1.12	0.61	0.99	−0.16	−0.31
1 person	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Employment status																
Student	0.21	2.69**	0.19	3.01**	0.17	1.81	0.83	9.55***	−0.63	−0.85	−0.12	−0.27	−0.75	−1.10	−0.19	−0.34
Unemployed	−0.22	−1.11	0.02	0.12	−0.03	−0.11	0.18	0.80	0.06	0.30	0.10	0.91	0.29	1.67	0.32	2.25*
Housewife	0.24	1.13	0.05	0.31	−0.05	−0.20	−0.02	−0.09	−0.52	−1.99*	−0.03	−0.17	0.10	0.40	0.10	0.47
Retired	0.10	0.28	−0.06	−0.22	−0.40	−0.97	−0.30	−0.79	−0.16	−1.64	−0.01	−0.20	−0.01	−0.10	0.06	0.74
Employed	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Education level																
Secondary school	0.51	1.04	0.19	0.47	−0.39	−0.65	0.41	0.73	−0.06	−0.22	0.19	1.29	0.25	1.07	0.16	0.81
university/college	0.56	1.18	0.28	0.72	−0.38	−0.66	−0.004	−0.01	0.33	1.93	0.06	0.62	0.04	0.26	−0.01	−0.09
Masters/PhD	0.29	0.60	0.13	0.34	−0.65	−1.12	−0.51	−0.92	0.24	1.18	0.13	1.11	0.24	1.31	0.14	0.89
Primary school or below	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.



	Stress	Anxiety	Depression	IES-R
China	7.86	6.15	6.38	30.76
Philippines	10.60	7.30	9.72	20.67

FIGURE 1 | Comparison of the mean scores of DASS-stress, anxiety and depression subscales, and IES-R scores between Filipino and Chinese respondents.

than Chinese during the COVID-19, but only the mean IES-R scores of Chinese respondents were above the cut-off scores for PTSD symptoms. Filipino respondents were more likely to report physical symptoms resembling COVID-19 infection, recent use of medical services with lower confidence, recent direct, and indirect contact with COVID, concerns about family members contracting COVID-19 and dissatisfaction with health information. In contrast, Chinese respondents requested more health information about COVID-19 and were more likely to stay at home for more than 20–24 h per day. For the Filipino, student status, low confidence in doctors, unsatisfaction of health information, long hours spent on health information, worries about family members contracting COVID-19, ostracization, unnecessary worries about COVID-19 were associated with adverse mental health.

The most important implication of the present study is to understand the challenges faced by a sample of people from an LMIC (The Philippines) compared to a sample of people from a UMIC (China) in Asia. As physical symptoms resembling COVID-19 infection (e.g., headache, myalgia, dizziness, and coryza) were associated with adverse mental health in both countries, this association could be due to lack of confidence in healthcare system and lack of testing for coronavirus. Previous research demonstrated that adverse mental health such as depression could affect the immune system and lead to physical symptoms such as malaise and other somatic symptoms (39, 40). Based on our findings, the strategic approach to safeguard physical and mental health for middle-income countries would be cost-effective and widely available testing for people present with COVID-19 symptoms, providing a high quality of health information about COVID-19 by health authorities.

Students were afraid that confinement and learning online would hinder their progress in their studies (41). This may explain why students from the Philippines reported higher levels of IES-R and depression scores. Schools and colleges should evaluate the blended implementation of online and face-to-face learning to optimize educational outcomes when local spread is under control. As a significantly higher proportion of Filipino respondents lack confidence in their doctors, health authorities should ensure adequate training and develop hospital facilities to isolate COVID-19 cases and prevent COVID-19 spread among healthcare workers and patients (42). Besides, our study found that Filipino respondents were dissatisfied with health information. In contrast, Chinese respondents demanded more health information related to COVID-19. The difference could be due to stronger public health campaign launched by the Chinese government including national health education campaigns, a health QR (Quick Response) code system and community engagement that effectively curtailed the spread of COVID-19 (43). The high expectation for health information could be explained by high education attainment of participants as about 91.4 and 87.6% of participants from China and the Philippines have a university education.

Furthermore, the governments must employ communication experts to craft information, education, and messaging materials

TABLE 3 | Association between physical health status and contact history and the perceived impact of COVID-19 outbreak as well as adverse mental health status during the epidemic after adjustment for age, gender, and marital status (n = 1,710).

Symptoms	The Philippines (LMIC) (n = 849)								China (UMIC) (n = 861)							
	Impact of Event		Stress		Anxiety		Depression		Impact of Event		Stress		Anxiety		Depression	
	B	t	B	t	B	t	B	t	B	t	B	T	B	t	B	t
Persistent/recurrent fever																
Yes	0.33	0.88	0.11	0.35	0.27	0.60	−0.04	−0.10	1.49	1.16	3.52	4.74***	3.11	2.64**	3.32	3.43**
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Chills																
Yes	0.40	1.68	0.61	3.16**	0.52	1.79	0.76	2.88**	0.60	1.61	0.90	4.17***	0.84	2.44*	0.90	3.18**
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Headache																
Yes	0.37	4.43***	0.38	5.64***	0.63	6.34***	0.35	3.76***	0.57	2.92**	0.48	4.21***	0.80	4.42***	0.55	3.71***
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Myalgia																
Yes	0.54	4.91***	0.52	5.82***	0.82	6.17***	0.40	3.19**	0.48	2.75**	0.41	4.06***	0.58	3.59***	0.58	4.37***
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Cough																
Yes	0.37	3.66***	0.22	2.68**	0.53	4.37***	0.13	1.13	0.54	2.17*	0.61	4.26***	0.67	2.95**	0.66	3.55***
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Breathing difficulty																
Yes	0.67	4.84***	0.69	6.17***	1.27	7.71***	0.64	4.12***	0.78	1.49	1.04	3.39**	1.01	2.10*	1.40	3.54***
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Dizziness																
Yes	0.74	4.78***	0.64	5.06***	0.91	4.80***	0.67	3.83***	0.92	3.94***	0.82	6.07***	0.97	4.52***	0.69	3.91***
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Coryza																
Yes	0.20	1.88	0.18	2.05*	0.31	2.40*	0.26	2.13*	0.59	3.02**	0.34	2.94**	0.52	2.91**	0.56	3.77***
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Sore throat																
Yes	0.30	2.76**	0.43	4.85***	0.61	4.72***	0.26	2.16*	0.33	1.44	0.59	4.40***	0.77	3.63***	0.73	4.22***
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Persistent fever and cough or breathing difficulty																
Yes	−0.62	−0.59	−0.64	−0.74	1.08	0.85	−0.55	−0.47	1.49	1.16	3.52	4.74***	3.11	2.64**	3.32	3.43**
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Nausea, vomiting, or diarrhea																
Yes	0.83	3.91***	0.84	4.86***	1.32	5.14***	0.89	3.74***	0.74	1.51	1.26	4.47***	1.33	2.99**	1.26	3.42**
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	

(Continued)

TABLE 3 | Continued

Symptoms	The Philippines (LMIC) (n = 849)								China (UMIC) (n = 861)							
	Impact of Event		Stress		Anxiety		Depression		Impact of Event		Stress		Anxiety		Depression	
	B	t	B	t	B	t	B	t	B	t	B	T	B	t	B	t
Consultation with a doctor																
Yes	0.05	0.28	0.06	0.42	0.38	1.74	0.11	0.52	0.47	1.29	0.22	1.06	0.32	0.95	0.22	0.80
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Tested for COVID–19																
Yes	−0.66	−1.54	0.07	0.20	0.25	0.48	−0.31	−0.65	−0.40	−0.62	−0.20	−0.54	−0.03	−0.06	−0.06	−0.12
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Recent quarantine																
Yes	0.04	0.14	0.23	1.02	0.45	1.35	0.17	0.55	0.35	1.74	0.25	2.07*	0.53	2.84**	0.37	2.42*
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Self–evaluation of health																
Poor	1.47	3.54***	1.83	5.41***	1.89	3.73***	2.02	4.34***	0.78	2.15*	1.09	5.20***	1.51	4.58***	1.21	4.49***
Fair	0.70	7.18***	0.55	6.93***	0.83	7.08***	0.76	7.02***	0.40	4.28***	0.23	4.31***	0.44	5.15***	0.40	5.77***
Good	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Medical insurance																
Yes	0.02	0.29	0.04	0.59	−0.09	−0.97	0.01	0.08	−0.03	−0.16	−0.18	−2.01*	−0.37	−2.61**	−0.22	−1.88
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Chronic illness																
Yes	0.02	0.17	0.14	1.74	0.07	0.57	0.14	1.28	0.43	2.14*	0.24	2.02*	0.24	1.32	0.27	1.79
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Direct contact with a confirmed case of COVID-19																
Yes	−0.06	−0.25	0.17	0.86	0.04	0.13	0.26	0.98	−1.54	−1.69	0.16	0.29	0.47	0.56	0.64	0.93
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Indirect contact with a confirmed case of COVID-19																
Yes	−0.03	−0.18	0.11	0.81	0.02	0.11	−0.16	−0.84	−0.33	−0.63	0.10	0.31	0.19	0.39	0.23	0.58
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Contact with (COVID-19) contaminated materials																
Yes	0.34	1.05	0.58	2.20*	0.34	0.86	0.26	0.72	−1.10	−1.72	0.11	0.29	0.36	0.61	0.31	0.63
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	

*$p < 0.05$; **$p < 0.01$; and ***$p < 0.001$.

TABLE 4 | Comparison of association of knowledge and concerns related to COVID-19 with mental health status after adjustment for age, gender, and marital status ($N = 1,710$).

Perception, knowledge and concerns related to COVID-19	The Philippines (LMIC) ($N = 849$)								China (UMIC) ($N = 861$)							
	Impact of event		Stress		Anxiety		Depression		Impact of event		Stress		Anxiety		Depression	
	B	*t*	*B*	*t*	*B*	*t*	*B*	*t*	*B*	*t*	*B*	*t*	*B*	*t*	*B*	*t*
Route of transmission Droplets																
Agree	−0.69	−1.59	0.10	0.28	0.08	0.15	0.05	0.11	0.003	0.02	−0.12	−1.44	−0.15	−1.14	−0.16	−1.39
Disagree	−0.56	−0.82	−0.001	−0.002	1.14	1.38	0.45	0.60	0.06	0.14	0.45	1.89	0.67	1.78	0.51	1.65
Do not know	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Contact via contaminated objects																
Agree	−0.08	−0.30	−0.08	−0.38	0.15	0.46	−0.32	−1.10	−0.07	−0.64	−0.08	−1.21	−0.07	−0.63	−0.11	−1.34
Disagree	0.20	0.48	0.02	0.06	0.12	0.24	−0.34	−0.72	0.11	0.55	0.004	0.03	−0.18	−1.00	−0.15	−1.02
Do not know	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Airborne																
Agree	−0.08	−0.68	0.11	1.21	0.02	0.17	0.12	0.98	0.07	0.62	0.04	0.58	0.01	0.12	−0.04	−0.46
Disagree	−0.02	−0.15	0.10	1.09	0.03	0.24	0.20	1.70	−0.02	−0.13	−0.05	−0.61	−0.06	−0.51	−0.09	−0.83
Do not know	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Level of confidence in a doctor's ability to diagnose or recognize COVID-19																
Very confident	−0.35	−2.33*	−0.16	−1.27	−0.29	−1.58	−0.35	−2.11*	0.02	0.06	−0.29	−1.44	−0.39	−1.25	−0.81	−3.14**
Fairly confident	−0.25	−1.74	−0.03	−0.23	−0.01	−0.03	−0.29	−1.80	0.32	0.92	−0.21	−1.04	−0.30	−0.94	−0.68	−2.60**
Not very confident	−0.01	−0.05	0.15	1.09	0.16	0.80	0.16	0.87	0.39	0.89	0.04	0.17	0.07	0.17	−0.45	−1.36
Not confident	0.07	0.24	0.12	0.49	−0.03	−0.09	0.08	0.25	−0.15	−0.15	−0.19	−0.32	0.63	0.70	−0.22	−0.30
Do not know	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Likelihood of contracting COVID−19 during the pandemic																
Very likely	0.17	0.91	0.14	0.90	0.19	0.85	0.13	0.61	−0.24	−1.24	−0.08	−0.70	0.04	0.25	−0.11	−0.75
Fairly likely	0.09	0.60	0.17	1.42	0.14	0.76	0.18	1.05	−0.02	−0.16	−0.14	−1.61	−0.05	−0.32	−0.16	−1.35
Not very likely	−0.08	−0.55	−0.10	−0.85	−0.19	−1.06	0.001	0.01	0.03	0.22	−0.16	−1.86	−0.10	−0.76	−0.16	−1.48
Not likely	−0.05	−0.30	−0.11	−0.87	−0.10	−0.49	0.01	0.04	−0.13	−0.74	−0.19	−1.86	−0.15	−0.95	−0.31	−2.29*
Do not know	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Likelihood of surviving if infected with COVID-19																
Very likely	−0.10	−0.70	−0.06	−0.50	−0.11	−0.61	−0.32	−1.98*	−0.27	−1.92	−0.14	−1.73	−0.18	−1.41	−0.24	−2.27*
Fairly likely	−0.13	−0.89	−0.10	−0.82	−0.12	−0.69	−0.28	−1.73	−0.01	−0.12	−0.08	−1.15	−0.10	−0.91	−0.19	−1.99*

(Continued)

TABLE 4 | Continued

Perception, knowledge and concerns related to COVID-19	The Philippines (LMIC) (*N* = 849)								China (UMIC) (*N* = 861)							
	Impact of event		Stress		Anxiety		Depression		Impact of event		Stress		Anxiety		Depression	
	B	*t*	*B*	*t*	*B*	*t*	*B*	*t*	*B*	*t*	*B*	*t*	*B*	*t*	*B*	*t*
Not very likely	0.27	1.44	0.23	1.52	0.33	1.45	0.29	1.37	0.02	0.12	0.05	0.47	0.39	2.17*	0.20	1.33
Not likely	0.55	1.93	0.31	1.33	0.34	0.98	0.55	1.72	−0.23	−0.65	0.07	0.36	0.52	1.62	0.16	0.62
Do not know	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Satisfaction with the amount of health information available about COVID-19																
Very satisfied	−1.31	−3.46**	−0.50	−1.58	−1.33	−2.87**	−1.37	−3.24**	−0.07	−0.28	−0.60	−3.94***	−0.71	−2.95**	−0.73	−3.67***
Fairly satisfied	−1.18	−3.21**	−0.46	−1.50	−1.27	−2.83**	−1.18	−2.86**	0.31	1.21	−0.48	−3.21**	−0.62	−2.63**	−0.61	−3.11**
Not very satisfied	−0.94	−2.50*	−0.34	−1.10	−1.14	−2.49*	−0.93	−2.23*	0.11	0.34	−0.33	−1.81	−0.51	−1.74	−0.38	−1.57
Not satisfied	−0.62	−1.49	−0.06	−0.18	−0.48	−0.95	−0.29	−0.62	0.82	2.20*	0.06	0.25	0.13	0.37	−0.19	−0.69
Do not know	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Degree of worry about family members being diagnosed with COVID-19																
Very worried	0.60	2.13*	0.51	2.20*	0.66	1.95	0.77	2.43*	−0.004	−0.01	−0.53	−2.49*	−0.39	−1.15	−0.77	−2.79**
Fairly worried	0.21	0.73	0.26	1.12	0.12	0.34	0.47	1.46	0.08	0.22	−0.63	−2.97**	−0.39	−1.15	−0.79	−2.86**
Not very worried	0.05	0.15	0.32	1.15	0.25	0.61	0.47	1.24	−0.36	−0.97	−0.76	−3.50***	−0.66	−1.94	−0.94	−3.35**
Not worried	−0.17	−0.32	−0.17	−0.38	−0.45	−0.69	0.35	0.58	−0.43	−1.08	−0.70	−3.04**	−0.63	−1.73	−0.92	−3.04**
No other family members	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Hours spent daily on the news relating to COVID-19																
≤1	−0.42 to −4.43***		−0.23 to −2.91**		−0.34 to −2.91**		−0.23 to −2.13*		0.06 to 0.49		0.06 to 0.76		−0.03 to −0.28		−0.05 to −0.52	
(1–3)	−0.04 to −0.46		0.04 to 0.54		−0.17 to −1.65		0.10 to 1.05		−0.03 to −0.25		−0.06 to −0.97		−0.09 to −0.97		−0.06 to −0.78	
≦3	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Feeling ostracized by other countries with the outbreak of COVID-19																
Yes	0.38 4.04***		0.17 2.10*		0.16 1.38		0.15 1.44		0.16 1.69		0.10 1.80		0.05 0.63		0.08 1.18	
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	

*$p < 0.05$; **$p < 0.01$; ***$p < 0.001$.

TABLE 5 | Comparison of the association between information needs about COVID-19 and the psychological impact as well as adverse mental health status between Filipino (LMIC) and Chinese (UMIC) participants after adjustment for age, gender, and marital status ($N = 1,710$).

Health information required	The Philippines (LMIC) ($N = 849$)								China (UMIC) ($N = 861$)							
	Impact of event		Stress		Anxiety		Depression		Impact of event		Stress		Anxiety		Depression	
	B	*t*	*B*	*t*	*B*	*t*	*B*	*t*	*B*	*t*	*B*	*t*	*B*	*t*	*B*	*t*
Symptoms related to COVID-19 infection																
Yes	0.08	1.01	0.01	0.08	0.08	0.83	−0.10	−1.15	0.20	1.63	0.04	0.52	0.12	1.02	0.02	0.19
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Prevention methods																
Yes	0.01	0.08	−0.03	−0.52	−0.001	−0.01	−0.17	−1.92	0.25	1.71	−0.10	−1.14	−0.16	−1.14	−0.15	−1.33
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Management/Treatment methods																
Yes	0.09	1.11	0.04	0.53	0.04	0.42	−0.08	−0.87	0.24	2.30*	0.09	1.45	0.20	2.10*	0.09	1.11
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Regular information update																
Yes	0.04	0.50	0.02	0.33	0.03	0.31	−0.09	−0.97	0.39	1.89	−0.14	−1.15	−0.13	−0.67	−0.20	−1.26
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Local transmission data																
Yes	0.01	0.11	−0.02	−0.27	−0.02	−0.19	−0.12	−1.35	0.04	0.19	−0.34	−2.60*	−0.31	−1.50	−0.36	−2.12*
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
More personalized information, such as those with pre-existing medical conditions																
Yes	0.09	1.18	0.03	0.46	0.07	0.74	−0.08	−0.90	0.03	0.19	−0.13	−1.63	−0.17	−1.32	−0.19	−1.83
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Effectiveness of drugs and vaccines																
Yes	0.08	0.94	0.02	0.33	0.04	0.36	−0.08	−0.84	0.10	0.61	−0.18	−1.80	−0.11	−0.69	−0.23	−1.81
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Infection statistics by geographical location																
Yes	0.02	0.27	0.01	0.16	0.05	0.47	−0.13	−1.41	0.14	0.82	−0.09	−0.92	−0.16	−1.05	−0.19	−1.49
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Travel advice																
Yes	0.01	0.13	−0.01	−0.09	0.02	0.22	−0.10	−1.24	0.11	0.83	−0.17	−2.09*	−0.07	−0.56	−0.25	−2.46*
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Transmission methods																
Yes	−0.004	−0.05	−0.04	−0.62	0.02	0.21	−0.19	−2.19*	0.48	2.66**	−0.11	−1.03	−0.17	−1.01	−0.14	−1.03
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	
Strategies and responses from other countries																
Yes	0.06	0.77	0.04	0.61	0.07	0.68	−0.08	−0.95	0.26	2.85**	−0.01	−0.22	−0.13	−1.47	−0.15	−2.07*
No	Reference		Reference		Reference		Reference		Reference		Reference		Reference		Reference	

*$p < 0.05$; **$p < 0.01$.

that are target-appropriate to each level of understanding in the community. That the Chinese Government rapidly deployed medical personnel and treated COVID-19 patients at rapidly-built hospitals (44) is in itself a confidence-building measure. Nevertheless, recent quarantine was associated with higher DASS-21 subscale scores in Chinese respondents only. It could be due to stricter control and monitoring of movements imposed by the Chinese government during the lockdown (45). Chinese respondents who stayed with more than three family members were associated with higher IES-R scores. The high IES-R scores could be due to worries of the spread of COVID-19 to family members and overcrowded home environment during the lockdown. The Philippines also converted sports arena into quarantine/isolation areas for COVID-19 patients with mild symptoms. These prompt actions helped restore public confidence in the healthcare system (46). A recent study reported that cultural factors, demand pressure for information, the ease of information dissemination via social networks, marketing incentives, and the poor legal regulation of online contents are the main reasons for misinformation dissemination during the COVID-19 pandemic (47). Bastani and Bahrami (47) recommended the engagement of health professionals and authorities on social media during the pandemic and the improvement of public health literacy to counteract misinformation.

Chinese respondents were more likely to feel ostracized and Filipino respondents associated ostracization with adverse mental health. Recently, the editor-in-chief of *The Lancet*, Richard Horton, expressed concern of discrimination of a country or particular ethnic group, saying that while it is important to understand the origin and inter-species transmission of the coronavirus, it was both unhelpful and unscientific to point to a country as the origin of the Covid-19 pandemic, as such accusation could be highly stigmatizing and discriminatory (48). The global co-operation involves an exchange of expertise, adopting effective prevention strategies, sharing resources, and technologies among UMIC and LIMC to form a united front on tackling the COVID-19 pandemic remains a work in progress.

Strengths and Limitations

The main strength of this study lay in the fact that we performed in-depth analysis and studied the relationship between physical and mental outcomes and other variables related to COVID-19 in the Philippines and China. However, there are several limitations to be considered when interpreting the results. Although the Philippines is a LMIC and China is a UMIC, the findings cannot be generalized to other LIMCs and UMICs. Another limitation was the potential risk of sampling bias. This bias could be due to the online administration of questionnaires, and the majority of respondents from both countries were respondents with good educational attainment and internet access. We could not reach out to potential respondents without internet access (e.g., those who stayed in the countryside or remote areas). Further, our findings may not be generalizable to other middle-income countries.

CONCLUSION

During the COVID-19 pandemic, Filipinos (LMIC) respondents reported significantly higher levels of depression, anxiety and stress than Chinese (UMIC). Filipino respondents were more likely to report physical symptoms resembling COVID-19 infection, recent use of medical services with lower confidence, recent direct and indirect contact with COVID, concerns about family members contracting COVID-19 and dissatisfaction with health information than Chinese. For the current COVID-19 and future pandemic, Middle income countries need to adopt the strategic approach to safeguard physical and mental health by establishing cost-effective and widely available testing for people who present with COVID-19 symptoms; provision of high quality and accurate health information about COVID-19 by health authorities. Our findings urge middle income countries to prevent ostracization of a particular ethnic group, learn from each other, and unite to address the challenge of the COVID-19 pandemic and safeguard physical and mental health.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

Ethical review and approval was required for the study on human participants in accordance with the local legislation and institutional requirements. Written informed consent to participate in this study was provided by the participants' legal guardian/next of kin. The Institutional Review Board of the University of Philippines Manila Research Ethics Board (UPMREB 2020- 198-01) and Huaibei Normal University (China) approved the research proposal (HBU-IRB-2020-002).

AUTHOR CONTRIBUTIONS

Concept and design: CW, MT, CT, RP, VK, and RH. Acquisition, analysis, and interpretation of data: CW, MT, CT, RP, LX, CHa, XW, YT, and VK. Drafting of the manuscript: CW, MT, CT, RH, and JA. Critical revision of the manuscript: MT, CT, CHo, and JA. Statistical analysis: CW, PR, RP, LX, XW, and YT. All authors contributed to the article and approved the submitted version.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpsyt.2020.568929/full#supplementary-material

REFERENCES

1. Sohrabi C, Alsafi Z, O'Neill N, Khan M, Kerwan A, Al-Jabir A, et al. World Health Organization declares global emergency: a review of the 2019 novel coronavirus (COVID-19). *Int J Surg.* (2020) 76:71–6. doi: 10.1016/j.ijsu.2020.02.034
2. Mahase E. Covid-19: WHO declares pandemic because of "alarming levels" of spread, severity, and inaction. *BMJ.* (2020) 368:m1036. doi: 10.1136/bmj.m1036
3. Singhal T. A review of coronavirus disease-2019 (COVID-19). *Indian J. Pediatr.* (2020) 87:281–6. doi: 10.1007/s12098-020-03263-6
4. Oxford. *Oxford U of. Coronavirus Disease (COVID-19) - Statistics and Research.* (2020). Available online at: https://ourworldindata.org/coronavirus%0D (accessed May 17, 2020).
5. Edrada EM, Lopez EB, Villarama JB, Salva Villarama EP, Dagoc BF, Smith C, et al. First COVID-19 infections in the Philippines: a case report. *Trop Med Health.* (2020) 48:21. doi: 10.1186/s41182-020-00218-7
6. CNN. *TIMELINE: How the Philippines is Handling COVID-19.* (2020). Available online at: https://cnnphilippines.com/news/2020/4/21/interactive-timeline-PH-handling-COVID-19.html (accessed May 17, 2020).
7. Worldmeters. *COVID-19 Coronavirus Pandemic.* (2020). Available online at: https://www.worldometers.info/coronavirus/ (accessed December 4 2020).
8. WorldBank. *World Bank National Accounts Data, and OECD National Accounts Data Files.* (2020). Available online at: https://data.worldbank.org/indicator/NY.GNP.PCAP.CD (accessed April 16 2020).
9. Schellekens P, Sourrouille D. *The Unreal Dichotomy in COVID-19 Mortality between High-Income and Developing Countries.* (2020). Available online at: https://www.brookings.edu/blog/future-development/2020/05/05/the-unreal-dichotomy-in-covid-19-mortality-between-high-income-and-developing-countries/ (accessed May 10 2020).
10. Medicalexpress. *'Slow Response': How Britain Became Worst-Hit in Europe by Virus.* (2020). Available online at: https://medicalxpress.com/news/2020-05-response-britain-worst-hit-europe-virus.html (accessed May 8 2020).
11. Mamun MA, Ullah I. COVID-19 suicides in Pakistan, dying off not COVID-19 fear but poverty? - The forthcoming economic challenges for a developing country. *Brain Behav Immun.* (2020) 87:163–6. doi: 10.1016/j.bbi.2020.05.028
12. Kar SK, Oyetunji TP, Prakash AJ, Ogunmola OA, Tripathy S, Lawal MM, et al. Mental health research in the lower-middle-income countries of Africa and Asia during the COVID-19 pandemic: a scoping review. *Neurol Psychiatry Brain Res.* (2020) 38:54–64. doi: 10.1016/j.npbr.2020.10.003
13. Leung GM, Lam TH, Ho LM, Ho SY, Chan BH, Wong IO, et al. The impact of community psychological responses on outbreak control for severe acute respiratory syndrome in Hong Kong. *J Epidemiol Community Health.* (2003) 57:857–63. doi: 10.1136/jech.57.11.857
14. Cristóbal-Narváez P, Haro JM, Koyanagi A. Perceived stress and depression in 45 low- and middle-income countries. *J Affect Disord.* (2020) 274:799–805. doi: 10.1016/j.jad.2020.04.020
15. Vallejo MA, Vallejo-Slocker L, Fernández-Abascal EG, Mañanes G. Determining factors for stress perception assessed with the perceived stress scale (PSS-4) in Spanish and other European samples. *Front Psychol.* (2018) 9:37. doi: 10.3389/fpsyg.2018.00037
16. Shin C, Kim Y, Park S, Yoon S, Ko YH, Kim YK, et al. Prevalence and associated factors of depression in general population of Korea: results from the Korea National Health and Nutrition Examination Survey, 2014. *J Korean Med Sci.* (2017) 32:1861–9. doi: 10.3346/jkms.2017.32.11.1861
17. Olsen LR, Mortensen EL, Bech P. Prevalence of major depression and stress indicators in the Danish general population. *Acta Psychiatr Scand.* (2004) 109:96–103. doi: 10.1046/j.0001-690X.2003.00231.x
18. Lim GY, Tam WW, Lu Y, Ho CS, Zhang MW, Ho RC. Prevalence of depression in the community from 30 countries between 1994 and (2014). *Sci Rep.* (2018) 8:2861. doi: 10.1038/s41598-018-21243-x
19. Sang T, Zhou H, Li M, Li W, Shi H, Chen H, et al. Investigation of the differences between the medical personnel's and general population's view on the doctor-patient relationship in China by a cross-sectional survey. *Global Health.* (2020) 16:99. doi: 10.21203/rs.3.rs-41725/v2
20. Ferrer RR, Ramirez M, Beckman LJ, Danao LL, Ashing-Giwa KT. The impact of cultural characteristics on colorectal cancer screening adherence among Filipinos in the United States: a pilot study. *Psychooncology.* (2011) 20:862–70. doi: 10.1002/pon.1793
21. Lei P, Jolibert A. A three-model comparison of the relationship between quality, satisfaction and loyalty: an empirical study of the Chinese healthcare system. *BMC Health Serv Res.* (2012) 12:436. doi: 10.1186/1472-6963-12-436
22. Peabody JW, Florentino J, Shimkhada R, Solon O, Quimbo S. Quality variation and its impact on costs and satisfaction: evidence from the QIDS study. *Med Care.* (2010) 48:25–30. doi: 10.1097/MLR.0b013e3181bd47b2
23. Xiong J, Lipsitz O, Nasri F, Lui LMW, Gill H, Phan L, et al. Impact of COVID-19 pandemic on mental health in the general population: a systematic review. *J Affect Disord.* (2020) 277:55–64. doi: 10.1016/j.jad.2020.08.001
24. Wang C, Pan R, Wan X, Tan Y, Xu L, McIntyre RS, et al. A longitudinal study on the mental health of general population during the COVID-19 epidemic in China. *Brain Behav Immun.* (2020) 87:40–8. doi: 10.1016/j.bbi.2020.04.028
25. Zhang MW, Ho CS, Fang P, Lu Y, Ho RC. Usage of social media and smartphone application in assessment of physical and psychological well-being of individuals in times of a major air pollution crisis. *JMIR Mhealth Uhealth.* (2014) 2:e16. doi: 10.2196/mhealth.2827
26. Chew NWS, Lee GKH, Tan BYQ, Jing M, Goh Y, Ngiam NJH, et al. A multinational, multicentre study on the psychological outcomes and associated physical symptoms amongst healthcare workers during COVID-19 outbreak. *Brain Behav Immun.* (2020) 88:559–65. doi: 10.1016/j.bbi.2020.04.049
27. Zhang MWB, Ho CSH, Fang P, Lu Y, Ho RCM. Methodology of developing a smartphone application for crisis research and its clinical application. *Technol Health Care.* (2014) 22:547–59. doi: 10.3233/THC-140819
28. Creamer M, Bell R, Failla S. Psychometric properties of the Impact of Event Scale - Revised. *Behav Res Ther.* (2003) 41:1489–96. doi: 10.1016/j.brat.2003.07.010
29. Lee SM, Kang WS, Cho A-R, Kim T, Park JK. Psychological impact of the 2015 MERS outbreak on hospital workers and quarantined hemodialysis patients. *Compr Psychiatry.* (2018) 87:123–7. doi: 10.1016/j.comppsych.2018.10.003
30. Le TA, Le MQT, Dang AD, Dang AK, Nguyen CT, Pham HQ, et al. Multi-level predictors of psychological problems among methadone maintenance treatment patients in difference types of settings in Vietnam. *Subst Abuse Treat Prev Policy.* (2019) 14:39. doi: 10.1186/s13011-019-0223-4
31. Cheung JTK, Tsoi VWY, Wong KHK, Chung RY. Abuse and depression among Filipino foreign domestic helpers. A cross-sectional survey in Hong Kong. *Public Health.* (2019) 166:121–7. doi: 10.1016/j.puhe.2018.09.020
32. Tee ML, Tee CA, Anlacan JP, Aligam KJG, Reyes PWC, Kuruchittham V, et al. Psychological impact of COVID-19 pandemic in the Philippines. *J Affect Disord.* (2020) 277:379–91. doi: 10.1016/j.jad.2020.08.043
33. Tee CA, Salido EO, Reyes PWC, Ho RC, Tee ML. Psychological State and Associated Factors During the 2019 Coronavirus Disease (COVID-19) pandemic among filipinos with rheumatoid arthritis or systemic lupus erythematosus. *Open Access Rheumatol.* (2020) 12:215–22. doi: 10.2147/OARRR.S269889
34. Ho CSH, Tan ELY, Ho RCM, Chiu MYL. Relationship of anxiety and depression with respiratory symptoms: comparison between depressed and non-depressed smokers in Singapore. *Int J Environ Res Public Health.* (2019) 16:163. doi: 10.3390/ijerph16010163
35. Quek TC, Ho CS, Choo CC, Nguyen LH, Tran BX, Ho RC. Misophonia in Singaporean psychiatric patients: a cross-sectional study. *Int J Environ Res Public Health.* (2018) 15:1410. doi: 10.3390/ijerph15071410
36. Hao F, Tan W, Jiang L, Zhang L, Zhao X, Zou Y, et al. Do psychiatric patients experience more psychiatric symptoms during COVID-19 pandemic and lockdown? A case-control study with service and research implications for immunopsychiatry. *Brain Behav Immun.* (2020) 87:100–6. doi: 10.1016/j.bbi.2020.04.069
37. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 Coronavirus Disease (COVID-19) epidemic among the general population in China. *Int J Environ Res Public Health.* (2020) 17:E1729. doi: 10.3390/ijerph17051729
38. Tan BYQ, Chew NWS, Lee GKH, Jing M, Goh Y, Yeo LLL, et al. Psychological impact of the COVID-19 pandemic on health care workers in Singapore. *Ann Intern Med.* (2020) 173:317–20. doi: 10.7326/M20-1083

39. Liu Y, Ho RC, Mak A. Interleukin (IL)-6, tumour necrosis factor alpha (TNF-α) and soluble interleukin-2 receptors (sIL-2R) are elevated in patients with major depressive disorder: a meta-analysis and meta-regression. *J Affect Disord.* (2012) 139:230–9. doi: 10.1016/j.jad.2011.08.003
40. Viljoen M, Panzer A. Proinflammatory cytokines: a common denominator in depression and somatic symptoms? *Can J Psychiatry.* (2005) 50:128. doi: 10.1177/070674370505000216
41. Li HY, Cao H, Leung DYP, Mak YW. The psychological impacts of a COVID-19 outbreak on college students in China: a longitudinal study. *Int J Environ Res Public Health.* (2020) 17:3933. doi: 10.3390/ijerph17113933
42. Krishnakumar B, Rana S. COVID 19 in INDIA: strategies to combat from combination threat of life and livelihood. *J Microbiol Immunol Infect.* (2020) 53:389–91. doi: 10.1016/j.jmii.2020.03.024
43. Huang Y, Wu Q, Wang P, Xu Y, Wang L, Zhao Y, et al. Measures undertaken in China to avoid COVID-19 infection: internet-based, cross-sectional survey study. *J Med Internet Res.* (2020) 22:e18718. doi: 10.2196/18718
44. Salo J. *China Orders 1,400 Military Doctors, Nurses to Treat Coronavirus.* (2020). Available online at: https://nypost.com/2020/02/02/china-orders-14000-military-doctors-nurses-to-treat-coronavirus/ (accessed March 22, 2020).
45. Burki T. China's successful control of COVID-19. *Lancet Infect Dis.* (2020) 20:1240–1. doi: 10.1016/S1473-3099(20)30800-8
46. Esguerra DJ. *Philippine Arena to Start Accepting COVID-19 Patients Next Week.* (2020). Available online at: https://newsinfo.inquirer.net/1255623/philippine-arena-to-start-accepting-covid-19-patients-next-week (accessed November 18, 2020).
47. Bastani P, Bahrami MA. COVID-19 related misinformation on social media: a qualitative study from Iran. *J Med Internet Res.* (2020). doi: 10.2196/preprints.18932. [Epub ahead of print].
48. Catherine W. *It's Unfair to Blame China for Coronavirus Pandemic, Lancet Editor Tells State Media.* (2020). Available online at: https://www.scmp.com/news/china/science/article/3082606/its-unfair-blame-china-coronavirus-pandemic-lancet-editor-tells (accessed May 8, 2020).

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychiatry

OPINION
published: 11 February 2021
doi: 10.3389/fpsyt.2020.589834

We Are All in This Together: COVID-19 and a Call to Action for Mental Health of Children and Adolescents

Priscilla Idele[1] *and Prerna Banati*[2]*

[1] UNICEF Office of Research at Innocenti, Florence, Italy, [2] UNICEF West and Central Africa Regional Office, Dakar, Senegal

Keywords: mental health, COVID-19, children, adolescent, psychosocial

The COVID-19 pandemic has exposed the urgent need to tackle the crisis of mental health among children and young people. We call for a multi-stakeholder Global Mental Health Alliance for Children, which would achieve the following objectives: to strengthen evidence and understanding of mental health and well-being, causes and risks for children and young people; to scale up investment in mental health programming for children and young people, and particularly expanding the global cadre of health workers, social workers and community workers, with a focus on prevention and promotion of mental health; to support youth-led, evidence- and rights-based initiatives; to expand advocacy and knowledge of mental health for children and young people among the wider public, and reduce stigma, marginalization and discrimination against those experiencing mental ill-health; and to enhance funding from both the public and private sectors for promotion of mental health, prevention of ill-health and treatment of mental health disorders.

For children already living with mental ill-health, the COVID-19 pandemic is exacerbating an already grave and growing challenge. Before the pandemic, between 10 and 20 per cent of all children and adolescents were estimated to suffer from some type of mental health disorder, and mental health conditions accounted for around 16 per cent of the global burden of disease and injury among adolescents (1). Worldwide, depression is estimated to be among the leading causes of disability among young people and suicides are the third leading cause of death among adolescents, and the second among 15–19-year-old adolescent girls. Fifty percent of mental health conditions arise before the age of 14, and 75 per cent by the mid-20s (1, 2).

Recent literature suggests elevated mental health impacts of COVID-19 on children and adolescents (3–5). A study of 8,079 students aged 12–18 years reported prevalence of depressive and anxiety symptoms (identified using Patient Health Questionnaire (PHQ-9) and the Generalized Anxiety Disorder (GAD-7) questionnaire at 43.7 and 37.4%, respectively, with female students at elevated risks (5). These staggeringly high figures become even more worrying given the formative nature of childhood and adolescence. Developmental science evidence has demonstrated the lifetime and intergenerational consequences of exposures to mental stressors early in life. Wemakor and Mensah (6) found that children of depressed mothers 15- 45 years old in northern Ghana were three times more likely to be stunted, noting that younger mothers were more likely to be depressed. Sherr (7) describes the consequences of adverse childhood impacts on mental health in later life, noting the well-documented consequences, including physical illness, death, divorce and unemployment. The risks to future human capital are significant and threaten economic growth and development particularly for nations seeking to reap demographic dividends.

Unfortunately, COVID-19 is not the first major global threat to impact mental well-being of children and adolescents. Various health, economic, societal, environmental and developmental risks have rocked the world and impacted the mental and psychosocial well-being of the youngest

OPEN ACCESS

Edited by:
Manasi Kumar,
University of Nairobi, Kenya

Reviewed by:
Raluca Sfetcu,
Spiru Haret University, Romania
Katie Edwards,
University of Nebraska-Lincoln, United States
Bolanle Adeyemi Ola,
Lagos State University, Nigeria

***Correspondence:**
Prerna Banati
pbanati@unicef.org

Specialty section:
This article was submitted to Public Mental Health, a section of the journal Frontiers in Psychiatry

Received: *06 August 2020*
Accepted: *23 December 2020*
Published: *11 February 2021*

Citation:
Idele P and Banati P (2021) We Are All in This Together: COVID-19 and a Call to Action for Mental Health of Children and Adolescents. Front. Psychiatry 11:589834. doi: 10.3389/fpsyt.2020.589834

generation. Evidence demonstrates the impacts of the global financial crisis on youth suicide rates, hitting men 15–24 hardest (8), the East Asian tsunami disaster resulted in chronic Post Traumatic Stress Disorders (PTSD) (9), exposure of children to armed conflict (10), and disease shocks such as HIV (11) have all seen impacts on increased anxiety and stress.

In an increasingly globalized world, the risks to children from such shocks are magnified. If the COVID-19 crisis has taught us anything, it is that global development partners, governments, communities, caretakers and young people themselves can no longer simply react to global shocks but must put in place measures to anticipate the most plausible risks and build resilience measures and contingency plans to protect the mental health of children and adolescents at the global, national, societal and individual levels.

To do so, the wide evidence gulf needs to be addressed, including assessing the burden in all contexts, understanding vulnerabilities and impacts, unpacking the social, environmental and health determinants of mental health and well-being, identifying solutions to fight stigma and discrimination, and looking critically at quality, durability, sustainability, and coverage of interventions, especially psychotherapy.

However, the absence of evidence is not evidence of absence. Some countries have taken on board mental health as a national issue. Significant political commitment by Sri Lanka after the 2004 Tsunami led to dedicated financing, efforts to decentralize mental health services and integration of mental health into primary health care across the island (12). The need for sustained political commitment and will, adequate national financing and development assistance, infrastructure and systems, and enduring inclusive governance mechanisms and concerted action by all partners is imperative. Vigo et al. (13) call for a partnership bringing together global and country level stakeholders including civil society, donors and development agencies.

Many lessons can be learnt from responses to the AIDS pandemic [see (14), this volume]. Notably, vocal national leadership and the institutionalization of a national response through inclusive National AIDS councils and bold accountability frameworks helped to accelerate action and progress in reaching the most vulnerable.

To respond across the spectrum of promotion—prevention—treatment and care—a coordinated multisectoral approach is imperative. Mental health is not a health sector issue alone. The role of the education sector is central to delivering and sustaining interventions, with evidence that whole-school multicomponent interventions can improve psychosocial outcomes for children (15, 16). Social welfare workforce and child protection services are often at the frontline, mitigating and reporting abuse and adverse childhood experiences. The health sector is critical, through systems level responses (including augmentation of global mental health workforce) as well as at the community level (through peer and lay-counselors) and links to primary health care.

Over the last decades, the global community has invested heavily in global partnerships to tackle development crises through effective financing of solutions. Multi-stakeholder Global Health Partnerships such as the Global Fund to fight AIDS TB and Malaria and the GAVI Alliance for vaccines and immunizations are effective and sustainable models with many positive attributes to build on, including taking a whole-of-society approach, promoting national ownership, engaging with affected populations, and leveraging new partners including the private sector (17). We are all in this together which means rallying together for impact across UN agencies, national governments, private sector, community-based organizations, academia and centrally, with young people themselves.

AUTHOR CONTRIBUTIONS

All authors listed have made an equal, substantial, direct and intellectual contribution to the work, and approved it for publication.

REFERENCES

1. WHO. *Child and Adolescent Mental Health* (2020). Available online at: https://www.who.int/mental_health/maternal-child/child_adolescent/en/
2. Idele P, Banati P, Anthony D. *Turning the Tide Together on Mental Ill-Health for Children*. UNICEF Innocenti Blog (2019). Available online at: https://blogs.unicef.org/evidence-for-action/turning-tide-together-mental-illhealth-children/
3. Golberstein E, Wen H, Miller BF. Coronavirus disease 2019 and effects of school closure for children and their families–reply. *JAMA Pediatr.* (2021) 175:211–2. doi: 10.1001/jamapediatrics.2020.3598
4. Xie X, Xue Q, Zhou Y. Mental health status among children in home confinement during the coronavirus disease 2019 outbreak in Hubei Province, China. *JAMA Pediatr.* (2020) 174:898–900. doi: 10.1001/jamapediatrics.2020.1619
5. Zhou SJ, Zhang LG, Wang LL, Guo Z-C, Wang J-Q, et al. Prevalence and socio-demographic correlates of psychological health problems in Chinese adolescents during the outbreak of COVID-19. *Eur Child Adolesc Psychiatry.* (2020) 29:749–58. doi: 10.1007/s00787-020-01541-4
6. Wemakor A, Mensah KA. Association between maternal depression and child stunting in Northern Ghana: a cross-sectional study. *BMC Public Health.* (2016) 16:869. doi: 10.1186/s12889-016-3558-z
7. Sherr L. in Lansford JE, Banati P. *Handbook of Adolescent Development Research and Its Impact on Global Policy*. Oxford: Oxford University Press (2019).
8. Chang S, Stuckler D, Yip P, Gunnell D. Impact of 2008 global economic crisis on suicide: time trend study in 54 countries. *BMJ.* (2013) 347:f5239. doi: 10.1136/bmj.f5239
9. Kar N, Krishnaraaj R, Rameshraj K. Long-term mental health outcomes following the 2004 Asian tsunami disaster: a comparative study on direct and indirect exposure. *Disaster Health.* (2013) 2:35–45. doi: 10.4161/dish.24705
10. Betancourt TS, Khan KT. The mental health of children affected by armed conflict: protective processes and pathways to resilience. *Int Rev Psychiatry.* (2008) 20:317–28 doi: 10.1080/09540260802090363
11. Lata S, Verma S. Mental health of HIV/AIDS orphans: a review. *J HIV AIDS Res.* (2013) 5:455–67.
12. Fernando N, Suveendran T, de Silva C. Decentralizing provision of mental health care in Sri Lanka, WHO South-East Asia. *J Public Health.* (2017) 6:18–21. doi: 10.4103/2224-3151.206159
13. Vigo DV, Patel V, Becker A, Bloom D, Yip W, et al. A partnership for transforming mental health globally. *Lancet*

Psychiatry. (2019) *S*2215-0366:30434–6 doi: 10.1016/S2215-0366(18)30434-6
14. Banati P, Idele P. Addressing the mental and emotional health impacts of COVID-19 on children: lessons from HIV/AIDS. *Front Psychiatry*. (forthcoming).
15. Ameratunga S, Clark T, Banati P. Changing school climates to promote adolescent wellbeing: two trials with one goal. *Lancet*. (2018) 392:S0140-6736(18)32280-3 doi: 10.1016/S0140-6736(18)32280-3
16. Shinde S, Weiss HA, Varghese B, Khandeparkar P, Pereira B, et al. Promoting school climate and health outcomes with the SEHER multi-component secondary school intervention in Bihar, India: a cluster-randomised controlled trial. *Lancet*. (2018) 10163:8–14. doi: 10.1016/S0140-6736(18)31615-5
17. Banati P, Moatti J. The positive contributions of global health initiatives. *Bull World Health Org*. (2008) 86:820. doi: 10.2471/BLT.07.049361

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychiatry

POLICY AND PRACTICE REVIEWS
published: 20 May 2021
doi: 10.3389/fpsyt.2021.571342

Mental Health and Psychosocial Support During COVID-19: A Review of Health Guidelines in Sub-Saharan Africa

Keneilwe Molebatsi[1,2], *Otsetswe Musindo*[3,4], *Vuyokazi Ntlantsana*[2] *and Grace Nduku Wambua*[2,4]*

[1] Department of Psychiatry, Faculty of Medicine, University of Botswana, Gaborone, Botswana, [2] Department of Psychiatry, Nelson Mandela School of Clinical Medicine, University of Kwa-Zulu Natal, Durban, South Africa, [3] Selibe Phikwe Government Hospital, Ministry of Health and Wellness, Selibe Phikwe, Botswana, [4] Department of Clinical, Neuro and Developmental Psychology, Amsterdam Public Health Research Institute, Vrije Universiteit Amsterdam, Amsterdam, Netherlands

OPEN ACCESS

Edited by:
Joanna Lai, UNICEF United Nations International Children's Emergency Fund, United States

Reviewed by:
Fatima Gohar, UNICEF ESAR, Kenya
Modupe O. Coker, Rutgers, The State University of New Jersey, United States

***Correspondence:**
Grace Nduku Wambua
wambua.nduku@gmail.com

Specialty section:
This article was submitted to Public Mental Health, a section of the journal Frontiers in Psychiatry

Received: *10 June 2020*
Accepted: *22 March 2021*
Published: *20 May 2021*

Citation:
Molebatsi K, Musindo O, Ntlantsana V and Wambua GN (2021) Mental Health and Psychosocial Support During COVID-19: A Review of Health Guidelines in Sub-Saharan Africa. Front. Psychiatry 12:571342. doi: 10.3389/fpsyt.2021.571342

The COVID-19 pandemic brought in its wake an unforeseen mental health crisis. The World Health Organization published a guideline as a way of supporting mental health and psychosocial well-being of different groups during this pandemic. The impact of the pandemic has pushed governments to put measures in place to curb not only the physical health of individuals but their mental health and psychosocial well-being as well. The aim of our paper was to review mental health guidelines of some Sub Saharan African (SSA) countries: (i) to assess their appropriateness for the immediate mental health needs at this time, (ii) to form as a basis for ongoing reflection as the current pandemic evolves. Guidelines were retrieved openly from internet search and some were requested from mental health practitioners in various SSA countries. The authors designed a semi structured questionnaire, as a self-interview guide to gain insight on the experience of COVID-19 from experts in the mental health sector in the various countries. While we used a document analysis approach to analyze the data, we made use of the Mental Health Preparedness and Action Framework to discuss our findings. We received health or mental health guidelines from 10 SSA countries. Cameroon, Kenya, South Africa, Tanzania, and Uganda all had mental health guidelines or mental health component in their health guidelines. Our experts highlight that the mental health needs of the people are of concern during this pandemic but have not been given priority. They go further to suggest that the mental health needs are slightly different during this time and requiring a different approach especially considering the measures taken to curb the spread of disease. We conclude that despite the provision of Mental Health and Psychosocial Support guidelines, gaps still exist making them inadequate to meet the mental health needs of their communities.

Keywords: Sub-Saharan Africa, mental health service, COVID-19, mental health guidelines, prevention policies

INTRODUCTION

The Severe Acute Respiratory Syndrome Coronavirus 2 (COVID-19) which emerged in December 2019 in the city of Wuhan, China has dominated headlines, spread globally, and resulted in a pandemic (1). To prevent transmission of the COVID-19 disease, countries responded by restricting movements. Lockdowns or quarantines have not only impacted the global economy and day-to-day lives, it has also caused a parallel pandemic of fear to the local and global community (2).

The entrance of COVID-19 into Sub-Saharan Africa (SSA) was later than most, with the first identified case in Nigeria in February 2020 (3). The effects of the disease have not been as severe as seen in western countries such as Italy and the United States of America (4). Africa is not a stranger to pandemics with Ebola, Yellow fever, Chikungunya virus and Zika virus among the recent culprits (5, 6), which has enabled countries to create or empower national public health institutes to focus on disease preparedness and responsiveness in the case of a pandemic (7). The mental health crisis which results from the multi-level impact of the pandemic has however gone on unattended (8). The contagion may, at biological level, directly affect the central nervous system thereby causing neuropsychiatric manifestations, at psychological level the impact of morbidity and mortality exceeds even the most resilient of societies (8, 9). At societal level, the opportunity cost of the pandemic is yet to be determined. There is a looming crisis on children's health where with the threat to non-communicable diseases such as malnutrition, and the threat to sustained immunization exists (10). In addition, the economic costs of the pandemic are high, particularly for the vulnerable group of low-income urban informal settlement dwellers who live under conditions of economic constraints who are put under further pressure by lockdown rules (11). The mental health impact of the additional burden of social distancing requirements in situations of crowded living circumstances, and the difficult choice of risking infection or going hungry needs consideration.

Significant impact on the well-being of those affected, their family, community members as well as health care workers have been highlighted (2). Emerging research from across the globe demonstrates that fear may lead to anxiety and depression for example, research from China indicated that 8.4% of the general population reported severe to extremely severe anxiety while 4.3% reported severe to extremely severe depression (12). Extreme states of anxiety, stresses, social stigma, and discrimination are associated with COVID-19 hence there is need of enhancing mental and psychosocial well-being of people affected. To mitigate the risk of negative psychological outcomes caused by COVID-19, the World Health Organization (WHO) department of Mental Health and Substance Use published a document, *"Mental health and psychosocial consideration during COVID-19 outbreak."* It was a way of supporting mental health and psychosocial well-being of different population groups during this pandemic (13). This document provides information to strengthen preparedness and response plans with regards to mental health and psychosocial consequences of COVID-19 outbreak.

Impacts of pandemics such as COVID-19 have highlighted the need for governments to put measures in place to curb not only the physical health of individuals but their mental and psychosocial well-being as well. In this paper, we review mental health guidelines of some Sub-Saharan African countries to achieve the following objectives:

i. To assess the appropriateness of the guidelines in our context
ii. To serve as information sharing to allow for ongoing dialogue across mental health sectors on the African continent
iii. To form as a basis for ongoing reflection as this current pandemic evolves.

CONCEPTUAL FRAMEWORK

We made use of the *Mental Health Preparedness and Action Framework (MHPAF)* developed by Ransing et al. (14) which we adapted for our paper. They describe five interlinked components and suggest that inadequate preparation of one component has a ripple effect and can affect the success of mental health interventions before, during and after a pandemic.

1. *Preparation and coordination:* Ransing et al. (14) suggest that in the early phase of a pandemic, this component should be directed toward preparing infrastructure. These include for example Mental Health Surveillance System (MHSS) that enables systematic data collection, analysis, interpretation, and the timely dissemination of the data to those responsible for prevention and control of the epidemic; training of volunteers and health care workers in psychological first aid (PFA) materials, designation of special clinics for mental health (also a shift to telepsychiatry).
2. *Monitoring and Assessment:* The MHPAF recommends that the MHSS team should prepare a written pandemic mental health emergency plan with special attention to the population at risk. The use of alternative forms of technology such as telepsychiatry, digital platforms, dedicated hotlines and mental health applications can be used for assessment and monitoring of mental health and have the potential to reduce the treatment gap. MHSS should be equipped with such tools for monitoring and assessment in all phases of the pandemic.
3. *Communication* is a key component in the mental health response during the pandemic with previous reports highlighting the need for up-to-date information on an ongoing basis throughout the period. The presentation of information by trusted public health officials helps in minimizing fear and hysteria (14). Reducing the mental distress due to misinformation and "myths" is also important in the early phase of the pandemic. Media (both mainstream and social) are the most frequently used approaches by the government to address misinformation. It is suggested

Abbreviations: COVID-19, Severe Acute Respiratory Syndrome Coronavirus 2; MHPSS, Mental Health and Psychosocial Support; MHPAF, Mental Health Preparedness and Action Framework; MHSS, Mental Health Surveillance System; PFA, Psychological First Aid; PTSD, Post Traumatic Stress Disorder; SSA, Sub-Saharan Africa; WHO, World Health Organization.

that the MHSS team or public health system should be well-equipped for continuous monitoring and should address myths promptly.

4. *Sustainability of mental health care services* – In this we look at the availability of resources—human and financial—that are critical for strengthening the country's preparedness and response to a pandemic. Are funds being directed to MH response? Are the specialist services adequately trained to meet the needs of pandemic, availability? Coordination and collaboration has also been sighted as important because a lack of coordination and collaboration within the healthcare system can affect the delivery of mental health services during a pandemic.

METHODOLOGY

We searched online for health guidelines for the management of COVID-19. We also requested guidelines from mental health practitioners in various SSA countries. Emails were sent to a selected number of mental health practitioners in SSA countries and those who responded to a second reminder were included in the study. We received guidelines from Botswana, Cameroon, Ethiopia, Kenya, Republic of South Africa (South Africa), Sierra Leone, Tanzania, Uganda, Zambia, and Zimbabwe. Ethical approval was not sought for this study as research on publicly available data does not require an ethical review (15).

The authors developed a semi structured questionnaire which was used as a self-interview guide to gain an understanding of perceptions of mental health practitioners/clinicians in various SSA countries regarding their country's mental health status and response during the pandemic (16, 17). Examples of the questions include "*How would you describe the situation the country with regards to mental health during this COVID-19 crisis*?," "*what are some of the mental health needs of the country at this time?*," "*In your opinion, what are some of the mental health needs of the country at this time?*," *"are issues of mental health a priority during this crisis? (availability of services, resources human, and financial)."*

The study used a document analysis methodology to assess MHPSS guidelines and recommendations developed by the various countries in the wake of COVID-19 (18). Document analysis is often used with other qualitative methods to allow for triangulation information which attempts to provide a convergence of evidence. The authors believe this was necessary to serve as input into present management, future policy guidelines and strategic planning processes for future epidemics/pandemics in SSA. Authors KM, OM, and GNW reviewed the various guidelines and responses from the online qualitative survey. Content analysis was carried out and the data was coded into broad themes, guided by our objectives.

RESULTS

We received health and mental health policy guidelines from 10 countries, and we were able to interview 10 experts from these countries (3 clinical psychologists, 1 mental health clinician and researcher, 6 psychiatrists). We highlight country specific COVID-19 demographics as at 9th June 2020 in **Table 1** (19). *Five* countries: Cameroon, Kenya (20), South Africa (21), Tanzania (22), and Uganda (23) all had mental health guidelines or a mental health component in their health guidelines. In **Table 2** we summarize the mental health guidelines developed between March to April 2020 as a response to the COVID-19 pandemic outbreak in SSA. Other countries including, Botswana, Sierra Leone, Ethiopia, Zambia, and Zimbabwe have health guidelines or Standard Operating Procedures (SOPs) for the management of the COVID-19, but these guidelines did not include Mental Health or Psychosocial support.

Mental health experts suggest that mental health of the communities is of concern during this pandemic. Anxiety heightened by the fear of contracting the virus and uncertainties due to poor information coming from governments and media. Extended lockdowns, curfews, and loss of work opportunities are impacting the economic livelihoods of many thus influencing their mental health. The potential rise in persons needing mental health services was also an issue of worry as many countries lack the human resource to cater to increased need of persons needing care.

> *The situation is a combination of variety of issues ranging from anxiety due to the uncertainty of clear information about the virus itself and panic due to the unknown preparedness in containing the spread and fatalities should they happen.* (Kenya)

> *Mostly anxiety brought about fear of the unknown and uncertainty regarding when this will be over, will people still have their jobs, how many people are we going to lose to this disease etc. Depression tends to co-exist hand in hand with anxiety and this situation is no different. Disruption of daily routines, confinement, fear of unemployment, stopping income generating activities for the informal sector all contributory.* (Botswana)

> *Our numbers are raising we are yet to reach the peak of the pandemic. …We are witnessing lots of fear worry and COVID induced anxiety among the population. The Lockdown and curfew are making many people restless due to loss of power to earn and creating lots of separation anxiety especially to family members locked away from their loved ones.* (Kenya)

> *The health system has suddenly come under an additional strain of COVID with COVID patients taking priority over mental health conditions, patients who would benefit from inpatient care have to be treated as outpatients to make room for the more urgent COVID cases. That is protective measure from infection, but it means that optimizing and prioritizing mental health care is not always be possible.* (South Africa)

> *The situation can be described as worrisome, and potentially perilous given the category of patients in question and the state of neglect attributable to this branch of medicine.* (Sierra Leone)

> *The main need of the country is to allay anxiety of the masses by providing correct and legitimate information and involving public in the war against COVID.* (Zambia)

TABLE 1 | COVID-19 Country demographics as at 9th June 2020 (19).

	First case	Confirmed cases	Dead	Recovered	Measures taken by country to curb spread of disease
Kenya	March 13th	2,862	85	849	Lockdown, curfew (7 P.M.−5 A.M.), travel ban between counties and abroad, mandatory quarantine for those coming in from abroad.
Republic of South Africa	March 5th	50,879	1,080	26,099	A travel ban between high risk countries 13 days after the first case. Followed by a total lockdown which began 26th March, for 5 weeks, followed by a phased easing of lockdown regulations.
Tanzania	March 16th	509	21	183	No restrictions.
Uganda	March 21st	657		118	Restricted movements except essential travel, closure of non-essential shopping outlets, curfew (7 P.M.−6:30 A.M.).
Cameroon	March 6th	8,312	212	4,794	Schools closure, mandatory masks, restricted external travel.
Sierra Leone	March 31st	1,001	49	611	Declared a 3-day nationwide lockdown covering the period Sunday, 3rd May to Tuesday, 5th of May 2020, afterwards inter-district travel restricted.
Botswana	March 30th	42	1	24	Lockdown declared on 02 April 2020 for 28 days followed by phased lifting of the lockdown restriction for 3 weeks. mandatory quarantine for those coming from high risk countries,
Zambia	March 18th	1,200	10	912	Partial lockdown form 20 March 2020: movement not restricted but the population encouraged to stay home, schools and alcohol selling outlets closed.
Zimbabwe	March 21st	287	4	46	National Lockdown and prohibition of gatherings was legislated for the 21 day period commending 30 March 2020, restricting movement of the public with the exception to those providing essential services. Mandatory 21-day quarantine for those returning from affected countries

People need support to deal with fears, stress, anxieties and distress of poverty, job/income loss as well as challenges of working at home in mostly inappropriate environments. (Zimbabwe)

Mental health experts cited that mental health during this pandemic was not a priority. The already taxed resources will be put under additional strain due to the rise in mental health needs of the countries during this crisis.

… no priority has been placed on issues of mental health during this crisis. It has never attracted much attention and chances are that the process of staff redistribution might affect the already understaffed solitary psychiatric Hospital (Sierra Leone)

Sadly mental health is an afterthought as the hierarchy in health limits the collaborative thinking for the good of all-every cadre feels and fronts their needs at the expense of self-care and aftercare management which is mental health-Within the mental health teams and across. (Kenya)

The already strained mental health care system will be under further strain, a general trail toward prioritizing COVID will come at a cost of mental health service provision. …. a large proportion of citizens, many of whom are in the informal labor market, now find themselves without an income which has a ripple effect on issues of compliance with medication as transport fees to health facilities may not be possible. The implications therefore are that the measures to protect society against COVID will invariably result in deterioration of other equally important health conditions including mental health conditions. (South Africa)

Mental health is a priority during this time, however given the limited number of mental health resources, people have been missing the opportunity to mental health information. (Tanzania)

Mental health is not a priority. The government is focusing on controlling transmission of the virus, protecting the economy, which is understandable, however, mental health could be mentioned more than under the 1% of the time it has come up in press meetings. (Botswana)

At first when we just started responding to COVID-19 as a country of course little or even attention was given to mental health to the point that all the mental units in the general hospitals were turned onto treatment units for COVID but as time went by and the government took some preventive measure including closing off borders and introducing lockdown, the mental health need started to be recognized as a results of a number of antisocial behaviors of violence and emotional outbursts in communities and among people hence the Ministry of health instituted psychosocial support subcommittee from all the response taskforce to focus at addressing the psychosocial needs. (Uganda)

It was highlighted that some of the mental health needs required at this time are different from what is needed in a stable environment. Firstly, they felt that the mental well-being of individuals may be addressed by the clarity and consistent communication by governments, which may lead to some assurance that they are taking the necessary measures to deal with the pandemic in the various countries. They cited the need for improved access to avenues where individuals may seek mental health and psychosocial support, suggesting (1) there is need for more awareness on mental health needs that may arise because of the pandemic, (2) a need for clear and structured referral systems that will help in the management of mental health needs, and (3) a need for alternative methods of support such as the use of telemedicine or eMedicine to interact with persons in need of psychosocial support. Increased awareness and education for families of those already living with mental health disorders as

TABLE 2 | Summary of guidelines and SOP's of MH and PSS during the COVID-19 outbreak in South Africa, Kenya, Uganda, Tanzania, Cameroon between March and April 2020.

	Kenya	**RSA**	**Cameroon**	**Uganda**	**Tanzania**
Mental health guideline/standard operating procedures	**April, 2020**	**April, 2020**	**April, 2020**	**April, 2020**	**April, 2020**
Objective	Yes - To aid in provision of quality and effective screening, management and provision of mental health and psychosocial support to people suspected or diagnosed to have COVID-19.	Yes - To provide information to promote and protect the mental well-being of the population and to raise awareness about MH problems that may arise due to the COVID-19 outbreak. - To direct head of health establishments, health service providers and informal caregivers on actions to be taken to identify and manage MH problems that may arise during this time. - To ensure that psychiatric facilities comply with measures that have already been prescribed to manage the COVID-19 outbreak.	No	Yes - To facilitate the contribution of a sense of normalcy, foster the healing process and enhances resilience of the affected populations through the support and management of stress, to prevent the negative psychological outcomes including anxiety, depression, panic attacks, and sleep disturbances.	Yes - To provide guidance on implementation of psychosocial support activities during and after COVID outbreaks.
Focus populations	- To cover the needs of the population, - People in treatment for COVID-19, those in quarantine and isolation, - People with mental health conditions requiring continuing care in these settings, - Health workers	- All populations - Provide support to affected individuals, families, and staff in need. - Primary health care workers	- People in isolation (patients) or in isolation (suspected of infection) - Relatives of people in isolation and/or quarantine, including children - The (para) medical staff in charge of people directly or indirectly infected with the infection	- Healthcare workers, health facility managers, - Care providers of children, - Older adults, - People with underlying health conditions, - People in isolation	- Individual, families, health workers and community - Patients confirmed of COVID-19 in treatment/isolation facilities/self-solation, - Contacts in self-isolation, - Individuals in mandatory self-isolation at home/quarantine facility, - Children affected by COVID-19
Interventions	- Psychological first aid - Enhancing coping skills	- N/A (see note below)	- Psychological first aid - Stress management - Enhancing coping skills	- Psychological first aid - Enhancing coping skills	- Psychological first aid - Enhancing coping skills
Who is assisting in provision of service	- Clinicians, health care workers, counselors, and psychologists	- Multi-disciplinary mental health specialists' team comprised of a psychiatrist, psychologist, nurse, occupational therapist and social worker	- Not identified	- Not identified	- Psychosocial team is composed of social workers, social welfare officers, clinical and community psychologists, risk communication and health promotion experts, charity social care organization representatives, community development officers and psychiatric medic such as clinical officer and nurses. - *The guideline also outlines their role during and after the outbreak.*
Was it developed collaboratively?	- Yes	- Not mentioned	- Not mentioned	- Yes	- Not mentioned
In line with WHO guidelines	- Yes	- No	- Yes (some and some)	- Yes	- Yes

these times may present adversity to the individuals possibly leading them to a worsened state.

The major mental health needs would be around calmness in understanding the nature of the virus, providing health workers with sufficient information regarding their safety while interacting with "unknown clients" and providing continuous mental health debriefing for improved resilience. Providing linkage to appropriate services identified based on the need. (Kenya)

While the medical urgency of the pandemic needs to take priority, this needs to be balanced against the mental health needs that will be accentuated by or arise because of the pandemic. Our country is in a position where re-traumatisation seems inevitable. COVID-19 comes at a time when we have not yet recovered from the psychological impact of the HIV pandemic. Some of the reactions to COVID-19, such as stigmatization of the infected are the same as happened with the HIV pandemic. (South Africa)

The COVID-19, without need for much emphasis, could leave traces of mental instabilities ranging from PTSD, Depression, anxiety disorders and other psychological problems. In the light of these, mental health needs in the country may include psychosocial support, psychotherapists, Psychotropic drugs, support for mental health education nationwide. (Sierra Leone)

Individuals with mental illness may have heightened emotional responses and may therefore show more vulnerability to the stress associated with COVID-19, increasing the risk of relapses or worsening of existing conditions. The fear and worry about the threatened lives and livelihoods may result in individuals developing anxiety and depressive symptoms. Patients with serious mental illness and those with cognitive deficits may find it hard to understand and institute behavioral changes required of them such as hand washing and additional hygiene practices, the now mandatory practice of wearing of masks in public may not be understood and masks may feel induce feelings of claustrophobia, social distancing and being forced to stay at home may be an additional stressor. These factors may negatively impact disease containment measures or have an added burden to the careers. (South Africa)

Coping with fear, which can be mitigated by receiving the right information on COVID-19 from reliable sources. (Tanzania)

The main need of the country is to allay anxiety of the masses by providing correct and legitimate information and involving public in the war against COVID. (Zambia)

People need support to handle COVID-19 and Lockdown-related mental health issues such as fear, uncertainty, anxiety, and depression. (Zimbabwe)

Capacity building in terms of providing mental health services. Information sharing and awareness about the different types of mental health illness. (Uganda)

Despite the lack of focus in mental health needs in the countries, some have placed a few measures in place to meet these needs. Some countries initiated training of mental health and lay providers in Psychological First Aid (PFA) to help manage the needs of healthcare workers, identified COVID cases, their families as well as the public.

Community engagement (to a minimal extent) on the consequences of the pandemic on mental health. (Sierra Leone)

Trainings of the mental health providers in PFA and deployment to quarantine sites, hospital, and tele counseling. (Kenya)

While patients continue to receive treatment as usual, various support structures have been put in place to provide frontline workers with psychological support as the pandemic poses the risk of an added stressor to this group. (South Africa)

Establishment of the subcommittee of MHPSS in all the different taskforce teams responding to COVID. Social media engagement by different partner both from the NGO world and government. (Uganda)

Creation of a national psychosocial task force which has been tasked with developing mental health guidelines…establishment of a toll free number where individuals may call to get assistance on psychosocial matters…social support such as provision of food baskets during lockdown. (Botswana)

It was also identified that the provision of mental health care/services may be hindered during this period due to various reasons: inadequate policies, limited human resource trained in mental health care and where to access these services, movement restrictions. Fear of contracting the virus may also hinder help-seeking behavior as well as the general stigma associated with mental health. It was also noted that there was a lack of collaboration and coordination of potential stakeholders who would help mitigate mental health needs.

Lack of knowledge among the populace on mental health and where to access these services. Stigma and discrimination associated with mental health that still needs to be debunked (Kenya)

The financial and economic barriers already stated. Social distancing means that physical consultations with mental health care providers has to be limited as much as possible. Users who are stable are allowed to have digital/electronic consultations with their providers. This useful resource is available to a very small proportion of the population as a greater number of the population has no access to gadgets that would allow such use, and no access to affordable data. (South Africa)

Resources are mainly directed to frontline staff and the vulnerable groups are at risk of being forgotten. (Zimbabwe)

People are afraid to come to hospitals fearing contracting the virus. Lack of enough PPE to healthcare workers making them prone to contracting the virus as well. (Tanzania)

Lack of coordination and communication, people do not know where to go for help. (Botswana)

Lack of leadership, lack of collaboration between various health professionals, lack of Infrastructure. Lack of transparency in extending rightful information, lack of regulatory measures

in strengthening the basic safety measures across the country. (Zambia)

The processes of developing mental health support protocols and actual service delivery are very bureaucratic. There is a lot of going back and forth especially with NGOs such that the service takes forever to kick off. This has resulted in catastrophic incidences, including suicide, incest, and development of severe mental disorders. (Zimbabwe)

Resources in terms of information and finances. Attitude of people toward mental health services. Few numbers of mental health experts. Poor policies. (Uganda)

As mentioned above, some countries in SSA have released guidelines to help manage the mental health and psychosocial needs of its society. Interviewed practitioners varied in their view of the appropriateness of the guidelines, which some found to be appropriate while others found them lacking to meet the needs of the community during this pandemic.

The plan is lacking on the coordination mechanism being that we interpret distress and abnormal behavior differently in Africa due to the stigma therefore healthcare seeking habits are limited and biased to certain populations. Vulnerable populations such as children, people with disabilities, the elderly are not given much considered. Conversely the adolescents, youth and general population have a low risk perception for mental health and might therefore miss out on timely referrals. We might therefore need to address mental health preparedness with the same urgency and approach we do with gender based violence or emergency delivery-develop a clear referral pathway and coordination standard operation protocol and procedure, sensitize both community and frontline health workers on the cascade and chain of management and offer collaborative support to other peers who might not be brave enough to shout out for help. (Kenya)

Yes, they are adequate. The SOPs released by the national government specifically encourages the identification of the specific groups and guidelines on how to handle each of them. (Kenya)

The initiative of developing guidelines in response to COVID is a good one. An important main objective of the guide is the fact that mental health care standards need not be compromised because of the pandemic, and mental health care users should continue receiving good quality care and continued screening for common mental conditions at primary health care has to continue. However, it needs to be taken into cognizance that the guideline requires added resources, such as additional patient screening for COVID, isolation of patients with suspected COVID. Not all facilities will have resources for such necessary measures as the system is already operating at or above capacity. The guidelines correctly stipulate that mental care should be given where it is due and where patients are infected with COVID, support must be given to patient family. The only vulnerable populations addressed by the guide is children, there is not special guide toward dealing with other vulnerable population. (South Africa)

(they need) to strengthen mental health services and involve mental health professionals in the management of every patient with COVID. (Zambia)

Mental health was not initially part of the COVID-protocol from the onset. There was need to integrate it from the beginning e.g., at pre-test stage. (Zimbabwe)

DISCUSSION

The countries differed from each other in terms of the occurrence of the first case, number of confirmed cases, rates of mortality and measures adopted. Mental health guidelines for COVID-19 were identified in 5 countries. Most mental health guidelines were developed based on the World Health Organization considerations on how to protect your mental health released in March 2020 (13). Our findings showed that the countries with mental health guidelines for use during this pandemic, had clearly stated purposes and aims. In addition, South Africa clearly identified mental health services as essential during this time as indicated in section 27 (2) of the disaster management act 2002 (24). This is supported by Secretary-General António Guterres of the United Nations who stated, "*Mental health services are an essential part of all government responses to COVID-19. They must be expanded and fully funded*" (25). Kenya went beyond what was expected and developed standard operating procedures (SOPS) for counselors and psychologists providing MHPSS services in the midst of this crisis (20).

SSA countries have shown economic growth at varying rates since the 1990's, and some have alluded the growth rates to be related to the quality of policies and institutions in the countries (26). In our study, we found no link between countries of high rates of economic growth and the presence of mental health policies.

It is important to note that, mental health in SSA has been given less priority during this pandemic and received little attention from the governments. This finding is however, to be expected as mental health policies have generally not been priority in most SSA countries (27, 28). For example, by 2020, the Nigerian Mental Health Services Delivery Policy had yet to be effected into law (28); In Zimbabwe, the policy had been last reviewed in 1996 (27). The focus, therefore, is more on prevention of COVID-19 infection and physical symptoms. The blind spot on mental health in policy reforms is evidenced by lack of mental health guidelines in Botswana, Sierra Leone, Ethiopia, Zambia, and Zimbabwe which shows that mental health is not at the frontline of health regulations and agendas. Our results are comparable with literature which observed that mental health remains under prioritized in Africa (29, 30) with majority of African countries lacking mental health policies or having outdated mental health legislature (31). In addition, COVID-19 budgets focused less on mental health but more on securing protective clothing and testing kits. Jacob et al. (32) agree that 70% of countries in Africa spend $< 1\%$ of the total health budget on mental health. Given the context of low overall funding for mental health, there is an urgent need for governments to increase funding for mental health in Africa. Even without the influence of a pandemic such as COVID-19, the mental health system in SSA is already taxed and insufficient with challenges related to the economic and development inequalities as well as social and cultural contexts (30).

The guidelines reviewed underscore the need to put appropriate measures in place that guide the provision of mental health and psychosocial support during and after the outbreak. They highlight that it is not only individuals, families directly affected or health care workers who are prone to psychological deterioration during and after the COVID-19 outbreak, but the whole society. The Inter-Agency Standing Committee (33) uses MHPSS to unite a broad range of actors responding to emergencies such as this one, underscoring the need for diverse, complementary approaches in the provision of appropriate support. It goes further to suggest that there are overarching principles to MHPSS response. These suggestions are echoed by Monteiro (30) who says that there is a lack of priority on mental health, as evidence not only in a lack of mental health policy, but most recently guidelines for the management of mental health issues that arise due to the COVID-19 crisis. Limited resources (both human and financial) for mental health leave our societies vulnerable. At 1.4 per 100,000, Africa compares unfavorably to the 9.0 per 100,000 mental health care workers reported globally (34). The professionals cited the need for not only improved access to care, as well as a need for clearly defined referral systems that cater to MHPSS needs during this time. These are systems that already need to be in place and bolstered during a crisis such as COVID-19, but this is not the case in many SSA countries.

Both the Kenyan and the Cameroon guidelines promote Psychological First Aid (PFA). According to WHO, (35) PFA is a humane, supportive, and practical assistance to fellow human being who have recently suffered exposure to serious stressors. During COVID-19, PFA is a non-professional framework that works to provide comfort and practical support, focusing on mental and psychosocial response during and after a crisis. In situations such as these, literature has shown that the number of people whose mental health is affected tends to be greater than the number of people affected by the disease (36). The health implications of contracting COVID-19 compounded by the stringent measures taken by governments to curb the spread of disease heighten risk for mental health issues. A review by Brooks et al. (37) suggests that individuals quarantined or in isolation require attention as they are deprived of their freedom. For individuals already suffering mental health problems, da Silva et al. (38) highlights that the strict measures in place make them more vulnerable to environmental stressors. Such stressors include long/extended quarantine duration, fears of infection, frustration, boredom, inadequate supplies, inadequate information, financial loss, and stigma. They suggest that the negative psychological effects may lead to post-traumatic stress symptoms, confusion, and anger. During this period children are also exposed to large amounts of information and high levels of stress and anxiety from the adults around them (39); therefore, there is need for the developed guidelines to address different population groups and their needs.

Victor and Ahmed (40) suggest that epidemics of the developing world differ from epidemics of the developed countries, both in causing agents and in their proportions. With isolation, reduced opportunity for leisure activities, increased financial stress as a consequence of reduced economic activity; mental health consequences of the pandemic are inescapable (41). Particularly in SSA as COVID-19 is an added burden in conditions where these factors are pre-existing. The Dohrenwend model describes how mental health relates to socio-economic stress and suggests two things. First, that social causation—or the financial strain, the increased exposure to violence and the food insecurity linked to poverty, combined with reduced access to social safety nets such as food banks, income support or family or friends who can offer loans—all increase the likelihood of people developing mental-health problems. Second, that those with pre-existing mental health conditions are most at risk of "social drift" —in which mental illness increases a person's exposure to economic shocks and spurs their fall into poverty (42). The loss of employment opportunities, reduced pay, together with lockdowns and movement restrictions have influenced deterioration of the social and economic conditions of many. Many are at risk for a decline in their mental health thus highlighting the need to address the social and economic conditions that contribute to poor mental health during this time (43).

While the odds may be against SSA with regards to mental health and COVID-19, the emergence of telemedicine in countries such as Nigeria and South Africa show promise in for future clinical care with reduced physical contact and therefore COVID-19 risk reduction (44, 45).

Recommendations

From our findings we recommend that governments need to put the appropriate measures in place to mitigate the mental health effects related to COVID-19. There is also need for clearly defined referral pathways that cater to MHPSS needs during this time. The systems that already in place, need to be bolstered during this crisis. There is need for guidelines that address specific vulnerable populations (children, adolescents, geriatric, differently abled, etc.) and their needs. The needs of such populations vary from that of general population and require more specialized support.

Strengths and Limitations

A strength of our study is the availability of COVID related MHPSS guidelines from included countries to critique. The inclusion of mental health experts working within these countries to give their views on the effects of the pandemic on the mental health of the African population. The limitations of this study are that it was self-interview soliciting expert opinion, which is lower in the hierarchy of evidence. However, expert opinion has been found to be an acceptable means of providing evidence as it is based on factual information and brings new information particularly in new or emergent areas (46). SSA countries are not homogenous and have various factors driving the socioeconomic landscape and policy, this poses a limitation to having a blanket assessment of the situation but, similarities such as rapid urbanization (47) make it prudent to assess these countries together.

CONCLUSION

We note that a number of SSA countries overlooked the development of MHPSS guidelines at a critical time where the

already unmet mental healthcare needs were anticipated to be under further strain. The development of MHPSS guidelines in the wake of a pandemic cannot be overstated. The consequences of added pressure because of COVID-19 to the mental health care system and simultaneous the allocation of resources away from these services will have a lasting effect for years to come require careful consideration. We would like to propose that the pandemic may be an opportunity to strengthen and improve on mental healthcare policies, as a first step by governments toward improved mental health care provision, particularly for under resourced settings.

AUTHOR CONTRIBUTIONS

KM, OM, and GNW reviewed the various guidelines and responses from the online qualitative survey. GNW interpreted the data. KM, OM, GNW, and VN developed the manuscript, critically revised it, and approved the final manuscript for submission. All authors contributed to the development of the project.

ACKNOWLEDGMENTS

We would like to acknowledge and thank mental health practitioners for their respective contributions to the development of this paper: Dorcas Khasowa (Kenya), Shillah Mwaniga (Kenya), Grace Obalim (Uganda), Walter Mangezi (Zimbabwe), Jennifer Raymond Mosha (Tanzania), Ravi Paul (Zambia), Abdul Jalloh (Sierra Leone), Noreen Kudzie Wini Dari (Zimbabwe), Michael Guy Toguem (Cameroon), and Justine Laure Mviena Menguene (Cameroon).

REFERENCES

1. Cucinotta D, Vanelli M. WHO declares COVID-19 a pandemic. *Acta Biomed*. (2020) 91:157–60. doi: 10.23750/abm.v91i1.9397
2. Yao H, Chen JH, Xu YF. Patients with mental health disorders in the COVID-19 epidemic. *Lancet Psychiatry*. (2020) 7:e21. doi: 10.1016/S2215-0366(20)30090-0
3. Nigeria Centre for Disease. *First Case of Corona Virus Disease Confirmed in Nigeria*. (2020). Available online at: https://ncdc.gov.ng/news/227/first-case-of-corona-virus-disease-confirmed-in-nigeria
4. Maclean R. *Africa Braces for Coronavirus, but Slowly*. The New York Times. (2020). Available online at: https://www.nytimes.com/2020/03/17/world/africa/coronavirus-africa-burkina-faso.html (accessed June 8, 2020).
5. WHO Africa. *Mapping the Risk and Distribution of Epidemics in the WHO African Region. A Technical Report*. (2016). Available online at: https://apps.who.int/iris/handle/10665/206560
6. Fenollar F, Mediannikov O. Emerging infectious diseases in Africa in the 21st century. *New Microb New Infect*. (2018) 26:S10–8. doi: 10.1016/j.nmni.2018.09.004
7. Mburu Y, Boum Y. *Coronavirus: Amid the Global Pandemic, Lessons for Africa*. (2020). Available online at: https://www.brookings.edu/blog/africa-in-focus/2020/03/20/coronavirus-amid-the-global-pandemic-lessons-for-africa/ (accessed June 8, 2020).
8. Tucci V, Moukaddam N, Meadows J, Shah S, Galwankar SC, Bobby Kapur G. The forgotten plague: Psychiatric manifestations of ebola, zika, and emerging infectious diseases. *J Glob Infect Dis*. (2017) 9:151–6. doi: 10.4103/jgid.jgid_66_17
9. Huremovic D. Neuropsychiatric complications of infectious outbreaks. In: *Psychiatry of Pandemics*. Cham: Springer (2019). doi: 10.1007/978-3-030-15346-5_7
10. Coker M, Folayan MO, Michelow IC, Oladokun RE, Torbunde N, Sam-Agudu NA. Things must not fall apart: the ripple effects of the Covid-19 pandemic on children in sub-Saharan Africa. *Pediatric Res*. (2020). doi: 10.1038/s41390-020-01174-y. [Epub ahead of print].
11. Amewu S, Asante S, Pauw K, Thurlow J. The economic costs of COVID-19 in Sub-Saharan Africa: insights from a simulation exercise for ghana. *Eur J Dev Res*. (2020) 32:1353–78. doi: 10.1057/s41287-020-00332-6
12. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *Int J Environ Res Public Health*. (2020) 17:1729. doi: 10.3390/ijerph17051729
13. World Health Organization. *Mental Health and Psychosocial Considerations During COVID-19 Outbreak*. World Health Organization. (2020). Available online at: https://www.who.int/docs/default-source/coronaviruse/mental-health-considerations.pdf
14. Ransing R, Adiukwu F, Pereira-Sanchez V, Ramalho R, Orsolini L, Teixeira ALS, et al. Mental health interventions during the COVID-19 pandemic: a conceptual framework by early career psychiatrists. *Asian J Psychiatr*. (2020) 51:102085. doi: 10.1016/j.ajp.2020.102085
15. Scott AM, Kolstoe S, Ploem MC. Exempting low-risk health and medical research from ethics reviews: Comparing Australia, the United Kingdom, the United States and the Netherlands. *Heal Res Policy Syst*. (2020) 18:11. doi: 10.1186/s12961-019-0520-4
16. Keightley E, Pickering M, Allett N. The self-interview: a new method in social science research. *Int J Soc Res Methodol*. (2012) 15:507–21. doi: 10.1080/13645579.2011.632155
17. Allett N, Keightley E, Pickering M. *Using Self-Interviews to Research Memory*. (2011). Available online at: https://hummedia.manchester.ac.uk/schools/soss/morgancentre/toolkits/16-toolkit-using-self-interviews.pdf
18. Bowen GA. Document analysis as a qualitative research method. *Qual Res J*. (2009) 9:27–40. doi: 10.3316/QRJ0902027
19. Worldometer. *Coronavirus Cases*. Worldometer (2020). Available online at: https://www.worldometers.info/coronavirus/coronavirus-cases/#daily-cases (accessed June 9, 2020).
20. Ministry of Health K. *Ministry of Health Standard Operating Procedures for COVID-19 Outbreak*. Nairobi (2020). Available online at: health.go.ke/wp-content/uploads/2020/03/SOPs-for-Counsellors-and-Psychologists-in-the-MHPSS-for-COVID-19-Response-1.pdf-1.pdf
21. Republic of South Africa. *RSA Guidelines on MH Interventions During the Covid 19 Disaster.pdf*. (2020). Available online at: https://www.westerncape.gov.za/assets/departments/health/COVID-19/guidelines_on_mental_health_interventions_during_the_covid-19_disaster.pdf
22. Ministry of Health T. *Standard Operating Procedures (SOPs) for Case Management and Infection, Prevention and Control Case*. (2020). Available online at: https://www.moh.go.tz/en/covid-19-info (accessed May 7, 2020).
23. Ministry of Health U. *National Guidelines for Management of COVID-19*. (2020). Available online at: https://www.health.go.ug/cause/national-guidelines-for-management-of-covid-19/
24. Republic of South Africa. *Disaster Management Act 2002*. (2002) Available online at: https://www.gov.za/sites/default/files/gcis_document/201409/a57-020.pdf (accessed June 8, 2020).
25. United Nations. *Mental Health Services Are an Essential Part of All Government Responses to COVID-19*. (2020). Available online at: https://www.un.org/en/coronavirus/mental-health-services-are-essential-part-all-government-responses-covid-19 (accessed June 8, 2020).
26. Toh K. Emerging growth economies in Sub-Saharan Africa on JSTOR. *Am Econ*. (2016) 61:229–44. doi: 10.1177/0569434516652041
27. Kidia K, Machando D, Mangezi W, Hendler R, Crooks M, Abas M, et al. Mental health in Zimbabwe: a health systems analysis. *Lancet Psychiatry*. (2017) 4:876–86. doi: 10.1016/S2215-0366(17)30128-1

28. Ugochukwu O, Mbaezue N, Lawal SA, Azubogu C, Sheikh TL, Vallières F. The time is now: reforming Nigeria's outdated mental health laws. *Lancet Global Health*. (2020) 8:e989–90. doi: 10.1016/S2214-109X(20)30302-8
29. Bird P, Omar M, Doku V, Lund C, Nsereko JR, Mwanza J. Increasing the priority of mental health in Africa: findings from qualitative research in Ghana, South Africa, Uganda and Zambia. *Health Policy Plan*. (2011) 26:357–65. doi: 10.1093/heapol/czq078
30. Monteiro NM. Addressing mental illness in Africa: global health challenges and local opportunities. *Community Psychol Glob Perspect*. (2015) 1:78–95. doi: 10.1285/i24212113v1i2p78
31. The Mental Health and Poverty Project. *Developing and adopting mental health laws in Africa*. Zambia: Lessons from Ghana (2010).
32. Jacob KS, Sharan P, Mirza I, Garrido-Cumbrera M, Seedat S, Mari JJ, et al. *Series Global Mental Health 4 Mental Health Systems in Countries: Where Are We Now?* (2007) Available online at: http://www.thelancet.com (accessed June 8, 2020).
33. Inter-Agency Standing Committee. *Briefing Note on Addressing Mental Health and Psychosocial Aspects of COVID-19 Outbreak*. (2020). Available online at: https://app.mhpss.net/?get=354/mhpss-covid19-briefing-note-final_26-february-2020.pdf (accessed May 7, 2020).
34. Sankoh O, Sevalie S, Weston M. Mental health in Africa. *Lancet Global Health*. (2018) 6:e954–5. doi: 10.1016/S2214-109X(18)30303-6
35. World Health Organization. Psychological first aid - guide for field workers. *Who*. (2011) 44:813.
36. Reardon S. Ebola's mental-health wounds linger in Africa: Health-care workers struggle to help people who have been traumatized by the epidemic. *Nature*. (2015) 519:13–4. doi: 10.1038/519013a
37. Brooks SK, Webster RK, Smith LE, Woodland L, Wessely S, Greenberg N, et al. The psychological impact of quarantine and how to reduce it: rapid review of the evidence. *Lancet*. (2020) 395:912–20. doi: 10.1016/S0140-6736(20)30460-8
38. da Silva AG, Miranda DM, Diaz AP, Teles ALS, Malloy-Diniz LF, Palha AP. Mental health: why it still matters in the midst of a pandemic. *Braz J Psychiatry*. (2020) 42:229–31. doi: 10.1590/1516-4446-2020-0009
39. Dalton L, Rapa E, Stein A. Protecting the psychological health of children through effective communication about COVID-19. *Lancet Child Adolesc Health*. (2020) 4:346–7. doi: 10.1016/S2352-4642(20)30097-3
40. Huremović D. *Psychiatry of Pandemics. Psychiatry of Pandemics*. Cham: Springer (2019). doi: 10.1007/978-3-030-15346-5
41. Kar SK, Yasir Arafat SM, Kabir R, Sharma P, Saxena SK. Coping with Mental Health Challenges During COVID-19. In: *Coronavirus Disease 2019 (COVID-19)*. (2020) p. 199-213. doi: 10.1007/978-981-15-4814-7_16
42. Dohrenwend BP, Levav I, Shrout PE, Schwartz S, Naveh G, Link BG, et al. Socioeconomic status and psychiatric disorders: the causation-selection issue. *Science*. (1992) 255:946–52. doi: 10.1126/science.1546291
43. Burgess R. COVID-19 mental-health responses neglect social realities. *Nature*. (2020). doi: 10.1038/d41586-020-01313-9. [Epub ahead of print].
44. Adepoju P. Africa turns to telemedicine to close mental health gap. *Lancet Digit Heal*. (2020) 2:e571–2. doi: 10.1016/S2589-7500(20)30252-1
45. Manyati TK, Mutsau M. Exploring the effectiveness of telehealth interventions for diagnosis, contact tracing and care of Corona Virus Disease of 2019 (COVID19) patients in sub Saharan Africa: a rapid review. *Health Technol*. (2021) 9:1–8. doi: 10.1007/s12553-020-00485-8
46. Wenger DR. Limitations of evidence-based medicine: the role of experience and expert opinion. *J Pediatr Orthop*. (2012) 32(Suppl. 2):S187–92. doi: 10.1097/BPO.0b013e318259f2ed
47. Guneralp B. *Urbanization in Africa: Challenges and Opportunities for Conservation*. (2017) Available online at: https://doi.org/10.1088/1748-9326/aa94fe doi: 10.1088/1748-9326/aa94fe (accessed March 8, 2021).

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychiatry

METHODS
published: 24 May 2021
doi: 10.3389/fpsyt.2021.612384

Design of a Mobile Application and Evaluation of Its Effects on Psychological Parameters of Covid-19 Inpatients: A Protocol for a Randomized Controlled Trial

Shokoufeh Aalaei[1], *Farnaz Khoshrounejad*[1], *Lahya Afshari Saleh*[2] *and Mahnaz Amini*[3]*

[1] Department of Medical Informatics, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran, [2] Department of Occupational Medicine, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran, [3] Lung Diseases Research Center, Faculty of Medicine, Mashhad University of Medical Sciences, Mashhad, Iran

OPEN ACCESS

Edited by:
Stefan Swartling Peterson, Karolinska Institutet (KI), Sweden

Reviewed by:
Rüdiger Christoph Pryss, Julius Maximilian University of Würzburg, Germany
Maurice Mars, University of KwaZulu-Natal, South Africa

***Correspondence:**
Mahnaz Amini
AminiM@mums.ac.ir

Specialty section:
This article was submitted to Public Mental Health, a section of the journal Frontiers in Psychiatry

Received: 01 October 2020
Accepted: 23 April 2021
Published: 24 May 2021

Citation:
Aalaei S, Khoshrounejad F, Saleh LA and Amini M (2021) Design of a Mobile Application and Evaluation of Its Effects on Psychological Parameters of Covid-19 Inpatients: A Protocol for a Randomized Controlled Trial. Front. Psychiatry 12:612384. doi: 10.3389/fpsyt.2021.612384

Background: Panic of the disease and the associated concerns can lower the quality of life and physical performance. As long as the COVID-19 pandemic is ever on the rise, the psychological pandemic of the disease is on the rise, too. The high prevalence of COVID-19 has further increased physicians' work pressure. Patients' needs are not met adequately by physicians. It seems essential to use aids to monitor patients' needs and serve them properly. Thus, in the present research, suggestions are made on how to evaluate patients' physical and psychological conditions during the treatment via a mobile application.

Methods and Analysis: The present research is a randomized, two parallel-group, controlled trial. One-hundred-twelve inpatients diagnosed with the coronavirus will be assigned randomly to the control and intervention groups. In the intervention group, a mobile application will be provided to educate patients, establish two-way interactions between patients and care providers and record patients' symptoms. Those in the control group will receive the usual care. The primary outcome is the change to the depression anxiety stress scales-21 (DASS-21) score from the baseline to 2 weeks after discharge from hospital. It will be measured at the baseline, at the time of discharge, and two weeks later.

Ethics and Dissemination: The Ethics committee of Mashhad University of Medical Sciences' approval date was 2020-04-19 with IR.MUMS.REC.1399.118 reference code. Thus far, participants' recruitment has not been completed and is scheduled to end in March 2021. The results will be disseminated in a peer-reviewed journal.

Trial Registration: IRCT20170922036314N4 (https://www.irct.ir/trial/47383).

Keywords: mobile health (mHealth), telemedicine, patient education and consulting, psychology, COVID-19, telemental health, telehealth, information technology

INTRODUCTION

Panic of the unknown can reduce perceived security in humans, and it has always been stressful. The prevalence of COVID-19 can be stressful too. The symptoms of the disease can range from mild to severe. The symptoms include fever, coughs, and shortness of breath (1). Anxiety is a common symptom in patients afflicted with a chronic respiratory disease and can lower the quality of life to a great extent. Clinical anxiety plagues about two-third of respiratory patients and also reduces the quality of life and physical performance. Anxiety induced by Covid-19 prevails and it seems to originate from the unknown nature of the disease and the ambiguity involved. Panic of the disease and the associated concerns might be so intense that it can provoke patients, adults and children. Often, people at a higher risk of the disease (those with diabetes, a transplant, hypertension, respiratory problems, etc.) react more severely to the disease (2).

Because COVID-19 pandemic is ever increasing, the psychological pandemic of the disease is also on the rise. New psychological problems have emerged due to the unreliability and instability of the coronavirus, bad news on the rapid transmission of the disease among people (3, 4), the unknown origin of the virus (5, 6), its high reproductivity (6) and the unpredictability of conditions. Besides the physical suffering, the increased mental pressure involved in confirmed cases of the disease or suspicious circumstances can exacerbate the condition (7, 8). Anxiety and panic can worsen the shortness of breath and reduce patients' adherence to physicians' advice and can even worry the medical staff. If so, patients may experience loneliness, denial, anxiety, depression, sleeplessness, and disappointment. This can reduce the rate of adherence to medical treatment. Some cases may even increase the chances of aggression and suicide (9). Besides inpatients, those discharged also experience different degrees of stress even after the end of the event.

On the other hand, at present, the high prevalence of COVID-19 has further increased physicians' work pressure. Patients' needs are not met adequately by physicians. It seems essential to use aids to monitor patients' conditions and serve them properly. As previously mentioned, COVID-19 patients are affected both physically and psychologically. They need support from both sides.

The current pandemic makes it essential to explore the different aspects of psychiatry, including social-psychological and medical interventions, to find effective evidence-based treatments. One way to reduce patients' stress is to run medical programs and report the health state to them, which can be provided in multiple ways (10).

The past decades have witnessed advanced digital technologies and, thus, the relevant revolutions are pretty promising. New technologies can cost-effectively improve health service provision. Today, many people can access such technologies at a low cost, especially technologies based on smartphones and mobile applications, which have attracted the global population. Thus, it seems that mobile-based interventions play a key role in providing medical services during the pandemic.

Mobile health solutions can potentially provide valuable services during the COVID-19 pandemic. These services can be in the form of education, resource allocation, surveillance, screening, treatment, diagnosis, prevention, management, and control (11).

Applications for contact tracing, symptom monitoring and information provision are among the critical applications developed to manage COVID-19 pandemic (12). Though many applications have been developed for COVID-19, many do not have the right quality (11).

A significant body of research has dealt with the effectiveness of self-care applications and software from physical and psychological aspects in different patients (13–16).

A body of research explored the role of mobile applications in mental health (17, 18). The findings of these studies along with the results of a review in 2019 (19) show that applications play a key role in reducing the symptoms of depression. Besides the patients, physicians' attitude toward the use of mobile-based interventions is positive and promising. Physicians' and patients' acceptance of mobile applications in this field contributes to the use of mobile-based devices for self-management in mental diseases. Due to the notable limitations of the pandemic (e.g., the quarantine, less social contact, and consequently less face-to-face referral to care-providing centers), attention has been drawn to telehealth approaches to facilitate the mental health-related services (20–23). Due to the effectiveness of mobile-based interventions in mental health domain, during the pandemic, mobile-based interventions can be used as non-drug interventions with almost no adverse effect on the COVID-19 patients. These can help reduce depression and anxiety (24).

Thus, in the present research the aim is to evaluate patients' physical and psychological conditions during the treatment (both during hospitalization and recovery) via a mobile application. To this aim, the data stored in the application which represent the patients' condition during the disease will be analyzed by a team of experts consisting of physicians and psychologists. It is expected that removing patients' ambiguities by teaching medical and psychological content, monitoring patients during hospitalization and recovery, and sending them feedback by the physician help reduce mental pressures and improve the medical treatment.

METHODS

Study Design and Setting

A randomized, two parallel-group, controlled trial is designed following the Consolidated Standards of Reporting Trials guidelines (25) (**Figure 1**) to investigate whether the mobile application designed will make any difference in the emotional states of depression, anxiety, and stress in target patients and whether it will produce any better outcome in COVID-19 patients.

The study will be conducted in Imam Reza Hospital in Mashhad, Khorasan Razavi Province, Northeastern Iran. The center is affiliated with Mashhad University of Medical Sciences (MUMS). This hospital has been a referral center for COVID-19 patients since the start of the pandemic in Iran.

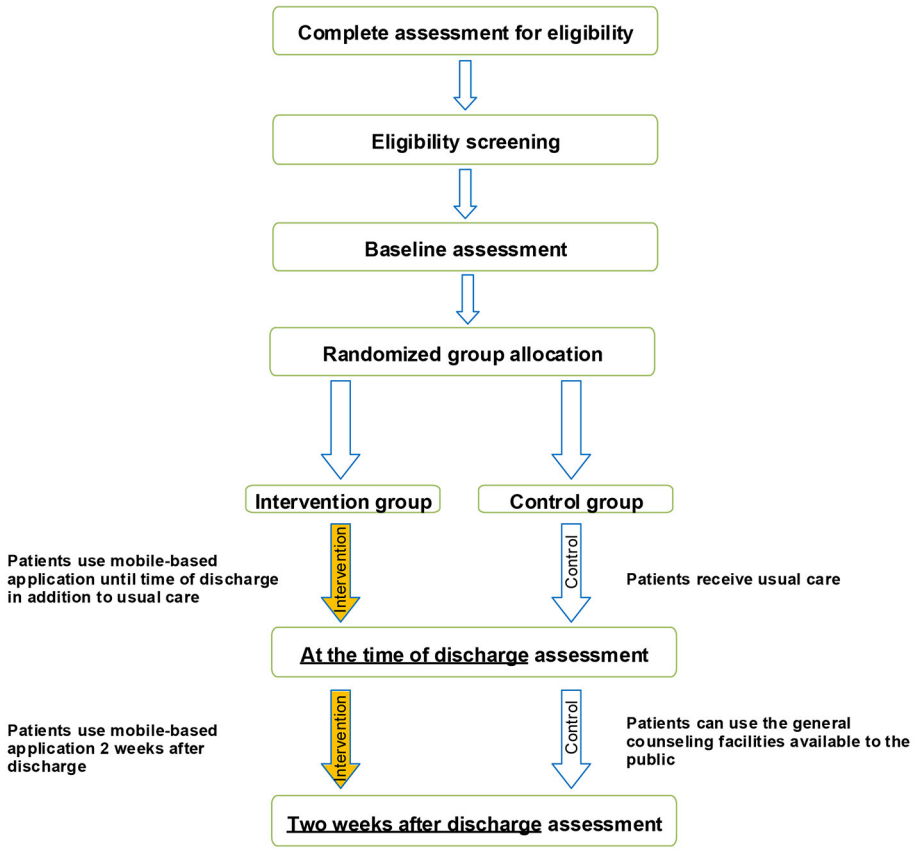


FIGURE 1 | Schematic of the study procedure.

Participants

The target population consists of patients hospitalized with the coronavirus. The eligible patients, based on the inclusion criteria, will be informed about the purpose of study. Then an assistant researcher will collaborate to obtain the written informed consent. It will be ensured that participants can withdraw from the study any time they wish with no effect on their subsequent care. The informed consent has already been evaluated by the Ethics Committee of MUMS (Ethical code: IR.MUMS.REC.1399.118).

Inclusion Criteria

- baseline literacy
- using a smartphone
- ability to work with a smartphone.

Exclusion Criteria

- unwillingness to continue with research
- transference to the wards where it is not possible to use a mobile phone, such as the intensive care unit
- deterioration of the patient's physical condition.

Objectives

The primary purpose of the present trial is to investigate the effectiveness of a mobile application in improving hospitalized Corona patients' psychological parameters such as depression, anxiety, and stress. The trial will also assess any change to respiratory/non-respiratory symptoms in the control and intervention groups.

Control Group

Participants in the usual care group will receive standard care as provided by their physicians at the time of hospitalization. After discharge, they will be recommended to use the general counseling facilities available to the public as soon as required.

Intervention Group

All patients participating in the intervention group will have to install a user-friendly mobile-based psychological counseling and health status monitoring application named "SarveDigital" on their mobile phones. They will also receive usual care the same as the control group.

Participants in the intervention group will be provided with oral and printed instructions for accessing and logging into the application. To access the application, it is necessary to fill in a personal form. Once this is adequately completed, the app services can be accessed.

Participants will be advised to have full access to the program until 2 weeks after discharge, and will be encouraged to use

the program regularly. They will be recommended to use the educational content of the application and ask their questions from a physician via the application.

Intervention

Need Analysis

In designing the application for COVID-19 patients, the first step was to extensively review the related literature on the pre-existing applications in terms of effectiveness, appropriateness to the target group, specific features, and probable discussions in design. Then, in several meetings with internal specialists, psychologists, sports consultants, and medical informaticians (no. of experts = 5), the scientific aspects of the topic, patients' needs during hospitalization and after discharge and the necessity of offering complementary solutions were analyzed. Consequently, according to the present findings, experts' comments and patients' cultural and local tendencies, the main features of the application were specified for the design.

Design Process

In order to design the technical features of the application and apply the maximum capabilities of the mobile application production domain, a team of experts was consulted. The original idea of the application was discussed in meetings shared between the clinical and technical teams. The ambiguities were solved and the technical aspects were discussed.

Eventually, considering the fact that the main goal of developing the application is establishing interactive communication between patients and healthcare providers, a mobile application was designed to support patients physically and psychologically.

During the design procedure, a formative evaluation was used and the feedback received from the experts and sample patients helped to remove the existing defects. The major changes to the application were: change in content, content categorization, larger font size, and change from a native app approach (Android-based application) to a web-based approach (web-based application) due to its compatibility with all smartphones regardless of the operating system. It will be possible to use the application for more patients.

Application Features

The mobile application has been designed with a simple, intuitive user interface.

The application consists of 4 main parts (**Figure 2**):

- **Education:** This part consists of a broad range of educational content during hospitalization and after discharge including psychological, general exercise, medical and health videos and texts about COVID-19 patients. The educational material required for COVID-19 patients will be provided using valid educational resources and experts' consensus.
  To improve the content in later versions of the software, at the end of each educational medium, the patient will be asked to rate the content and help us increase the quality of services.
- **Contacting Care Providers:** This part serves the following functions:
  1. Support by other medical staff besides the attending physicians such as psychologists who cannot be physically present in the clinic for safety matters.
  2. Patient-physician communication via software in hours later than daily visits. Besides filling out an improvement checklist, the patient can write a text about personal queries and concerns.
  3. Physician's (or any other therapist's) feedback for patient. Upon seeing the patient's text, the therapist can send a text-based or audio message as the response (to relieve the patient).
     Contacting care providers will be disabled at the end of the study (2 weeks after discharge).
- **Symptoms Self-report:** SarveDigital will help COVID-19 patients record their symptoms and, thus, their physician will be able to monitor and control their condition from a distance. Patients will be asked to enter their health symptoms such as fever, sore throat, dry cough, difficulty breathing or the shortness of breath, and loss of taste or smell at least three times a week into the application. Each symptom will be rated on a 4-point scale (e.g., "no fever," "mild fever," "moderate fever," and "high fever").
  These data will automatically be sent to the physicians' portal so that the physician will be aware of the patient's health status. It should be noted that the attending physician and the psychologist assigned will be able to access physicians' portal via their mobile phone with a username and password. This will ensure the privacy and security of the patient's information and the relevant classified information (26).
- **Care Providers' Biography:** This part introduces the key information about the attending physician and psychologist who will communicate with the patient. The aim is to increase the trust the patient places in them to easily share concerns, queries and else.

Outcome Measures

Primary Outcomes

The primary outcome will be a change to the patient's depression anxiety stress scales-21 (DASS-21) score from baseline to 2 weeks after discharge from hospital. It will be measured at the baseline, upon discharge and 2 weeks afterward. It should be noted that baseline measurements will be collected as soon as the patient is admitted to the hospital. This will ensure that almost all patients are included under the same conditions.

Secondary Outcomes

- Changes to the respiratory symptoms including the respiratory rate will be determined through physician assessment; oxygen saturation will be measured through pulse oximetry; lung involvement will be checked by imaging at the time of discharge.
- Changes to the non-respiratory symptoms including multi-organ failure will be determined through kidney and liver function tests; fever will be measured with a thermometer; secondary infection will be measured by physician assessment at the time of discharge.

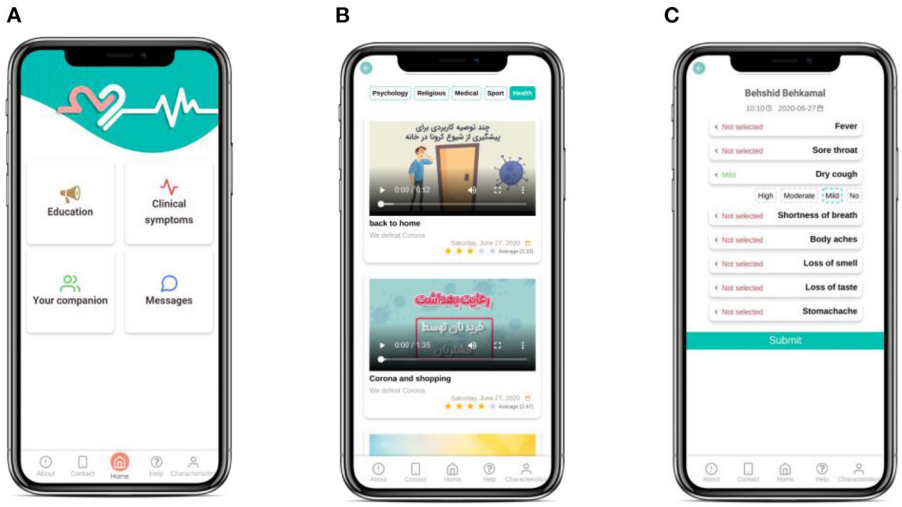


FIGURE 2 | Screenshot of **(A)** home page view, **(B)** education, and **(C)** symptoms self-report.

Data Collection Instruments

Psychological assessment will be conducted using the DASS-21 questionnaire, as the primary outcome. This questionnaire (21 items) is primarily designed to test emotional states such as depression, anxiety, and stress with three respective subscales each with 7 items. The instrument is known for appropriate psychometric properties and is widely employed. A validated version of the questionnaire in Persian language (27) will be used in the present study with three subscales as the main indicators of the negative emotional and psychological responses. A 4-point Likert scale will be used to test the emotional state of each subscale in the questionnaire. The scale ranges from 0 (does not apply to me at all) to 3 (applied to me very much, or most of the time). As for the total score of each subscale, it ranges from 0 to 21, and a higher score represents a higher level of depression, anxiety, and stress. According to Asghari et al. (27), Cronbach's Alpha test of internal consistency was estimated at 0.94 for the whole scale and 0.85, 0.85, and 0.87, respectively, for depression, anxiety, and stress subscales. Moreover, the intra-class correlation with an absolute agreement between Time 1 and Time 2 assessment occasions for depression, anxiety and stress scales were found to be 0.77 (95% CI: 0.56–0.88), 0.89 (95% CI: 0.81–0.94), and 0.85 (95% CI: 051–0.94), respectively. Intra-class correlation values above 0.74 represent a good reliability (28).

The secondary outcomes (i.e., respiratory/non-respiratory symptoms) will be determined by physician assessment, pulse oximetry, radiology images, kidney and liver function tests, and a thermometer.

- In the intervention group, the degree to which the software is used (e.g., seeing the educational content, completing symptoms) and the quantity of questions from care providers will be extracted from the recorded logs of every user and will be reported accordingly.
- At the end of the research, the survey on the quality of application will be submitted to patients in the intervention group. The information will help to improve the later versions of the application. The questionnaire, derived from the related literature in telemedicine (29, 30), will enquire about users' comments on content domains, presentation design, ease of use, usability and satisfaction. Translation, modification and usage of the questionnaires were based on the opinion of three experts in the field of medical informatics familiar with telemedicine research. After an initial review of the content (of the questionnaires) by the experts, a limited sample of the patients ($n = 5$) also evaluated the instrument to further revise it.

All study content, screening and questionnaire data will be collected through online survey software (Google Form).

Sample Size

The similar research was used to estimate the sample size. The most similar study to the present work was conducted by Proudfoot et al. (31), who explored the effect of a mobile application on stress, anxiety and depression. In the above-mentioned research, after the intervention, the effect size between the control and intervention group (the one provided with the application) was reported to be 0.41. The sample size is estimated 190 in total (95 for the intervention group and 95 for the control group) which is calculated in G*Power software with an effect size of 0.41, error probability of 0.05, power of 0.8, and allocation ratio of 1:1. Regarding the 10 % attrition rate within the study, the goal is to include 105 patients in each group (210 participants overall).

Randomization

www.randomization.com will be used to create a randomization sequence. The sequence of the generated random number will be inserted into envelopes sealed by an independent researcher

(SA), not participating in the main data collection phase or in the intervention. These envelopes will be opened only after the participants sign the informed consent and complete all baseline assessments (FK). Then, the eligible participants will be randomly divided into two groups, a usual care group and an intervention group, which uses the application.

Blinding

The nature of the intervention is in a way that does not allow for patient blinding. Similarly, the outcome assessor is not blinded either. That is because s/he is constantly in touch with patients in the intervention group to answer the application questions. The data manager (who generates the randomization sequence, prepares envelopes and maintains a list of the participants who already enrolled) and the data analyzer will be completely blinded to the control and intervention group assignment and specifications.

Data Management

A management committee (MA, SA, and LAS) is formed to monitor data quality and to approve any decision in the present trial. Data entry and coding will be conducted by people other than the main research team and will be checked by the management committee through range-checks for data values.

Statistical Analysis

The normal quantitative variables (checked via the Kolmogorov–Smirnov normality test) will be described using mean and standard deviation. The rest of data will be described using median and interquartile range. To compare the two research groups in terms of the mean difference of quantitative variables, if the normality assumption is met, an independent-sample *T*-test will be run. Otherwise, Mann–Whitney *U*-test will be employed. To test the homogeneity of qualitative variables in the two groups, the Chi-squared test and Fisher's exact test will be run at the *p*-value of 0.05. Repeated-measures or equivalent non-parametric tests will be employed for the continuous outcomes measured repeatedly. All these tests will be two-tailed at a 5 % significance level. Statistical analyses will be done in SPSS22. The analysis will be conducted on an intention to treat. No interim analyses are planned.

RESULTS

So far, the design procedure has been fulfilled. The recruitment of participants has not been completed and is scheduled not later than March 2021.

DISCUSSION

The present research, a randomized clinical trial in type, aims to evaluate a mobile application designed to monitor COVID-19 patients and provide them with clinical and psychological feedback compared to usual care. It seems that such an intervention can provide proper support for the peak time of the disease occurrence. The prospective findings will provide evidence for the effect of mobile health on COVID-19 patients. This research, which will be conducted by an interdisciplinary team, makes it possible to evaluate the effect of this intervention precisely.

Mobile-based interventions can be effective in all stages of prevention, treatment, and follow-up. Instances are checking symptoms, educating patients, communicating with patients and adhering to treatment. Different studies have dealt with the effect of mobile applications on stress and anxiety management and managed to control them (14–16). Thus, it seems that providing psychological support for COVID-19 patients can reduce mental pressure, signs of depression and anxiety (32).

Providing mental healthcare services is not only essential for patients with COVID-19 but also for all individuals who are at a higher risk of the disease. Preliminary reports show that, during the pandemic, people are actively searching for online services to meet their mental health needs. It proves public interest in and acceptance of the medium (33). China, as the first country faced with the coronavirus, has been actively involved in providing different telemental health services during the pandemic. These services have been provided by academic and governmental organizations and include online counseling, supervision, training, and psychoeducation. Research findings proved the effectiveness of online telemental health services and social networks in improving patients' tolerance and stress (34).

Among the benefits of telehealth services are enabling individuals to welcome treatments, cooperate in diagnostic and therapeutic measures, and giving them personal feedback, and supporting or motivating them (35).

The three factors of physician, patient and disease play a key role in the therapeutic process of a disease. If the first two are united, they can pass through the third (i.e., the disease). To unite the physician and patient, it is essential to create connections and interactions between them, possibly facilitated by mobile-assisted technologies (36). We set this issue as a main goal in SarveDigital development. Thus, the instrument developed will enable patients to report their clinical and psychological problems to the medical staff at almost any time. Moreover, this two-way communication will help patients to be actively involved in the treatment procedure, as advised by the physician. There is no harm in using a mobile phone by COVID-19 patients and this is a right preserved for them.

The majority of patients are only examined once a day by the attending physician. Therefore, reporting the respiratory, physical, and mental conditions to the attending physician can create a sense of trust in the medical system and can reduce anxiety. It is in line with the results of a study by Noee et al. (37) which investigated the potential applications of mobile apps in the Iranian health system based on physician opinions. In the light of the present findings, to further develop mobile-assisted healthcare services in Iran, the priorities are: recording and tracking vital signs, supporting electronic decision-making in health-related issues, providing healthcare for remote areas, improving service quality, selecting the best health behavioral patterns, raising social awareness and improving health-related behavior, and increasing patients' knowledge of the disease (37).

It seems that, within the complications of COVID-19 pandemic, most of the above-mentioned priorities should be considered in the applications designed so that we can hope to manage the disease.

An investigation of the existing healthcare applications in Iran shows that the design and development of mobile health applications have grown at least quantitatively in recent years. Considering the fact that Iran is among the top-ranking Middle-eastern countries using mobile phones, it is not far from expectation to warmly embrace the health-related applications (36). A review of published literature on mobile health in Iran proves that the mobile health-related body of research is ever increasing in Iran (38). Although Iranian researchers joined this line of research later, the effectiveness of the interventions in this field in Iran further attests to the potential value of the interventions in disease management. COVID-19 pandemic drew further attention to the significance of using telemedicine tools. During the COVID-19 pandemic, Iranian people have been as psychologically pressed as all around the globe (39). More cases of mental health problems have been reported among COVID-19 patients than others (20) which shows the need for systematic and goal-oriented interventions for COVID-19 patients to support them both psychologically and physically.

If SarveDigital proves effective in telemonitoring COVID-19 patients, we can hope such instruments can reduce the medical staff's work pressure, especially those in the front line of battling the disease. It can also help to reduce COVID-19 patients' anxiety and stress.

STRENGTHS AND LIMITATIONS OF THIS STUDY

- The self-care mobile application in the present research was designed in a structured way with the help of a multi-disciplinary team.
- The application addresses specific, well-defined characteristics, including care-providers' education, contact, self-reported symptoms and care-providers' biography. These all can increase the chances of success.
- The design of this study (randomized controlled trial) tends to meet the highest level of evidence.
- We cannot blind patients to the nature of the intervention, and this is an alleged limitation in the present research.
- Some limitations of the present research are the low literacy of using mobile health in the target population and some patients' unwillingness to continue using the application.

ETHICS AND DISSEMINATION

The approval was obtained from the Ethics committee of Mashhad University of Medical Sciences on 2020-04-19 (# IR.MUMS.REC.1399.118). This trial was registered in Iran Trial Registrar under IRCT20170922036314N4 registration number and 22 June 2020 registration date. The results will be disseminated in a peer-reviewed journal.

The dataset supporting the present results can be made available by the corresponding author upon reasonable request. Personal information about the potential and enrolled participants will be saved on a secure file server research drive at MUMS to ensure confidentiality before, during and after the research.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

ETHICS STATEMENT

This study was approved by the Ethics Committee of Mashhad University of Medical Sciences and Medical School (Ethical code: IR.MUMS.REC.1399.118).

AUTHOR CONTRIBUTIONS

MA and LS conceived the study idea and design. SA and MA designed the plan of RCT implementation. FK conducts the RCT. SA and FK drafted the manuscript. All authors have been involved in critically revising the manuscript. All authors read and approved the final manuscript.

FUNDING

This work is funded by the research deputy of Mashhad University of Medical Sciences, Mashhad, Iran under Grant 990067.

ACKNOWLEDGMENTS

The authors are grateful to all study participants and team members as well as supporting staff.

REFERENCES

1. Wu Z, McGoogan JM. Characteristics of and important lessons from the coronavirus disease 2019 (COVID-19) outbreak in China: summary of a report of 72 314 cases from the Chinese Center for Disease Control and Prevention. *JAMA*. (2020) 323:1239–42. doi: 10.1001/jama.2020.2648
2. Menon V, Padhy SK. Mental health among COVID-19 survivors: are we overlooking the biological links? *Asian J Psychiatry*. (2020) 53:102217. doi: 10.1016/j.ajp.2020.102217
3. Asmundson GJ, Taylor S. Coronaphobia: fear and the 2019-nCoV outbreak. *J Anxiety Disord.* (2020) 70:102196. doi: 10.1016/j.janxdis.2020.102196
4. Huang C, Wang Y, Li X, Ren L, Zhao J, Hu Y, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet.* (2020) 395:497–506. doi: 10.1016/S0140-6736(20)30183-5
5. Fisher D, Heymann D. Q&A: the novel coronavirus outbreak causing COVID-19. *BMC Med.* (2020) 18:57. doi: 10.1186/s12916-020-01533-w
6. Wu JT, Leung K, Leung GM. Nowcasting and forecasting the potential domestic and international spread of the 2019-nCoV outbreak

originating in Wuhan, China: a modelling study. *Lancet.* (2020) 395:689–97. doi: 10.1016/S0140-6736(20)30260-9
7. Lim LJ, Fong LM, Hariram J, Wei LY, Tor, P.-C. COVID-19, a pandemic that affects more than just physical health: two case reports. *Asian J Psychiatry.* (2020) 53:102200. doi: 10.1016/j.ajp.2020.102200
8. Mi L, Jiang Y, Xuan H, Zhou Y. Mental health and psychological impact of COVID-19: potential high-risk factors among different groups. *Asian J Psychiatry.* (2020) 53:102212. doi: 10.1016/j.ajp.2020.102212
9. Li W, Yang Y, Liu Z-H, Zhao Y-J, Zhang Q, Zhang L, et al. Progression of mental health services during the COVID-19 outbreak in China. *Int J Biol Sci.* (2020) 16:1732. doi: 10.7150/ijbs.45120
10. Xiang Y-T, Yang Y, Li W, Zhang L, Zhang Q, Cheung T, et al. Timely mental health care for the 2019 novel coronavirus outbreak is urgently needed. *Lancet Psychiatry.* (2020) 7:228–9. doi: 10.1016/S2215-0366(20)30046-8
11. Salehinejad S, Niakan Kalhori SR, Hajesmaeel Gohari S, Bahaadinbeigy K, Fatehi F. A review and content analysis of national apps for COVID-19 management using Mobile Application Rating Scale (MARS). *Inf Health Soc Care.* (2021) 46:42–55. doi: 10.1080/17538157.2020.1837838
12. Singh HJL, Couch D, Yap K. Mobile health apps that help with COVID-19 management: scoping review. *Jmir Nurs.* (2020) 3:e20596. doi: 10.2196/20596
13. Preziosa A, Grassi A, Gaggioli A, Riva G. Therapeutic applications of the mobile phone. *Br J Guidance Counsel.* (2009) 37:313–25. doi: 10.1080/03069880902957031
14. Repetto C, Gaggioli A, Pallavicini F, Cipresso P, Raspelli S, Riva G. Virtual reality and mobile phones in the treatment of generalized anxiety disorders: a phase-2 clinical trial. *Pers Ubiquitous Comput.* (2013) 17:253–60. doi: 10.1007/s00779-011-0467-0
15. Villani D, Grassi A, Cognetta C, Toniolo D, Cipresso P, Riva G. Self-help stress management training through mobile phones: an experience with oncology nurses. *Psychol Serv.* (2013) 10:315. doi: 10.1037/a0026459
16. Carissoli C, Villani D, Riva G. Does a meditation protocol supported by a mobile application help people reduce stress? Suggestions from a controlled pragmatic trial. *Cyberpsychol Behav Soc Netw.* (2015) 18:46–53. doi: 10.1089/cyber.2014.0062
17. Kuhn E, Kanuri N, Hoffman JE, Garvert DW, Ruzek JI, Taylor CB. A randomized controlled trial of a smartphone app for posttraumatic stress disorder symptoms. *J Consult Clin Psychol.* (2017) 85:267. doi: 10.1037/ccp0000163
18. Huberty J, Green J, Glissmann C, Larkey L, Puzia M, Lee C. Efficacy of the mindfulness meditation mobile app "calm" to reduce stress among college students: randomized controlled trial. *JMIR mHealth uHealth.* (2019) 7:e14273. doi: 10.2196/14273
19. Kerst A, Zielasek J, Gaebel W. Smartphone applications for depression: a systematic literature review and a survey of health care professionals' attitudes towards their use in clinical practice. *Eur Arch Psychiatry Clin Neurosci.* (2020) 270:139–52. doi: 10.1007/s00406-018-0974-3
20. Mohammadi SM, Ashtari S, Khosh Fetrat, M. The psychological impact of COVID-19 pandemic on mental health of Iranian population. *Int J Travel Med Global Health.* (2020) 9:19–24. doi: 10.34172/ijtmgh.2021.04
21. Rosen CS, Glassman LH, Morland LA. Telepsychotherapy during a pandemic: a traumatic stress perspective. *J Psychother Integr.* (2020) 30:174. doi: 10.1037/int0000221
22. Wind TR, Rijkeboer M, Andersson G, Riper H. The COVID-19 pandemic: the 'black swan'for mental health care and a turning point for e-health. *Internet Interv.* (2020) 20:100317. doi: 10.1016/j.invent.2020.100317
23. Zhou X, Snoswell CL, Harding LE, Bambling M, Edirippulige S, Bai X, et al. The role of telehealth in reducing the mental health burden from COVID-19. *Telemed eHealth.* (2020) 26:377–9. doi: 10.1089/tmj.2020.0068
24. Ding H, He F, Lu Y, Hao S, Fan X. Effects of non-drug interventions on depression, anxiety and sleep in COVID-19 patients: a systematic review and meta-analysis. *Eur Rev Med Pharmacol Sci.* (2021) 25:1087–96. doi: 10.26355/eurrev_202101_24679
25. Schulz KF, Altman DG, Moher D. CONSORT 2010 statement: updated guidelines for reporting parallel group randomised trials. *Trials.* (2010) 11:1–8. doi: 10.1186/1745-6215-11-32
26. Liem A, Sit HF, Arjadi R, Patel AR, Elhai JD, Hall BJ. Ethical standards for telemental health must be maintained during the COVID-19 pandemic. *Asian J Psychiatr.* (2020) 53:102218. doi: 10.1016/j.ajp.2020.102218
27. Asghari A, Saed F, Dibajnia P. Psychometric properties of the Depression Anxiety Stress Scales-21 (DASS-21) in a non-clinical Iranian sample. *Int J Psychol.* (2008) 2:82–102.
28. Brown TA, Chorpita BF, Korotitsch W, Barlow DH. Psychometric properties of the Depression Anxiety Stress Scales (DASS) in clinical samples. *Behav Res Ther.* (1997) 35:79–89. doi: 10.1016/S0005-7967(96)00068-X
29. Feizalahzadeh H, Zagheri Tafreshi M, Moghaddasi H, Ashghali Farahani M, Zareh Z, Khalilzadeh M. Effectiveness of multimedia based on education and traditional methods on life quality of hemodialysis patients. *J Holist Nurs Midwifery.* (2016) 26:69–78.
30. Ding H, Fatehi F, Russell AW, Karunanithi M, Menon A, Bird D, et al. User experience of an innovative mobile health program to assist in insulin dose adjustment: outcomes of a proof-of-concept trial. *Telemed eHealth.* (2018) 24:536–43. doi: 10.1089/tmj.2017.0190
31. Proudfoot J, Clarke J, Birch M-R, Whitton AE, Parker G, Manicavasagar V, et al. Impact of a mobile phone and web program on symptom and functional outcomes for people with mild-to-moderate depression, anxiety and stress: a randomised controlled trial. *BMC Psychiatry.* (2013) 13:1–12. doi: 10.1186/1471-244X-13-312
32. Purgato M, Gastaldon C, Papola D, Van Ommeren M, Barbui C, Tol WA. Psychological therapies for the treatment of mental disorders in low-and middle-income countries affected by humanitarian crises. *Cochrane Database Syst Rev.* (2018) 7:CD011849. doi: 10.1002/14651858.CD011849.pub2
33. Liu S, Yang L, Zhang C, Xiang Y-T, Liu Z, Hu S, et al. Online mental health services in China during the COVID-19 outbreak. *Lancet Psychiatry.* (2020) 7:e17–e8. doi: 10.1016/S2215-0366(20)30077-8
34. Shaygan M, Yazdani Z, Valibeigi A. The effect of online multimedia psychoeducational interventions on the resilience and perceived stress of hospitalized patients with COVID-19: a pilot cluster randomized parallel-controlled trial. *BMC psychiatry.* (2021) 21:1–12. doi: 10.1186/s12888-021-03085-6
35. Borjalilu S, Talebpor A. The role of mobile applications in delivery of mental health services: a review study. *J Health Biomed Inf.* (2016) 3:132–44.
36. Ahmadizad A, Varmaghani M, Varmaghani S. Mobile health services: past, present, future. *Educ Strategy Med Sci.* (2017) 10:246–33.
37. Noee M, Sari AA, Olyaeemanesh A, Mobinizadeh M. Prioritizing the potential applications of mobile-health in the iranian health system. *J Res Health Sci.* (2020) 20:e00473. doi: 10.34172/jrhs.2020.08
38. Ershad Sarabi R, Sadoughi F, Jamshidi Orak R, Bahaadinbeigy K. Role of mobile technology in Iran healthcare system: a review study. *J Health Biomed Inf.* (2018) 4:313–26.
39. Serafini G, Parmigiani B, Amerio A, Aguglia A, Sher L, Amore M. The psychological impact of COVID-19 on the mental health in the general population. *QJM Int J Med.* (2020) 113:531–7. doi: 10.1093/qjmed/hcaa201

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychiatry

OPINION
published: 10 June 2021
doi: 10.3389/fpsyt.2021.576352

Lessons Learned From a Low-Income Country to Address Mental Health Needs During COVID-19

Judite Blanc[1], Azizi Seixas[1], Elizabeth Farrah Louis[2], Donaldson Fadael Conserve[3], Georges Casimir[4] and Girardin Jean-Louis[1]*

[1] Department of Population Health, New York University, New York, NY, United States, [2] Fogarty International Center (FIC), Bethesda, MD, United States, [3] University of South Carolina Lancaster, Lancaster, CA, United States, [4] State University of New York Downstate Medical Center, Brooklyn, NY, United States

Keywords: 2019 coronavirus disease, Haiti 2010 earthquake, psychological first aid, war mentality, low and middle income country

OPEN ACCESS

Edited by:
Stefan Swartling Peterson, Karolinska Institutet (KI), Sweden

Reviewed by:
Anu Mary Oommen, Christian Medical College & Hospital, India

****Correspondence:***
Judite Blanc
juditeblanc@yahoo.fr

Specialty section:
This article was submitted to Public Mental Health, a section of the journal Frontiers in Psychiatry

Received: *01 July 2020*
Accepted: *20 April 2021*
Published: *10 June 2021*

Citation:
Blanc J, Seixas A, Louis EF, Conserve DF, Casimir G and Jean-Louis G (2021) Lessons Learned From a Low-Income Country to Address Mental Health Needs During COVID-19. Front. Psychiatry 12:576352. doi: 10.3389/fpsyt.2021.576352

INTRODUCTION

As of April 2021, more than 130 million Coronavirus-2019 (COVID-19) confirmed cases and 2 million deaths were reported in 223 countries, territories or regions (1). The devastation caused by the global health crisis surpassed that which was caused by the severe acute respiratory syndrome (SARS) epidemic and the Ebola outbreak. Evidence shows COVID-19 is associated with high mortality, transmission rate, and strict biosecurity restriction. COVID-19 has affected many segments of society such as neighborhood quarantines, nighttime curfews, and states of emergency imposed worldwide. World economies have declined, borders and markets closed, trade and agricultural production have faltered, creating cascades of human and material losses. Psychological stress above and beyond the fear-provoking consequences of the disease itself.

A systematic review of cross-sectional studies published during the first 5 months of 2020 revealed an alarming rate of symptoms of anxiety (6.33 to 50.9%), depression (14.6 to 48.3%), posttraumatic stress disorder (7 to 53.8%), psychological distress (34.43 to 38%), and stress (8.1 to 81.9%) in the global population including in high and low- and middle-income countries such as the US, Denmark, Italy, Spain, China, Iran, Turkey, and Nepal. These studies also showed that the female gender, being$$ less than $\leq$40 years, a diagnostic of chronic/psychiatric ailments, unemployment, student status, and frequent exposure to social media/COVID-19 related news were risk factors for adverse mental health outcomes (2).

In light of these current and unimaginable realities of a global panic and trauma, it is thus incumbent on all of us to protect against, manage, and rebound from COVID-19. However, since the world has not dealt with the scope and magnitude of such a global disaster in a century (Spanish Flu being the last major pandemic), we were unprepared administratively and psychologically. We remain ill-equipped to handle the demands of COVID-19. To deal with this pandemic, some countries, such as the United States, have invoked the spirit of war to cope administratively and psychologically with the COVID pandemic (3). A war mentality may have psychological benefits in some instances, such as the appropriate lauding of healthcare and frontline workers as heroes and the sense of being part of a community fighting against a common enemy—COVID-19. Although a war mentality may positively affect the administrative

response to fighting COVID-19 by providing a more robust supply chain management of personal protective equipment (PPE), it presents some drawbacks. A war mentality may not be the best approach to address and cope with COVID-19 pandemic as it will likely induce a constant state of fear, alarm, victimhood syndrome, and xenophobia. A war mentality may not be the best approach to cope with a pandemic, as it may induce victimhood syndrome where individuals protest against harsh public health policies such as shelter-in-place and physical distancing. The war mentality has to lead to higher levels of xenophobia against people of Asian descent, as seen in the horrific spate of recent attacks against Asian Americans in the United States. The use of "othering" caused by COVID-19 is a maladaptive coping strategy where foreigners are seen as scary and used as the scapegoats (e.g., the constant prejudicial undertones of COVID-19 being a Chinese virus) (4). All of these approaches are antithetical to the appropriate prescription and remedy of surviving a disaster.

THE CASE FOR PSYCHOLOGICAL FIRST AID AND RELATED APPROACHES DURING COVID-19

We argue that instead of a war mentality, a global natural disaster mentality, one rooted in psychological first aid framework and other related approaches such as psychoeducation, and psychosocial support is needed (5, 6). It will help us address the administrative and psychological needs to survive COVID-19. According to the Inter-Agency Standing Committee, common reactions during an outbreak may include avoidance of health facilities, fear of being infected, feeling powerless to protect oneself and others, anxiety, worry, loneliness with self-isolation, depression, triggers of previous stressors. One such stressor that could be particular for this outbreak is the risk of getting infected or infecting others since many guidelines are not being followed, mistaking other health problems with symptoms of COVID-19, and uncertainty about the outcomes of the pandemic (7). Given the prolonged uncertainty of the COVID-19 pandemic, one psychological model, psychological first aid could be helpful to recognize the potential mental health distress and stress that affected populations are facing (8).

The PFA is a novel intervention that respects the dignity, culture and capacities of others (9). According to Shultz and Forbes (2014). PFA is characterized by five key elements which are: safety, calming, connectedness, self-efficacy, and hope. In other terms, PFA is a human-centered and culturally-tailored early intervention that includes a provision of information, comfort, emotional care, and instrumental support to individuals exposed to acute stress. As a frontline intervention, PFA is not meant to be delivered by mental health professionals. The goal is to habilitate an array of lay workers, ranging from professional disaster responders (emergency services personnel, medical emergency teams) to teachers and clergy to administer it. PFA frameworks are currently largely accessible and available in multiple languages. Education on PFA is offered through a variety of live, online, mobile, and mediated training modalities (6).

In the following section, we will summarize our observation of how PFA and other related psychological frameworks were disseminated and integrated with the reinforcement of the Haitian mental health system; and into non-governmental organizations (NGO's) interventions in the aftermath of one of the most devastating disaster in Haitian history (8, 9), to address administrative and psychological needs of the country, and argue for the adoption of PFA for COVID-19.

LEARNING FROM HAITI'S PSYCHOLOGICAL FIRST AID AND MENTAL HEALTH STRATEGY 2010 EARTHQUAKE

Haiti's response post-2010 earthquake paradigmatically changed how the country deals with natural disasters, specifically its public health response. Prior to the 2010 earthquake, there was no cogent mental health policy by the *Ministere de la Santé Publique et de la population* (Ministry of Health) *(MSPP)*, despite several attempts to create one by Bijoux (10). The undervalued priority of mental health issues in Haiti may explain the delayed creation and implementation of a mental health policy. Prior to the disaster, there was no systematic planning for services. The number of mental health professionals was very limited. In 2003, a joint Pan American Health Organization (PAHO) and WHO report identified ten psychiatrists and nine psychiatric nurses working in the public and private sectors in Haiti. In addition, these professionals work mostly in Port-au-Prince, where individuals have to travel from the countryside to receive mental health services. There is a psychiatric hospital in Port-au-Prince and another one about 22 miles from the capital of Port-au-Prince. In the second largest public hospital in the country, Hospital of Justinien in Cap-Haitien (northern side), with limited monthly psychiatric services (10). In 2011, in the field of mental healthcare services the WHO report identified:

- 27 psychiatrists (0.28 psychiatrist per 100.000 inhabitants)
- 14 physicians with no specialization in psychiatry (0.14 per 100.000 inhabitants)
- 36 nurses per 100.000 inhabitants
- 194 psychologists, i-e two per 100.000 inhabitants
- 82 social workers, i-e 0.86 per 100.000 inhabitants
- 1 occupational therapist
- 1 neurologist
- 2 speech therapists.

MENTAL HEALTH IN THE AFTERMATH OF THE HAITI 2010 EARTHQUAKE

Weeks after the earthquake, there was a mobilization of Haitian psychologists toward the implementation of a national mental health policy in the country. Several meetings were held from March 2010 to December 2010 to plan and implement the formation of l'Association Haitienne de Psychologie (AHPsy) (Haitian Psychological Association). The newly formed association aimed to partner with other stakeholders

TABLE 1 | A roadmap toward the dissemination of culturally tailored psychological first aid frameworks during Covid-19 pandemic.

1. Dissemination of Psychological First Aid Guide for lay providers, ranging from professional disaster responders (emergency services personnel, medical emergency teams) to teachers and clergy.
2. Require that all schools and institutions of higher education include a mandatory psychological first aid module for all staff members and develop a mechanism to refer at-risk youth to mental health programs.
3. Implement free mental health programs for the most vulnerable groups such as essential workers (health-care and hospital personnel, public transportation, delivery and grocery workers); COVID-19 survivors (particularly those who presented with severe forms of the disease); the elderly, families who lost loved ones and those who lost their jobs due to the pandemic.
4. Provide tax incentives for the implementation of employer-sponsored wellness programs that promote mental health in at-risk communities.
5. Establish helplines with a diverse staff that mirrors that of the community and that require staff in the helpline to practice cultural humility.
6. Allocate funding to advance studies on mental health, psychological resilience to the COVID-19 pandemic.

in defining a national plan for mental health. As a result, AHPsy held its first conference in June 2011. A plethora of local and international psychologists, psychiatrists, social workers, nurses, spiritual healers, instructors, and educators participated in that conference and shared their data, findings and knowledge on psychological trauma and other related issues (11). Three years later in 2014, a 60-pages document entitled "Mental Health Component" was published by the MSPP (12).

TRAINING OF HUMAN RESOURCES IN PSYCHOLOGICAL FIRST AID AND OTHER RELATED APPROACHES

In the aftermath of the earthquake, Haiti became the new El Dorado as non-governmental organizations and international organizations (IOs) entered the country to provide emergency care and "psychological first aid" to amputees in a state of posttraumatic shock, and those with other physical injuries (9). Multiple training sessions, workshops and conferences between Haitian and foreign psychiatrists, psychologists and social workers were organized in Haiti and abroad.

IMPLEMENTATION OF IDEO AND URAMEL AND FIRST PSYCHOLOGICAL TRAUMA CENTER IN HAITI

L'Institut de Development Personnel et Organisationnel- (IDEO) (*Institute for Personal and Institutional Development*) and the Unite de Recherche et d'Action Medico-Legale-URAMEL (*Unit of Research and Medico-Legal Action*) partnered to offer psychological first aid training and trauma-focused care before the 2010 earthquake. In the aftermath of the earthquake, they received international funding from "Terre des Hommes and Trauma Aid Germany" to launch Haiti's first comprehensive Psychological Trauma Center (Center de Psychotrauma) in Port-au-Prince. According to an interview with the Haitian online press agency *Alterpresse* in January 2014, URAMEL's head reported having conducted more than 17,000 therapy sessions for 3,869 people (13). The Report published in 2016 by IDEO (14) indicated that from December 2011 to April 2015, children's mental health and development were largely taken into account in their overall program.

INTEGRATIVE APPROACHES OF PFA

Plas Timoun (Children's Corner)

The First Lady of the Republic of Haiti, Elizabeth Préval, initiated a project called *Plas Timoun*, to help children cope with stressful events such as grievance, loss of homes, and relocation to temporary shelters, etc. A group of six buses were parked in the courtyard of the Haitian Art Museum in "Champ de Mars," the largest public square in the capital at that time transformed into a vast temporary accommodation camp. In Champs de Mars, children benefited from eight workshops: painting, theater, reading, games, music, pottery, sport and socio-educational activities[1].

The Response of the Haitian Church With Catholic Relief Support

As a result of the support provided by Secours Catholique (*Catholic Relief*), a non-profit catholic association that indicated having provided psychological assistance to more than 15,000 children since 2012, the "Cellule D'Aide Psychologique" (Psychological Assistance Unit) (CAP-CHR) was implemented. In an attempt to respond adequately to the numerous requests for psychological services from the community, following January 2010, the Haitian Conference of Religious (CHR), through this structure, the CAP was initially created in support of religious structures. The CAP is a group of Christians with skills in psychology but also laypersons sharing the same Christian values. In May 2011, the association CAP-CHR was recognized by the Ministry of Social Affairs of Haiti. The purpose of the CAP-CHR was to mobilize and train teams of undergraduates in psychology to work with families, throughout schools and provide them with tools for their psychological reconstruction.

Eleven years after the most devastating natural catastrophe in Haiti's history, the memories and the scars of the earthquake are alive in the Haitian collective psyche. And Haitian mental health professionals unanimously acknowledged that the disaster shed light on the importance of mental health for disaster-preparedness initiatives in this disaster-prone island. From this psychological standpoint, what lessons could high-income countries learn from the Haitian experience with the 2010 earthquake? We recommend avoiding the spirit of war which was adopted by some world leaders as a coping strategy to

[1]https://africa.si.edu/exhibits/haiti/plas.html.

COVID-19, rather in **Table 1**, we propose a roadmap toward the dissemination of culturally-tailored psychological first aid and other related approaches to address mental health outcomes of the pandemic.

CONCLUSION

In summary, 10 years after the Haiti 2010 earthquake, great progress has been made in public policies, programs and the provision of services in the field of mental health. As a result of such progress, in April 2020, to ensure that psychological care became more accessible, AHPsy launched a *helpline*. For nearly 3 weeks, as COVID-19 made waves in the country, attendants received calls from dozens of Haitians in need of professional psychological support. According to the head of this service, the former President of AHPsy, "Although the service was not created specifically for COVID-19, it was set up in the midst of a coronavirus pandemic. Surprisingly, we are receiving very few cases of psychological distress in connection to the COVID-19 pandemic," says Ronald Jean Jacques (15). Could Haiti's long history of coping with historical traumas and natural disaster a buffer against adverse mental health outcomes during COVID-19? One year since the first case of COVID-19 has been reported in Haiti, at the end of March 2021, Haiti was among the countries with the least COVID-19 confirmed cases (<13,000) and death (<300) (16). Certainly, some could argue that, this is due to a lack of testing, limited tourist activities and commercial relationships with the outside world. For historical and socio-economic reasons, global health authorities were anxious about the impact of COVID-19 on the first Black republic along with other low and middle-income countries (LMICs). As of April 2021, surprisingly, according to the Haitian Ministry of Health, Haiti is coping well with the COVID-19 pandemic.

AUTHOR CONTRIBUTIONS

All authors listed have made a substantial, direct and intellectual contribution to the work, and approved it for publication.

FUNDING

JB research was supported by funds from the NIH (T32HL129953), AS was supported by NIH-funded K01HL135452 and R01HL152453, GJ-L was supported by NIH-funded K07AG052685, R01MD007716, and R01HL142066, and EL was supported by the Fogarty International Center and National Institute of Mental Health, of the National Institutes of Health under Award Number D43 TW010543.

REFERENCES

1. WHO. *WHO Coronavirus (COVID-19) Dashboard. COVID19*. WHO (2021). Available online at: https://covid19.who.int/
2. Xionga J, Lipsitzc O, Nasric F, Luic LMW, Gillc H, Phanc L, et al. Impact of COVID-19 pandemic on mental health in the general population: a systematic review. *J Affect Disord.* (2020) 277:55–64. doi: 10.1016/j.jad.2020.08.001
3. Frieden T. *Former CDC Director: There's a Long War Ahead and Our Covid-19 Response Must Adapt.* CNN (2020). Available online at: https://www.cnn.com/2020/03/20/health/coronavirus-response-must-adapt-frieden-analysis/index.html
4. Kuo L. Trump sparks anger by calling coronavirus the 'Chinese virus' [Online]. *The Guardian.* (2020, March 17). Available online at: https://www.theguardian.com/world/2020/mar/17/trump-calls-covid-19-the-chinese-virus-as-rift-with-coronavirus-beijing-escalates
5. WHO. *Mental Health Considerations during COVID-19 Outbreak* [Online] (2020). Available online at: https://pscentre.org/?resource=9031
6. WHO. *Psychological First Aid: Guide for Field Workers Guide for Field Workers.* WHO (2011).
7. Pfefferbaum B, North C. Mental Health and the Covid-19 Pandemic. *N Engl J Med.* (2020) 383:510–2. doi: 10.1056/NEJMp2008017
8. Shultz JM, Forbes D. Psychological First Aid: Rapid proliferation and the search for evidence. *Disaster Health.* (2014) 2:3–12. doi: 10.4161/dish.26006
9. Schafer A, Snider L, van Ommeren M. Psychological first aid pilot: Haiti emergency response. *Intervention.* (2021) 8:245–54. doi: 10.1097/WTF.0b013e32834134cb
10. OMS. *Le Systeme de Sante Mentale en Haiti.* Haiti: OMS (2011).
11. Nicolas G, Jean-Jacques R, Wheatley A. Mental health counseling in haiti: historical overview, current status, and plans for the future. *J. Black Psychol.* (2012) 38:509–19. doi: 10.1177/0095798412443162
12. Ministère de la sante publique et de la population. *Composante de Santé Mentale de la Politique Nationale de Sante.* Port-au-Prince: Ministère de la sante publique et de la population (2014).
13. Bruno E. *Haïti-Séisme/4 ans : Faire le deuil des proches disparus, un cap difficile* [Online]. Alterpresse (2014). Available online at: https://www.alterpresse.org/spip.php?article15771.
14. IDEO. *IDEO Presentation* [Online]. Internal Report. Trauma Ressources International (2016). Available online at: https://traumaresourcesinternational.org/wpcontent/uploads/2016/10/Foundatino-IDEO-Pr%c3%a9sentation.pdf.
15. Francisque J. "Tu es folle!", "Un homme doit gérer ses problèmes seul"...visiter un psy reste mal vu en Haïti [Online]. Ayibopost (2020). Available online at: https://ayibopost.com/tu-es-folle-un-homme-doit-gerer-ses-problemes-seulsvisiter-un-psy-reste-mal-vu-en-haiti/
16. Ministere de la Sante Publique et de la Population. *COVID-19- Siyasyon Maladi a Ayiti* [Online] (2021). Available online at: www.mspp.gouv.ht

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Public Health

BRIEF RESEARCH REPORT
published: 18 June 2021
doi: 10.3389/fpubh.2021.586062

COVID-19-Related Stressors and Mental Health Among Chinese College Students: A Moderated Mediation Model

Zaichao Han[1], Xiujuan Tang[2], Xiaoshan Li[2,3], Youtian Shen[2], Li Li[2], Jingjing Wang[2], Xiaowei Chen[2] and Zhijun Hu[2]*

[1] College of Life Sciences, Jiangxi Normal University, Nanchang, China, [2] School of Psychology, Jiangxi Normal University, Nanchang, China, [3] Center of Mental Health Education and Research, School of Psychology, Jiangxi Normal University, Nanchang, China

This study aims to examine the relation between COVID-19-related stressors and mental health among Chinese college students during the pandemic outbreaks, and the possible mediator or moderator between them. Five hundred and fifty Chinese college students were invited to complete an anonymous survey, and the data were analyzed with SPSS 16.0 software. The results shows that the number of stressors has a negative direct and indirect (through risk perception of being infected with COVID-19 disease) impacts on college students' mental health. Adaptive coping is a protective factor of students' mental health, and could be regarded as a buffer that attenuates the negative effect of the COVID-19-related stressors on risk perception of being infected with COVID-19 disease (or mental health). With regard to demographic variables, females, junior and senior students, or students whose family residence was worst hit by the pandemic tend to report poorer mental health during the pandemic outbreak. These findings enrich our understanding about the impact of the COVID-19 pandemic on college population and have implications for university counseling services during times of acute, large-scale infective disease outbreaks.

Keywords: COVID-19-related stressors, coping, mental health, perceived risk of being infected with COVID-19, online learning satisfaction

OPEN ACCESS

Edited by:
Manasi Kumar,
University of Nairobi, Kenya

Reviewed by:
Mohammed A. Mamun,
Centre for Health Innovation, Networking, Training, Action and Research, Bangladesh
Maureen King'E,
University of Nairobi, Kenya

***Correspondence:**
Xiaoshan Li
boat010519@126.com

Specialty section:
This article was submitted to Public Mental Health, a section of the journal Frontiers in Public Health

Received: *22 July 2020*
Accepted: *24 May 2021*
Published: *18 June 2021*

Citation:
Han Z, Tang X, Li X, Shen Y, Li L, Wang J, Chen X and Hu Z (2021) COVID-19-Related Stressors and Mental Health Among Chinese College Students: A Moderated Mediation Model. Front. Public Health 9:586062. doi: 10.3389/fpubh.2021.586062

INTRODUCTION

COVID-19 pandemic not only caused damage to individual physical heath, but also have a negative impact on individual mental health (1, 2). Recently, a study of 1120 respondents from 194 cities in China showed that 53% respondents reported a moderate or severe psychological impact, and approximately 30.3% (36.4%) respondents reported the symptoms of depression (anxiety) during early COVID-19 outbreak (3). Although psychological symptoms are common phenomenon for people lived in infectious areas, the significant individual differences in susceptibility to mental health problems was also found during the pandemic outbreak (4, 5). The student population (including college students) became susceptible to the pandemic and may easily develop mental health problem due to their immaturity of psychological development, and the fluctuation of the mood (6). In addition, taking online course was often seemed as one of challenge issues for college students during the pandemic, and student suicide related to online schooling was reported in

many countries or areas (7, 8). However, recent researches related to the pandemic mainly focused on patients, front-line health care workers, or abnormal response to the pandemic among general population, we know little about the effect of pandemic on college student population and how these influences occur. Therefore, studying the impact of COVID-19 pandemic on college student population can enrich our understanding about the impact of pandemic on general population and holds the promise of information for counselors to prevent negative psychological effect of pandemics on the general college student population.

Stress-health theory believes that stressful events might cause individual physical or mental health problems (6). As a new infectious disease, highly contagious and harmful, rapid development, and no effective drugs for preventive or treatment are main characteristics of the COVID-19 pandemic (1). During the pandemic outbreak, students' mental health was influenced by some stressful issues related to the pandemic, including individual physical health under the threaten of the COVID-19 disease, individual daily routine disrupted, and so on. Those issues above are regarded as the COVID-related stressors in the present study. Previous research has shown that the large number of stressors related to infectious disease is a risk factor in predicting individual psychological symptoms during SARS (9). In addition, the risk perception of being infected with COVID-19 disease is the common response by general population during the pandemic (10, 11). The risk perception model of health suggests that stressful events related with infectious disease have indirect negative effects on individual mental health by increasing individuals' perceived risk of being infected with diseases (12). Thus, the first hypothesis was proposed as follows:

Hypothesis 1: Individuals who experience more COVID-19-related stressors might have a higher perceived risk of being infected with COVID-19, leading to worse mental health.

Coping refers to an individual's constantly changing cognitive and behavioral efforts when dealing with environmental or physiological challenges (13). It is often regarded as a moderator to explain individual differences in susceptibility to mental health problems during the pandemic. On one hand, individuals who use adaptive coping strategy frequently tend to engage in problem solving and take positive measures (e.g., wearing masks for outdoor activities) to protect them from harm in a dangerous world (2, 12), which may reduce the impact of stressors on the risk perception of being infected with COVID-19 disease. On the other hand, individuals who use adaptive coping strategy frequently tend to make great effort (e.g., taking medical treatment; receive psychological intervention) in dealing with the potential adverse consequence of being infected with disease (e.g., physical harm) (2), which might reduce the negative effect of the risk perception of being infected with disease on mental health. Previous research has shown that adaptive coping (e.g., problem-based coping) could be regarded as a buffer in the stress-psychological symptoms relationship (9). Thus, we proposed the second hypothesis as follows:

Hypothesis 2: Adaptive coping could serve as a buffer by attenuating the negative effect of stressor on perceived risk of being infected with COVID-19, and the negative effect of risk perception of being infected with COVID19 on individual mental health.

METHOD

Participants

During the pandemic outbreak, all college students in mainland China were asked to stay at home to take online course instead of offline course. A total of 550 students from the College of Life Sciences at Jiangxi Normal University took part in our health survey in April 15–19, 2020. With the help of university counselor, the survey was sent to students by email, and participants were asked to complete an anonymous, self-reported questionnaire and to return it by the deadline. In the process of data collecting, all researchers including university counselors received the online training, including the standard procedure of data collection, data confidentiality, and so on. Questionnaires with more than 15% of the items unanswered were excluded from the later analysis. Finally, the data of 522 students was used in the following analysis. The response rate was 95%. This study was approved by the ethics committees of the School of Psychology, Jiangxi Normal University, and written informed consent was obtained by all participants.

Measurement

Mental Health

Mental Health Inventory (MH-5) (14) were used to measure the mental health of Chinese college students. The participants were asked to respond on a six-point Likert scale (1 = none of the time, 6 = all of the time). Higher scores indicate better health. The MH-5 has been proven to be adequate as a screener for depression symptoms or generalized anxiety disorder, and as a valid scale in predicting individual mental health among Chinese samples (15). In the current study, the Cronbach's alpha of the scale was 0.81.

COVID-19-Related Stressors

According to Main, the stressors related to infectious disease could be divided as following six groups: self-related events, family-related events, friend-related events, acquaintance-related events, information-related events, and other infectious disease related events (9). Main's view on stressor categorization of infectious disease was supported in our interview survey during COVID-19 pandemic. Therefore, we developed a checklist to assess participants' experience with COVID-19-related stressors based on the Main's categories of stressors related to infectious disease. The COVID-19-related stressors were grouped into six categories: (a) self-related events (three items, e.g., You have the experience of contacting with a confirmed COVID-19 case); (b) family-related events (three items, e.g., A member of your family was a confirmed COVID-19 case"); (c) friend-related events (three items, e.g., A close friend of yours was diagnosed with COVID-19); (d) acquaintance-related events [three items, e.g., Someone you know (not including your family members or close friends) had COVID-19-like symptoms (fever, coughing)]; (e) information-related events (two items, e.g., You heard others talking about the severity and contagiousness of COVID-19); and (f) other COVID-19-related events (two items, e.g., Your family

members had to be in contact with others because of work). A score of 1 indicates that the participants has experienced the stressor related to COVID-19 during the pandemic, while a score of 0 indicates that they have not. With total score of all items computed, the high scores indicate that students experienced more COVID-19-related stressors.

Risk Perception of Being Infected With COVID-19

Based on risk perception with SARS (16), we developed two items to assess college students' perceived risk of being infected with COVID-19. The participants were asked to report their potential exposure to infected patients or their perceived chance of being infected with COVID-19 (very low, low, medium, high, or very high). A high mean score of these two items indicates that the respondent has a higher perceived risk of being infected with COVID-19.

Adaptive Coping

The Brief Coping Strategy Scale (17) was used to assess how frequently participants used coping strategies during the COVID-19 pandemic. The questionnaire includes problem-based coping (e.g., active coping) and emotion-based coping (e.g., denying). Participants responded to each item on a four-point scale (1 = *I have never used it,* 4 = *I always used it*). The difference between problem-based coping and emotion-based coping was used to measure individual coping during the pandemic. A higher score indicates that individuals tend to use adaptive coping (e.g., focus on problem solving) rather than maladaptive coping (e.g., escape). The Brief Coping Strategy Scale has been proven to have high reliability and validity for Chinese samples, and the Cronbach's α values of problem-based coping and emotion-based coping were 0.86 and 0.87 in the present study, respectively.

Social Demographic Variables

In the present study, social demographic characteristics include gender (male, female), grade, and family residence. For variable of family residence, Hubei province was regarded as a worst-hit area during the pandemic, while other areas were regarded as low risk zones.

Data Analysis

Data analysis was conducted via SPSS statistical software version 16.0. First, the demographic characteristics of the college students was calculated for all variables of interest. Second, multivariate tests were applied to compare mental health among college students by groups. Third, multiple regressions were used to analysis the influencing factors of MH5 among college students during the pandemic. In regression model, mental health was regarded as an outcome variable, COVID-19-related stressors as a predictor, risk perception of being infected with COVID-19 disease as a mediator, coping as a moderator, and sex, grade, family residence as control variables. The moderator was mean-centered, as suggested by Aiken and West (18). There was no interaction term for the demographic variables (e.g., gender) in the final regression because there was no effect of the interaction of demographic variables and the predictor (or moderator or mediator) on mental health in the preliminary analysis. Multicollinearity was not considered a problem because the variance inflation factors for all terms in the models did not exceed the cutoff value of 7 (19).

RESULTS

Descriptive Statistics

The demographic and characteristics of the study population are shown in **Table 1**. Among the 522 responding participants, 115 (22%) were male, 355 (68%) were middle grade (includes freshmen and sophomore), 167(32%) high grade students (include juniors and seniors), 47(17.8%) students whose family residence lived in Hubei province (The worst-hit area during the pandemic).

Status of Mental Health by Subgroups

Table 1 shows that female, high grade, or students whose family residence was worse hit by the pandemic reported poorer mental health than male, middle grade, or students whose family residence was slightly hit by the pandemic (*ps.* < 0.05). The results also shows that female students report higher risk perceptions of being infected with disease than male students ($p < 0.05$), and junior and senior students report more COVID-related stressors than freshman and sophomore ($p < 0.05$).

Regression Analysis on the Impact of the Pandemic on Mental Health Among College Students

Regression analyses shows (see **Table 2**) that the number of COVID-19-related stressors negatively predicts mental health ($\beta = -0.21$, $p < 0.001$), while adaptive coping positively predict mental health ($\beta = 0.59$, $p < 0.001$) after controlling participants' gender, grade, and family residence. The number of stressors had an indirect negative effect on mental health through risk perception of being infected with COVID-19 disease [indirect effect: −0.03, CI (−0.05, −0.01)]. Hypothesis 1 was supported. The two-way interaction effect of coping and stressor on risk perception ($\beta = -0.17$, $p < 0.05$) and mental health ($\beta = 0.25$, $p < 0.001$) is significant. The result of a simple slope analysis (16) shows that the number of stressors has a large impact on risk perception of being infected with COVID-19 disease at low level of adaptive coping (below −1 SD from mean) than that at high level (above 1 SD from mean) ($B_{low} = 0.1$, $p < 0.001$; $B_{high} = 0.08$, $p < 0.05$, $Z = 6.8$, $p < 0.001$). The number of stressors has an indirect negative effect (through risk perception of being infected with COVID-19 disease) on mental health [indirect effect: −0.08, CI (−0.14, −0.01)] at a low level of adaptive coping, instead of a high level. Hypothesis 2 was partially supported.

DISCUSSION

COVI-19 caused suffering for people who lived in infected areas. Recent researches related to the pandemic mainly focused on the epidemiology, clinical characteristics of infected patients, the genomic characterization of the virus, and psychological research of medical staff or patients (3–5), less attention was paid to the impact of the pandemic on college student population,

TABLE 1 | Demographic characteristics of the college students by psychological symptoms.

		MH-5		Stressor		Risk perception		Adaptive	
Characteristic	***N* (percent)**	**M ± SD**	***P***	**M ± SD**	***P***	**M ± SD**	***P***	**M ± SD**	***P***
Observations	522(100)	4.76 ± 0.68		2.01 ± 1.44		1.43 ± 0.63		18.8 ± 6.27	
Gender			<0.05		0.28		< 0.001		0.739
Female	407(77.9)	4.73 ± 0.64		2.04 ± 1.42		1.48 ± 0.62		18.80 ± 6.16	
Male	115(22.1)	4.87 ± 0.79		1.88 ± 1.53		1.23 ± 0.51		19.02 ± 6.68	
Grade			<0.05		<0.01		0.252		0.087
Middle	355(68)	4.81 ± 0.67		1.86 ± 1.45		1.39 ±0.58		19.20 ± 6.34	
High	167(32)	4.64 ± 0.68		2.33 ± 1.37		1.48 ± 0.64		18.10 ± 6.07	
Family residence			<0.01		<0.01		0.112		<.05
Low hit	426(82.2)	4.79 ± 0.65		1.96 ± 1.40		1.39 ± 0.57		19.06 ± 6.26	
High hit	47(17.8)	4.51 ± 0.71		2.55 ± 1.67		1.54 ± 0.74		17.02 ± 5.95	

TABLE 2 | Multiple regressions predicting psychological mental health from stressors, risk perception of being infected with disease and coping strategy ($N = 522$).

	Mental health		Risk perception		Mental health	
	β	ΔR^2	β	ΔR^2	β	ΔR^2
Grade	−0.10*	0.03	0.05	0.04	0.01	0.44
Gender	−0.08		0.18***		−0.06	
Family residence	−0.12**		0.08		−0.03	
The number of stressors	−0.21***	0.39	0.28***	0.12	−0.19**	
Adaptive coping	0.59***		−0.20***		0.39***	
Adaptive coping× stressors	0.25***	0.02	−0.17*	0.01	0.25***	
Risk perception					−0.12**	0.01
Risk perception × coping					0.06	0.003

Moderators were mean-centered before being entered into the equation. In all regression equations, participants' grade, gender, and family residence were regarded as control variables, β = standardized regression coefficient; stressors = COVID-19-related stressors; Risk perception = Risk perception of being infected with COVID-19 disease. For gender: 0 = male, 1 = female; grade: 0 = middle grade, 0 = high grade; family residence: 0 = the place was under low hit by the pandemic, 1 = the place was under high hit by the pandemic; ΔR^2 = The added amount of total variance in the dependent variable captured by added predictors in the model.

*** $p < 0.001$, ** $p < 0.01$, * $p < 0.05$.

and how these impacts occur. The present study contributes existed literature by investigating the relation between the COVID-19-related stressors and mental health among Chinese college students, and the possible mediator (risk perception of being infected with COVID-19 disease) and moderator (coping strategy) between them. It could enrich our understanding about the impact of the COVID-19 pandemic on college student population, and have implications for university counseling services during the pandemic.

Being similar to the result of previous study about the impact of SARS-related stressors on psychological symptoms (9), the COVID-19-related stressors had a positive relation with psychological symptoms. It indicates that students who experience a large number of COVID-19-related stressors tend to report more psychological symptoms. The possible reason might be that, when students experienced a large number of COVID-19-related stressors, students themselves or some important persons of them (e.g., friends) tend to expose to the COVID-19, and have high possibility to be infected with disease. For the awe of life, they tend to report more mental or physical problem (20). Besides, people who have experienced a larger number of COVID-19-related stressors might suffer more social influence of the pandemic, such as quarantine, social distancing, economic distress, changed daily life, and misunderstanding (e.g., illness stigma), which might be another reason for individual poor mental health during the pandemic (21–23). The mediated role of risk perception of being infected with COVID-19 disease provide an evidence for risk theory of health during the infectious disease outbreak (12). It highlights the important role of cognition in stress-health relationship during the COVID-19 pandemic, and provides an interpretation about the stress-health relation from risk perspective. That is, the large number of COVID-19-related stressors has indirect negative effects on college students' mental health through increasing individual (unreasonable) risk perception of being infected with disease. In addition, the result shows that adaptive coping can be a buffer in stress-mental health relationship or the relation of stress and risk perception of being infected with disease. It is consistent with previous study about the protecting role of problem-based coping in stress-psychological adjustment relationship during other infectious disease pandemics (e.g., SARS) (9). The possible reason might be that individuals who frequently use adaptive coping might take positive measure (e.g., wear mask for outdoor activities; receive psychological intervention) to change the unfavorable situation, which could protect them from being infected with disease or minimizing the negative impact of COVID-19-related stressor on their mental health.

For demographic variables, women tended to report a higher perceived risk of being infected with COVID-19 and poorer mental health. It could be explained by the white-male effect (24), which posits that males not only express less concerns about large scale of public health emergency (e.g., radiation from Fukushima) than women, but also interpret the emergency issue

as a threat to financial stability rather than to physical well-being. For grade, junior and senior students reported worse mental health than students in other grades. The possible reason might be that, compared with freshmen and sophomores, junior and senior students are faced with the issues of graduation and job searching, and may experience more stressors and more psychological symptoms in the process of preparing for graduation or looking for a job (or internship). Students whose family residence was severely hit tended to report poorer mental health than those whose family residence was slightly hit by the pandemic. It was consistent with the previous research about the impact of family residence on psychological symptoms during other infectious disease pandemics (9). The possible reason might be that the physical health of students themselves (or some important persons around them) were more likely under threat of being infected with COVID-19 disease, if students' home was located in high risk areas.

The study has several limitations. First, the cross-sectional design does not allow the investigation of changes in individuals' mental health at different periods of the COVID-19 pandemic, which would provide a fuller picture of the psychological impact of the epidemic outbreak. Future research should consider a longitudinal design to examine the relationships among those variables above during the pandemic. Second, beside of the variables of coping and risk perception, the stress-adjustment relation might be influenced by other variables such as socioeconomic status, family influence and so on. More attention should be paid to those factors when discussing the stress-adjustment relation during the pandemic. Third, the study population might be biased due to convenient sampling, especially for its tendency toward female participants, which cannot estimate the representativeness.

CONCLUSION

In this study, COVID-19-related stressor is a risk factor of mental health among college students. COVID-19-related stressors have a negative impact on college student's mental health through increasing the risk perception of being infected with disease, and adaptive coping can be regarded as a buffer in reducing the negative impact of COVID-19-related stressors on mental health (or risk perception of being infected with disease). Government should provide more approaches in reducing the negative impact of the COVID-19-related stressors on individual mental health (e.g., transmitting the knowledge of how to prevent and control COVID-19), and increase their confidence in fighting against the pandemic. And school manager should also pay more attention to the female, junior and senior students, or students whose family residence was severely hit by the pandemic.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the ethics committees of the School of Psychology, Jiangxi Normal University. The participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

ZaH, XT, XL, YS, LL, JW, XC, and ZhH participated in the design of this study, carried out the concepts, design, data acquisition, analysis, manuscript editing, revising the manuscript critically for important intellectual contents, final approval of the version to be published, and agreement to be accountable for all aspects of the work. ZaH, XT, and XL have largest contribution for this manuscript. All authors contributed to the article and approved the submitted version.

FUNDING

This study was supported by the Educational Science Foundation of Jiangxi Province, CN (Grant nos. 20ZD018; 16YB033); the Humanities and Social Sciences of Education Office of Jiangxi province (Grant no. XL20103).

REFERENCES

1. Guan W-J, Ni Z-Y, Hu Y, Liang W-H, Ou C-Q, He J-X, et al. Clinical characteristics of coronavirus disease 2019 in China. *N Engl J Med*. (2020) 382:1708–20. doi: 10.1056/NEJMoa2002032
2. Li X, Tang X, Wu H, Sun P, Wang M, Li L. COVID-19-related stressors and Chinese adolescents' adjustment: the moderating role of coping and online learning satisfaction. *Front Psychiatry*. (2021) 12:633523. doi: 10.3389/fpsyt.2021.633523
3. Wang CY, Pan RY, Wan XY, Tan Y, Xu L, Ho CS, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *Int J Env Res Pub He*. (2020) 17:1–25. doi: 10.3390/ijerph17051729
4. Li Z, Ge J, Yang M, Feng J, Yang C. Vicarious traumatization in the general public, members, and non-members of medical teams aiding in covid-19 control. *Brain Behav and Immun*. (2020) 88:916–9. doi: 10.1101/2020.02.29.20029322
5. Pfefferbaum B, North CS. Mental health and the covid-19 pandemic. *N Engl J Med*. (2020) 383:510–2. doi: 10.1056/NEJMp2008017
6. Brotman DDJ, Golden SH, Wittstein IS. The cardiovascular toll of stress. *Lancet*. (2007) 370:1089–100. doi: 10.1016/S0140-6736(07)61305-1
7. Mamun MA, Chandrima RM, Griffiths MD. Mother and son suicide pact due to COVID-19-related online learning issues in bangladesh: an unusual case report. *Int J Ment Health Ad*. (2020). doi: 10.1007/s11469-020-00362-5
8. Manzar D, Albougami A, Usman N, Mamun MA. Suicide among adolescents and youths during the covid-19 pandemic lockdowns: a press media reports based exploratory study. *J Child Adoles Psychiatr Nurs*. (2021) 34:139–46. doi: 10.1111/jcap.12313

9. Main A, Zhou Q, Ma Y, Luecken LJ, Liu X. Relations of SARS-related stressors and coping to Chinese college students' psychological adjustment during the 2003 Beijing SARS epidemic. *J Couns Psychol*. (2011) 58:410–23. doi: 10.1037/a0023632
10. Yu M, Tian F, Cui Q, Cui Q, Wu H. Prevalence and its associated factors of depressive symptoms among Chinese college students during the COVID-19 pandemic. *BMC Psychiatry*. (2020) 21:66. doi: 10.1186/s12888-021-03066-9
11. Li Y, Zhao J, Ma Z, McReynolds LS, Lin D, Chen Z, et al. Mental health among college students during the COVID-19 pandemic in China: a 2-wave longitudinal survey. *J Affect Disorders*. (2020) 281:597–604. doi: 10.1016/j.jad.2020.11.109
12. Shi K, Lu J, Fan H, Jia J, Song Z, Li W, et al. Rationality of 17 cities' public perception of sars and predictive model of psychological behavior. *Chinese Sci Bul*. (2003) 48:1297–303. doi: 10.1007/BF03184166
13. Büssing A, Ostermann T, Neugebauer EA, Heusser P. Adaptive coping strategies in patients with chronic pain conditions and their interpretation of disease. *BMC Public Health*. (2010) 10:1–10. doi: 10.1186/1471-2458-10-507
14. Berwick DM, Murphy JM, Goldman PA, Ware JEJ, Weinstein BMC. Performance of a five-item mental health screening test. *Med Care*. (1991) 29:169–76. doi: 10.1097/00005650-199102000-00008
15. Li X, Wang K, Huo Y, Zhou M. The effect of infertility-related stress on chinese infertile females' mental health: the moderating role of marital adjustment. *Psych J*. (2019) 232–9. doi: 10.1002/pchj.255
16. Lau JTF, Yang X, Pang TH, Kim JH. SARS preventive and risk behaviours of Hong Kong air travellers. *Epidemiol Infect*. (2004) 132:727–36. doi: 10.1017/S0950268804002225
17. Xie Y. The research on the reliability and validity of the brief coping strategy questionnaires. *Chin J Clin Psychol*. (1998) 6:114–5.
18. Aiken LS, West SG. *Multiple Regression: Testing and Interpreting Interactions*. Thousand Oaks, CA: Sage (1991).
19. Neter J, Wasserman W, Kutner MH. *Applied Linear Statistical Models*. Homewood, IL: Irwin (1990).
20. Wang M, Zhao Q, Hu C, Wang Y, Yang Y. Prevalence of psychological disorders in the covid-19 epidemic in china: a real world cross-sectional study. *J Affect Disorders*. (2020) 281:312–20. doi: 10.1016/j.jad.2020.11.118
21. Mamun MA, Ullah I. COVID-19 suicides in Pakistan, dying off not COVID-19 fear but poverty? The forthcoming economic challenges for a developing country. *Brain Behav Immun*. (2020) 87:163−6. doi: 10.1016/j.bbi.2020.05.028
22. Dsouza DD, Quadros S, Hyderabadwala ZJ, Mamun MA. Aggregated COVID-19 suicide incidences in India: fear of COVID-19 infection is the prominent causative factor. *Psychiatry Res*. (2020) 290:e113145. doi: 10.1016/j.psychres.2020.113145
23. Mamun MA. The first covid-19 triadic (homicide!) suicide pact: do economic distress, disability, sickness, and treatment negligence matter? *Perspect Psychiatr C*. (2020). doi: 10.1111/ppc.12686
24. Morioka R. Gender difference in the health risk perception of radiation from fukushima in japan: the role of hegemonic masculinity. *Soc Sci Med*. (2014) 107:105–12. doi: 10.1016/j.socscimed.2014.02.014

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychiatry

ORIGINAL RESEARCH
published: 22 June 2021
doi: 10.3389/fpsyt.2021.589827

Addressing the Mental and Emotional Health Impacts of COVID-19 on Children and Adolescents: Lessons From HIV/AIDS

Prerna Banati[1]* *and Priscilla Idele*[2]

[1] UNICEF West and Central Africa Regional Office, Dakar, Senegal, [2] UNICEF Office of Research at Innocenti, Florence, Italy

The COVID-19 pandemic has led to lasting mental health and psychosocial consequences just as were experienced with the HIV epidemic. A rapid review of published systematic reviews on HIV/AIDS and mental health outcomes and responses among children and adolescents was used to identify lessons for the COVID-19 pandemic response. The review found that HIV/AIDS responses to promote mental health, prevent ill-health and treat mental health conditions included diverse interventions at the structural or national, community, household and individual levels. Some of these responses can be easily replicated, others require substantial adaptation, and some can inform development of new innovative offline and online responses to mitigate impact of COVID-19 on mental health of children and adolescents. Programs that mitigate economic impacts including child grants, income generating activities for caregivers, food distribution, health care vouchers, and other economic empowerment interventions can be replicated with minor adjustments. Helplines for vulnerable or abused children and shelters for victims of gender-based violence can be scaled up to respond to the COVID pandemic, with minimal adaptation to adhere to prevention of contagion. Mass media campaigns to combat stigma and discrimination were successfully employed in the HIV response, and similar interventions could be developed and applied in the COVID context. Some programs will need more substantial adjustments. In health facilities, mainstreaming child-sensitive mental health training of frontline workers and task sharing/shifting to community volunteers and social workers as was done for HIV with community health workers, could advance mental illness detection, particularly among abuse victims, but requires adaptation of protocols. At the community and household levels, expansion of parenting programs can help caregivers navigate negative mental health effects on children, however, these are not often operating at scale, nor well-linked to services. Programs requiring innovation include converting adolescent and youth safe physical spaces into virtual spaces particularly for at-risk girls and young women; organizing virtual community support groups, conversations, and developing online resources. Re-opening of schools and introduction of health and hygiene policies, provides another opportunity for innovation - to provide mental health and psychosocial support to all children as a standard package of care and practice.

Keywords: COVID-19, mental health, psychosocial, children, adolescents, HIV/AIDS, rapid review

OPEN ACCESS

Edited by:
Manasi Kumar,
University of Nairobi, Kenya

Reviewed by:
Ching-Wen Chang,
The Chinese University of Hong Kong, China
Emily Waterman,
Bennington College, United States

***Correspondence:**
Prerna Banati
pbanati@unicef.org

Specialty section:
This article was submitted to Public Mental Health, a section of the journal Frontiers in Psychiatry

Received: *31 July 2020*
Accepted: *24 May 2021*
Published: *22 June 2021*

Citation:
Banati P and Idele P (2021) Addressing the Mental and Emotional Health Impacts of COVID-19 on Children and Adolescents: Lessons From HIV/AIDS. Front. Psychiatry 12:589827. doi: 10.3389/fpsyt.2021.589827

INTRODUCTION

Evidence of COVID-19 impacts on children and adolescent mental health has been lagging (1). Yet attention to the mental health of children is crucial. The majority of mental health and psychosocial disorders begin during adolescence (10–19 years) and continue into adulthood if not appropriately treated (2), with 10–20% of children and adolescents experiencing diagnosable mental health illnesses (3). Suicide rates are increasing, with young people now being the group at highest risk of suicide in a third of countries, in both developed and developing contexts (2, 4, 5). Depression is the third leading cause of illness and disability among adolescents, and suicide is the third leading cause of death in older adolescents (15–19 years) (2). Apart from mortality and morbidity, mental health and psychosocial illness have other negative consequences for young people, such as lower educational achievements, substance abuse, violence, and poor reproductive and sexual health. If left untreated, it is estimated that mental health disorders which emerge before adulthood can impose a health cost 10 times higher than those that emerge later in life (6).

As the literature of the COVID 19 pandemic grows, we see increasing reports of its mental health consequences on children and adolescents (7–9). However, the literature has been sparse on effective and appropriate responses to mitigate and manage these consequences to protect children and adolescents. This paper seeks to use the expansive evidence generated from the HIV/AIDS pandemic and the impacts on mental and psychosocial well-being of children and adolescents to guide potential responses to COVID-19 impact on children and adolescent mental health. The paper takes a social determinants of health perspective, which recognizes both the direct and indirect impacts of COVID-19 on child mental health. As a result, the analysis covers the direct impact of the disease on the infected person and family; as well as the impact of the pandemic more broadly.

HIV came on the scene about 40 years ago, first considered as a disease of homosexuals, foreigners and sex workers, and shortly after became a generalized epidemic especially in countries across Africa, where the disease has had a disproportionate impact. WHO (10) reports that since the beginning of the HIV epidemic, 75 million people have been infected with the HIV virus and about 32 million people have died of HIV. Globally, 38 million (32.7–44.0 million) people were living with HIV at the end of 2019 (11). Significant mental health and substance use problems have been observed at higher rates among people living with HIV and people who are vulnerable to HIV infection than the general population (12). People with risk factors for HIV and who are vulnerable to mental health conditions often face other significant challenges to accessing and adhering to HIV prevention and treatment modalities. Social stigmas, and criminalization of intersecting risk factors in some contexts (such as sex work, drug use or same-gender sex) present challenges to key populations. These groups experience stigma and discrimination, including incarceration that negatively affect mental health, and this relationship is further compounded by the unfortunate stigma of mental illness in society (13).

The social and behavioral nature of HIV transmission has necessitated investigation beyond the biomedical, to address the social determinants of mental health in HIV affected populations, including addressing risk factors across the human social ecology - from individual, in families and at home, in communities and schools, and in the macro-structural environment. There is growing global evidence that mental disorders in populations – including HIV affected populations - are strongly socially determined, for example, poverty, income inequality, interpersonal violence and forced migration, are key determinants of mental disorders (14).

Evidence from the HIV epidemic successfully shed light on the situation, risk factors and experiences of vulnerable and marginalized individuals who were at heightened risk of co-morbidities. UNAIDS (11) notes the clear positive relationship between HIV prevalence and income disparity; unequal gender norms limiting agency and reduced access to education and economic resources all contribute to HIV risk. The report also notes that young women are at particular risk. In sub-Saharan Africa (SSA) today, women and girls account for 6 out of 10 new infections. Adolescent girls and young women in SSA aged 15–24 account for approximately one quarter of all 2019 infections: disproportionally high given this group constitutes only 10% of the population. Marginalized populations such as commercial sex workers, injecting drug users and people who identify as LGBTI are also at increased risk – and although a small proportion of the population, key populations and their sexual partners carry a disproportionate burden of HIV/AIDS illness.

As we interrogate learnings from HIV on future responses to mental health impacts of COVID-19, it is important to note here that there are both similarities and differences between these two pandemics (15). *Similarities* include the fact thatin both cases, treatment can significantly increase life expectancy and reduce adverse effects of disease progression. Group dynamics and population behaviors play a central role in the spread of both diseases. Stigma and discrimination are prevalent for both diseases, and misinformation is common, with fear driving responses and behaviors. The HIV pandemic has had wide-ranging social and economic consequences, similar to the case of COVID. Commercial sex workers have recently been reported negotiating mask use with their sex partners, with similarities to the HIV experience around condom use (16). *Differences* include the doubling time: early HIV cases doubled over 6–12 months, for SARS-CoV-2 the interval is a matter of days. If left untreated, HIV is mainly life-threatening to all ages while COVID 19 kills a minority of infected individuals, largely older populations and those with existing co-morbidities and vulnerabilities. While a path to ending the COVID-19 pandemic appears closer with the introduction of vaccines, and steep declines in countries with high vaccine rates show this to be possible, an end to the HIV pandemic is much less clear. With treatment, HIV infection is chronic and irreversible while COVID−19 infection is treatable, and an infected person could recover in a short period of time. HIV affects people of reproductive age and can be transmitted from mother to child. Mother to child transmission dynamics of SARS-COV-2 virus are not yet well-understood. Behaviors driving the spread of infection are different - risky sexual

behavior and injecting drug use for HIV, while poor hygiene, social and physical proximity are risk factors for COVID-19. Both diseases have re-shaped intergenerational dynamics, however the impacts are manifested differently, with the HIV epidemic leaving behind many orphans to be taken care of by grandparents, while the COVID-19 pandemic has so far had a disproportionate impact on the elderly, although this may vary by country context and demographic structure (17).

METHODOLOGY

We undertook a rapid review of published peer reviewed literature on the impacts of the HIV epidemic on the mental health of children in PubMed, Google Scholar, Cochrane and 3IE databases from June 16 to July 5 2020. We focused solely on published systematic reviews available since 2000. Meta analyses were not included as robust meta analyses are largely statistical procedures that draw from, or are conducted in the context of, a systematic review.

The following search string was used (adapted depending on the search engine employed):

> Search string 1: (HIV or AIDS) and (depression or mental or anxiety or suicide or psych*) and "systematic review" and (child* or adolescen*).

The inclusion criteria are defined in **Figure 1**. Given the rapid nature of the review, each article was screened and reviewed by only one author. Systematic reviews were analyzed and coded for whether they reviewed determinants, prevalence or mental health disease impact, interventions, pathways or mechanisms of action for mental health outcomes, or mental health diagnostic tools or measures. We coded for geographic setting: low- or middle-income and resource constrained or not. In addition, key evidence gaps identified from each review were summarized.

The authors noted key limitations to the methodology described here. Firstly, the absence of non-English language materials may mean findings are disproportionately focused in anglophone settings. Secondly, publication bias was also noted with the vast majority of articles reporting positive findings, and a small minority reporting negative or inconclusive findings. Due to the nature of the rapid review, only systematic reviews were accessed and only one author summarized. This could bias the evidence accessed and summarized. Finally, the authors noted that systematic reviews are not well-suited to capturing macro-level policy or political shifts or outcomes.

DATA ANALYSIS

The analysis and presentation of data complies with well-accepted methodologies applied in rapid reviews (18). Results from the included publications were synthesized using tables which have provided descriptive details of the publications used in the analysis. The findings provide an overview of the evidence identified, organized thematically. The themes are derived with the goal of providing a sense of the "volume and direction of available evidence" (18).

RESULTS

Figure 2 provides a flow chart summary of the studies accessed, reviewed and analyzed. Over 2,000 potentially relevant titles resulted in the abstract review of 94 records. 63 systematic reviews were ultimately analyzed. The 63 systematic reviews draw analyses from 2,498 studies. Of the 63 studies reviewed, 38 reviewed determinants, prevalence or mental health disease impact; 32 reviewed interventions with direct or indirect mental health implications; 13 reviewed pathways or mechanisms of action for mental health outcomes, and 7 reviewed mental health or diagnostic tools or measures. Forty-one studies were focused exclusively on HIV affected populations, while the remaining included HIV as one outcome area of interest. Twenty-five studies were geographically focused on low- or middle-income settings. While studies were all used to inform the findings and discussion sections of this paper, 30 focused exclusively on children and adolescents and are summarized in **Table 1**.

FINDINGS

Recognizing the complex etiology of child and adolescent mental health and also HIV, we identified six summary findings.

Poverty and Other Vulnerabilities and Stressors Intersect and Compound Children's Mental Health Risks

Similar to COVID-19, during the HIV pandemic, affected households experienced major shocks to earnings and disruptions to employment resulting in loss of income and precarious financial situations, driving families into hardship and poverty. Parental death left orphans either in the care of other relatives, grandmothers, single parents, or child headed households. Such changing dynamics add stress to already vulnerable households, leading to an increased burden of mental ill health. The vulnerabilities experienced by HIV-infected or affected children are multiple and intersecting and have an impact on their psychological well-being. Findings tended to show that AIDS orphans and vulnerable children had poorer psychological well-being in comparison with children from HIV-free families or children orphaned by other causes (23). HIV-related stressful life events, stigma, and poverty were identified as risk factors, as was pre-existing disability (23).

The vulnerabilities captured are multi-faceted. Socio-demographic variables such as older adolescent girls (29), disability (49) and victims of trafficking were at heightened risk of mental illness (50). Food insecurity was found to drive poor mental health outcomes among HIV affected adolescents and youth (21). Finally, adverse events, such as exposure to abuse and violence, experiences of stigma or discrimination, or taking care of an unwell adult were also detrimental to children's mental health (51, 52). Some evidence is provided that infants, adolescents, children with infected or ill mothers, and children living with severely ill adults are particularly vulnerable (35). A number of factors were found to be protective such as

Study Design

* Systematic Reviews following PRISMA or PRISMA-P protocols were included. Other studies were also included if a systematic process was presented, such as source of studies and exclusion/inclusion criteria

Population

* Studies were included if they focused on children and adolescents aged, 0-19 years as defined by the UN

* All genders were included

* All HIV serostatus were included

* Some studies on parent and caregiver mental health outcomes were included if they had at least a child-related mental health measure

Language

* English language studies were included

Timing

* Only studies published between 2000 and 2020 were included

FIGURE 1 | Inclusion criteria for rapid review.

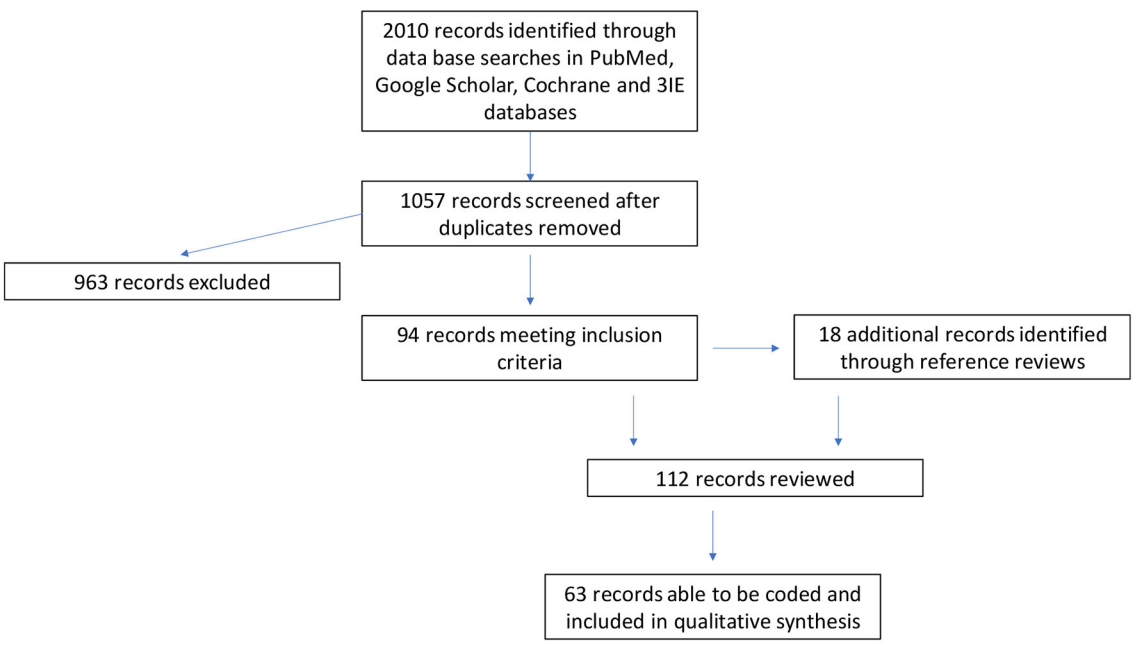


FIGURE 2 | PRISMA flow chart.

TABLE 1 | Summary of systematic reviews focused on children's mental health and HIV.

Author	References	Title	Number of studies in review
Govindasamy et al.	(19)	Informing the measurement of well-being among young people living with HIV in sub-Saharan Africa for policy evaluations: a mixed-methods systematic review.	40
Hartog et al.	(20)	Stigma reduction interventions for children and adolescents in low- and middle-income countries: Systematic review of intervention strategies.	61
Toska et al.	(21)	Sex in the shadow of HIV: A systematic review of prevalence, risk factors, and interventions to reduce sexual risk-taking among HIV-positive adolescents and youth in sub-Saharan Africa.	35
Han et al.	(22)	Intergenerational Interventions for People Living with HIV and Their Families: A Systematic Review.	13
Chi and Li	(23)	Impact of Parental HIV/AIDS on Children's Psychological Well-Being: A Systematic Review of Global Literature	30
Qiao et al.	(24)	Disclosure of Parental HIV Infection to Children: A Systematic Review of Global Literature	38
Gourlay et al.	(25)	Barriers and facilitating factors to the uptake of antiretroviral drugs for prevention of mother-to-child transmission of HIV in sub-Saharan Africa: a systematic review.	44
Sherr et al.	(26)	A systematic review examining whether interventions are effective in reducing cognitive delay in children infected and affected with HIV.	17
Sherr et al.	(27)	A Systematic Review of Psychological Functioning of Children Exposed to HIV: Using Evidence to Plan for Tomorrow's HIV Needs.	11
Sherr et al.	(28)	Evidence-based gender findings for children affected by HIV and AIDS - a systematic overview.	11
Haines et al.	(29)	Which HIV-infected youth are at risk of developing depression and what treatments help? A systematic review focusing on Southern Africa.	12
Sherr et al.	(30)	A systematic review of cognitive development and child human immunodeficiency virus infection.	54
Sherr et al.	(31)	Developmental challenges in HIV infected children—An updated systematic review.	21
Rachel et al.	(32)	Disclosure of HIV status to children in resource-limited settings: a systematic review.	32
Spies et al.	(33)	Mental health outcomes in HIV and childhood maltreatment: a systematic review.	34
Kimera et al.	(34)	Challenges and support for quality of life of youths living with HIV/AIDS in schools and larger community in East Africa: a systematic review.	16
Goldberg and Short	(35)	What do we know about children living with HIV-infected or AIDS-ill adults in Sub-Saharan Africa? A systematic review of the literature	47
Skeen et al.	(36)	Interventions to improve psychosocial well-being for children affected by HIV and AIDS: a systematic review.	16
King et al.	(37)	Interventions for improving the psychosocial well-being of children affected by HIV and AIDS.	0
Barry et al.	(38)	A systematic review of the effectiveness of mental health promotion interventions for young people in low- and middle-income countries.	22
Klasen and Crombag	(39)	What works where? A systematic review of child and adolescent mental health interventions for low- and middle-income countries.	134
Sherr and Mueller	(40)	Where is the evidence base? Mental health issues surrounding bereavement and HIV in children.	14
Kuo and Operario	(41)	Caring for AIDS-orphaned children: A systematic review of studies on caregivers.	29
Britto et al.	(42)	Prevalence and correlates of HIV disclosure among children and adolescents in low-and middle-income countries: A systematic review.	22
van Wyhe et al.	(43)	Cross-cultural assessment of HIV-associated cognitive impairment using the Kaufman assessment battery for children: a systematic review.	9
Lloyd and Operario	(44)	HIV Risk among Men Who Have Sex With Men Who Have Experienced Childhood Sexual Abuse: Systematic Review and Meta-Analysis.	12

(Continued)

TABLE 1 | Continued

Author	References	Title	Number of studies in review
Medley et al.	(45)	Effectiveness of Peer Education Interventions for HIV Prevention in Developing Countries: A Systematic Review and Meta-Analysis.	31
Krauss et al.	(46)	Disclosure of HIV status to HIV-positive children 12 and under: A systematic cross-national review of implications for health and well-being.	14
Hudelson and Cluver	(47)	Factors associated with adherence to antiretroviral therapy among adolescents living with HIV/AIDS in low- and middle-income countries: a systematic review.	15
McAteer et al.	(48)	A systematic review of measures of HIV/AIDS stigma in paediatric HIV-infected and HIV-affected populations	22

disclosure of HIV status, satisfaction with relationships and social support (29).

We see similar impacts during the COVID pandemic, where extreme financial stress on households is likely to impact families and individuals. Programs that mitigate the economic impacts among the most vulnerable were central to the HIV response and are increasingly being applied to support the COVID−19 response. For HIV, these included child grants, income generating activities for caregivers, cash transfers, food distribution, health care vouchers, community support groups and other economic empowerment interventions. Examples from South Africa, Kenya and Malawi have all shown promising results (53–55). While these responses are being rolled out, the operational mechanisms will need to be adapted to adhere to prevention of contagion (social distancing, wearing masks) which were not needed in the case of HIV. In addition to the individual and household level effects, for COVID-19, we see serious implications in the macro economic and fiscal space. Greater attention to the indirect impacts of shifting patterns of remittances, trade and global financial flows on children's well-being will need further investigation.

Living Arrangements, Child Abuse and Maltreatment Experienced by AIDS Affected and Infected Children Increase Mental Ill-Health

Similar to COVID-19, the HIV pandemic had a significant impact on social and community fabric, through disruptions in social networks and relationships. During the HIV pandemic, these disruptions were implicated in spikes of child abuse and violence and increases in alternative care arrangements, including at institutions and orphanages and with relatives (56). In our review, risk factors for ill-mental health, particularly depression, include sexual abuse (57), child maltreatment (29) and exposure to violence (58). Spies et al. (33) note that substance abuse, major depressive disorder, and post-traumatic stress disorder were most commonly reported among HIV positive individuals reporting childhood maltreatment. They also noted an association between childhood maltreatment and poor adherence to antiretroviral therapy.

Kuo et al. (41) reviewed the caregiving arrangements for AIDS-orphaned children, identifying findings relevant for COVID-19. Their evidence suggests that caregiving demands are often added to over-burdened and weakened extended family systems particularly in low resource contexts, due to pre-existing financial hardships and reduced social support networks. Their paper also sheds light on the increased psychological and economic stress on caregivers (41).

During the COVID pandemic, undeniably the burden of care is falling on the household, and on women in particular. As women and adolescent girls are largely left responsible for preparation of meals, financial stress in low income settings may mean they could be blamed for insufficient food and subjected to domestic violence. We are currently observing increased reports of levels of abuse, maltreatment and violence, largely documented among women and girls, and often occuring in their own households under conditions of lockdown (59, 60).

During the HIV pandemic, helplines, cash grants for caregivers, accreditation for orphanages, foster care, and adoptions were put in place. For adolescents, safe spaces were created which allowed girls to engage safely with their peers. Expanding the reach of helplines to address child sensitive issues of violence or abuse, shelters, online counseling as well as expansion of virtual safe spaces for example, could offer an opportunity for the COVID-19 response. Mainstreaming mental health training of frontline COVID-19 health and community workers to detect mental distress, particularly among victims of violence, can be an effective approach.

The Functioning and Quality of Health Systems Have Impacts on Mental Health Outcomes of Children

Many have expressed frustration with long-standing capacity gaps, poor service accessibility and inadequate mental health policy provisions in low- and middle-income countries, critical components required to ensure an adequate health system that delivers good mental health for all (61). However, few studies in our review sought innovations to address the shortfalls. Example approaches identified include: task sharing of mental health care which was observed to improve the reach and effectiveness of services in rural and other low-resource settings; lay health workers to deliver care and community-based packages across outcomes and social support services to pregnant women at risk was seen to be effective, home based care; and non-specialist

providers in mental health and neurology and physician-nurse substitution were also identified as possible approaches.

A number of studies noted the need to embed mental health services within the primary health care response, yet this approach was not assessed in any study we reviewed. Integrated models, such as adding a service to an existing service, and those that work both at community and in facilities have been tried successfully (38) but more research is needed on how to make this work effectively. Community workers and volunteers have played a key role in supporting HIV infected patients. They have also assisted in task shifting and task sharing in roles that could easily be done by a lay person such as rapid testing, supply of medicine, follow up for adherence and referrals. In Zambia – adherence support extension workers were recruited, in Malawi they took the shape of community volunteers and patients receiving ART, and South Africa has had very successful community workers models (62, 63). Of relevance to COVID-19, in a systematic review by Mwai et al. community health workers expanded the HIV response by successfully providing patient support (such as counseling, home-based care, education and livelihood support), and health service support (such as screening, referrals and surveillance). Potentially, detection and referrals to mental health services could be layered onto existing community health worker models, though this would require adaptation for the COVID-19 context, including revised protocols and additional protective equipment.

School-Based Platforms Can Provide Effective Mental Health and Psychosocial Support at Scale

While there were differential effects for gender and age, classroom-based interventions – particularly for adolescents - have reduced symptoms of common mental disorders (38). In the review by (38) thirteen mental health promotion and universal prevention interventions implemented schools were explored for their potential to improve mental health outcomes. The authors noted the interventions spanned across the development of social, emotional, problem solving and coping skills, to mental health promotion combined with physical fitness programs, stress reduction, sexuality education programs, and including art interventions and peer support interventions led by teachers. Two interventions were designed specifically to support AIDS orphaned children. After-school recreational activities had a significant positive impact on children and adolescents' externalizing and internalizing problem scores and also improved parental support as a result of parental involvement in the structured activities. Classroom based interventions were reported to have a significant positive effect on both children and adolescents in terms of improved social and emotional well-being, communication skills and reduced conduct and peer problems and hyperactivity levels. Specific gender effects were reported in one classroom based intervention where significant reductions in psychological difficulties and aggression were seen in males only and improved prosocial behavior among females only. All the universal life skills and resilience school-based interventions identified reported significant positive effects on students' mental health and well-being in terms of improved self-esteem, motivation, and self-efficacy (38) and these interventions, if delivered online, would also be relevant for children experiencing COVID-19 lockdowns. Evidence was mixed for peer education programs in developing countries. Some studies suggested these are moderately effective at improving knowledge and some selected behavioral outcomes but show no significant impact on biological outcomes (45).

There were also promising findings among multicomponent interventions in school and community settings (38). There is evidence that school-based health centers are popular with young people and provide important mental and reproductive health services. Gaps in school-based programming was also evident, as the preponderance of such programs addressed older children, and younger children in LMIC primary schools were often not subject of study. The authors report greater effectiveness of multi-component interventions, which they identify as ''interventions that adopt a social competence approach and develop supportive environments," in comparison to interventions that narrow in on specific problem behaviors. The review notes the efficacy of whole school approaches, which have recently been evaluated by RCTs in Bihar and the UK and shown to be effective in reducing externalizing behaviors and bullying (64).

By early March, COVID-19 had resulted in the closure of schools in over 108 countries (65). As schools begin to slowly reopen, teachers and administrators will be at the frontlines, and play an important role in detecting and mitigating mental health impacts of adverse experiences of lockdown, stigma, social isolation and experience and exposure to disease and deaths. However, they cannot do this alone. As schools introduce new health and hygiene policies, they need to be mindful of mental health implications and include these as a standard part of their health and hygiene protocols.

Positive Coping, Relationships With Caregivers, Family and Social Support Can Improve Child Mental Health Outcomes

The evidence confirms that individual coping skills, trusting relationship with caregivers and social support protected HIV-affected children against negative mental health effects, with some evidence that these were most impactful among those most stressed (23). Adaptive coping and social support were considered critical to overcome the structural and economic barriers associated with poverty that led to mental ill-health (19) and would be relevant for children experiencing poverty and economic stress as a result of financial crises borne of the COVID-19 pandemic.

There was little reflection of the quality and content of caregiving provided nor information on the challenges of caring for children orphaned by AIDS or effects on caregivers' health and well-being (41). However, a few of the reviews engaged with parenting – noting parent training is a highly promising intervention for behavioral disorders and can bring down rates of conduct problems significantly (39). Evidence suggests that parenting interventions appear to be at least as effective when implemented in countries that are culturally different than

those in which they were developed. Gardner et al. (66) report that extensive adaptation was not necessary for the successful transportation of these types of interventions (66).

Applying these lessons today, expanded parenting programs which help caregivers navigate the negative mental health effects on children, may help to mitigate the long-term impacts of COVID-19 (67, 68). An open-access hub of online resources on parenting during COVID-19 has been launched by a consortium of agencies and academics (69). Wide use of such resources – which focus on building positive relationships, diverting and managing bad behavior, and managing parenting stress – can help reduce caregiver and parental stress and strengthen child-parent bonds and build stronger relationships between children and their caregivers.

Our review shows that unintentional or forced HIV disclosures were common (24). In LMIC settings, full disclosure of HIV status among children and adolescents living with HIV was uncommon (42). Findings regarding the impacts of disclosure were mixed but disclosure tended to have long-term positive impacts on the well-being of children, parents and family in general (24). Within the COVID-19 context, disclosure to family has not been as structured as seen during the HIV experience, which has well-established protocols for counseling and testing, complemented with guidelines for disclosure. For example, WHO provides evidence-based guidelines to health workers providing disclosure counseling for children under the age of 12, in recognition of their ''emotional and aptitudinal ability to understand and cope with the nature of the illness, stigma, family relations and concerns about social support" (70). Increasing concerns can be seen around privacy of COVID19 testing, with documented instances of people being shunned and stigmatized emerging (71). Lessons from HIV suggest that COVID-19 disclosure should be sensitive to the child's age and perceived ability to understand the meaning of infection (32). Caregivers may need support from health care providers during the disclosure process. Evidence-based guidelines incorporating the developmental status of the child and adapted to cultural context, taking account of caregiver perceptions are prerequisite to enhancing disclosure in local contexts (42). Development and dissemination of such guidelines for COVID-19 disclosure, accompanied by health-worker training and counseling, would be a useful contribution.

Family support should form part of mental health prevention strategies (72). Such support needs to embrace a number of sectors such as housing, education, and employment which need to work together with support from voluntary and mental health sectors. Mobilization of local communities – such as was done for HIV – needs to be undertaken, and may include community outreach and working with community leaders to ensure inclusion of mental and physical health concerns in COVID-19 programs. In response to COVID-19, community groups have been successful at organizing virtual support groups, community conversations (72), developing online resources and even joint singing events (73). Sustainable financial and capacity development support to community ventures can help foster resiliency and build back better in anticipation of future outbreaks.

Stigma and Discrimination Can Have Significant Impacts on Children's Emotional Lives

As seen during the COVID-19 pandemic and the HIV epidemic, experiences of stigma have had a wide range of negative outcomes for children (34, 74). In a study focusing on HIV treatment adherence, the authors note that interventions to reduce stigma should target multiple levels of influence - intrapersonal, interpersonal and structural - in order to have maximum effectiveness (75). Findings suggest that children and adolescents are under-represented in stigma reduction interventions in low- and middle-income settings (20), suggesting more stigma reduction interventions are needed that address a wider variety of stigmas, with children as direct and indirect target group.

Increasingly, we see emerging stigmatization of COVID-19 patients or their families, creating situations that are not mentally or psychologically healthy and are likely to cause much stress, anxiety or depression in the long run. Such experiences can instill a sense of fear and degenerate into loneliness, social and emotional isolation. Community, religious and faith-based organizations have had a positive role in combatting HIV stigma and discrimination in sub-Saharan African (76). While not many were well-measured, mass media campaigns were developed to respond to the HIV pandemic that proved to be effective at reducing stigma (77), and similar interventions could be developed and applied in the COVID-19 context.

DISCUSSION

Policymakers and practitioners seeking actionable results to manage the mental health consequences of COVID-19 can benefit from the experiences of HIV. The analysis presented in this paper can be categorized into three types of responses: those that can be easily replicated, those require substantial adaptation, and those that require development of new innovative offline and online responses to mitigate negative consequences of COVID-19 on mental health of children. A summary is presented in **Table 2**. Many of the programs that mitigate economic impacts including child grants, income generating activities for caregivers, cash transfers, food distribution, health care vouchers, community support groups and other economic empowerment interventions can be replicated with minor adjustments. Given multiple vulnerabilities compound risk of poor mental health in children, cash programs, for example, should expand to include multi-dimensionally poor children and their families. Evidence shows that cash programs have some success in reducing mental ill health (51). Ideally, these programs include "plus" components that link households receiving cash to mental health services.

Helplines for psychosocial support to vulnerable or abused children and counseling services and shelters for victims of gender-based violence can be scaled up to respond to the COVID-19 pandemic, with some minimal adaptation to adhere to prevention of contagion. Mass media campaigns to combat stigma and discrimination were successfully employed in the

TABLE 2 | Summary of COVID-relevant responses for children's mental health derived from HIV/AIDS rapid review.

Ease of application to COVID	Easily replicated	Requires adaptation	Requires innovation
Platform			
Individual	• Helplines for psychosocial support. • Counseling services. • Shelters for victims of gender-based violence.	• Peer programs linked to provision of services.	• Converting adolescent and youth safe physical spaces into virtual spaces.
Household	• Child grants. • Income generating activities for caregivers. • Cash transfers and cash-plus programs. • Food distribution. • Health care vouchers. • Economic empowerment interventions.	• Expansion of parenting programs.	
Community	• Community support groups. • Mass media campaigns to combat stigma and discrimination were successfully.	• Community mobilization initiatives. • Community outreach workers and programs with community leaders. • Mental health clinics in every school that re-opens, and equipping them with trained service providers, robust protocols and referral pathways.	• Virtual community support groups and social entertainment programs. • Online resources including modules devoted to positive mental health for students as part of on-line curricula. • Introduction of stringent health and hygiene policies during and after reopening of schools. • Standard package of care and practice in all schools upon their reopening.
Health System		• Mainstreaming child-sensitive mental health training of frontline health workers. • Task shifting and task sharing with Community Health Workers.	

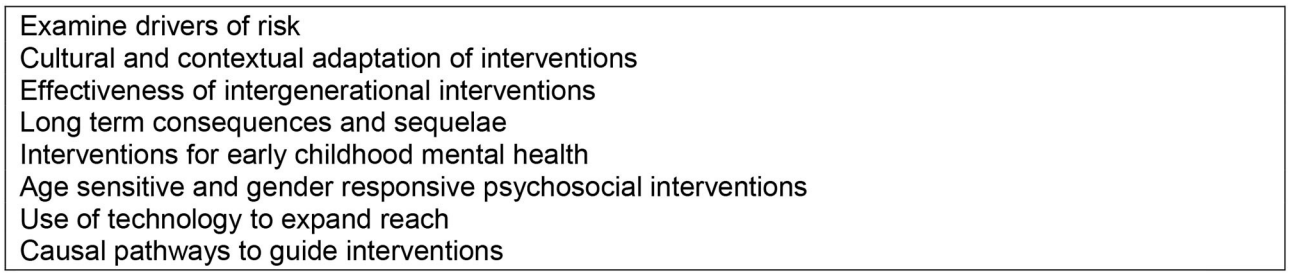


FIGURE 3 | Children's mental health evidence gaps identified from Rapid Review of HIV/AIDS literature.

HIV response, and similar interventions could be developed and applied in the COVID-19 context.

Some programs will need more substantial adjustments. At the health facility level, mainstreaming child-sensitive mental health training of frontline health workers and task sharing and task shifting to community volunteers and social workers as was done for HIV with community health workers, could advance detection of mental illnesses, particularly among victims of abuse, but would require adaptation of protocols. At the community and household levels, expansion of parenting programs can help caregivers navigate the negative mental health effects on children, however, these are not often operating at scale, nor with adequate linkages to community-level services. Community mobilization initiatives were commonly seen during the HIV pandemic, as were community outreach workers and programs with community leaders. However, such community-based initiatives will need substantial adaptation and re-orientation given the closure of many community spaces and schools, as well as the dissolution of community ties as a result of home-isolation and lockdown. The school platform can also be harnessed for mental health service delivery particularly in low income contexts, where schools have not been exploited for child mental health delivery. Adding mental health clinics into every school that re-opens, and equipping them with trained service providers, robust protocols and referral pathways can ensure every child can benefit. With the reopening of community venues and schools, new community groups can also be created to advance community mobilization for children's mental health, but this will require adaptation and planning.

Programs requiring innovation include converting adolescent and youth safe physical spaces into virtual spaces particularly for at-risk girls and young women. There have been some successful pilots for violence prevention during COVID-19 (78). Innovating similar models for mental health among young people could be advanced. Expanding virtual community support groups, social entertainment, and developing online resources including modules devoted to positive mental health for students as part of on-line curricula could be an effective approach. Re-opening of schools and introduction of stringent health and hygiene policies, provides another opportunity for innovation - to provide mental health and psychosocial support to all children as a standard package of care and practice.

The review also provided an opportunity to assess evidence gaps. The majority of reviews acknowledged the need for better measurement, research and data on HIV and children's mental health, identifying important gaps that are worthwhile to mention here and important to keep in mind as the evidence base for COVID-19 evolves.

One of the largest gaps noted was the need for specific data on vulnerable populations such as women, children and young people, heterosexual men, drug users and trafficked individuals. During the early parts of the HIV pandemic, age and sex disaggregated data were not available, excluding information on children. Compared to adults, this resulted in delays in the prevention, detection and treatment of affected and infected children. Once age and sex-disaggregated data were made available, children were understood to be directly affected by HIV. Work by Idele et al. reminds us that we should not make this same mistake for COVID-19 (17).

Our review of evidence from HIV exposed the absence of gendered data and analysis. One systematic review noted that of the 15 studies on bereavement they included, seven analyzed data by gender with mixed findings (28). The review noted that major policies fail to provide gender data for young children, despite scientifically established gendered mental health impacts manifesting in adulthood.

Another gap commonly cited was the need for more quality research empirically examining causal pathways or mechanisms of action (33, 35). The absence of such evidence has hampered detection of entry points for action and limited the development of effective interventions. Future COVID research would benefit from more attention to causal inference and further characterization of processes and circumstances, as well as variation, related to vulnerability and resilience.

Long term consequences will also need to be monitored and longitudinal designs and rigorous developmentally-sensitive measurement is needed to inform the design of large-scale policies and programming for children, adolescents and youth (35). Importantly, a number of studies reported the need for intergenerational evidence, both on experiences and interventions on the mental health of children and their families (22).

Importantly, the methodology prevented us from unpacking the role of national leadership and effective public policy in the promotion, prevention, detection and care of mental health conditions in children. Our experience of HIV responses in sub-Saharan Africa suggests that effective national leadership made a significant difference by shifting discourses, combatting stigma and expanding prevention, treatment and care through decentralized approaches, including in Kenya, Uganda and Tanzania. To systematize these, robust policy analysis, which is not often seen in the peer reviewed literature, is needed.

Figure 3 describes other research gaps that were identified as a result of our review. It is possible that the absence of mental health data, analysis and research reflects the low priority it has in many countries. With the growing momentum to institutionalize and embed mental health into our public health and social systems, we hope these trends will soon reverse.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

AUTHOR CONTRIBUTIONS

PB and PI conceptualized paper and shared writing. PB undertook analysis for rapid reviews. All authors contributed to the article and approved the submitted version.

REFERENCES

1. Idele P, Banati P, Anthony D. *Turning the Tide Together On Mental Ill-Health For Children. UNICEF Innocenti Blog* (2019). Available online at: https://blogs.unicef.org/evidence-for-action/turning-tide-together-mental-ill-health-children/ (accessed August 31, 2020).
2. World Health Organization. *Mental Health: Strengthening Our Response* (2007). Available online at: https://www.who.int/news-room/fact-sheets/detail/mental-health-strengthening-our-response (accessed August 31, 2020).
3. Kieling C, Baker-Henningham H, Belfer M, Conti G, Ertem I, Omigbodun O, et al. Child and adolescent mental health worldwide: evidence for action. *Lancet*. (2011) 378:1515–25. doi: 10.1016/S0140-6736(11)60827-1
4. Patel V, Flisher AJ, Hetrick S, McGorry P. Mental health of young people: a global public-health challenge. *Lancet*. (2007) 369:1302–13. doi: 10.1016/S0140-6736(07)60368-7
5. World Health Organization. *Mental Health Atlas* (2014). Available online at: https://www.who.int/mental_health/evidence/atlas/mental_health_atlas_2014/en/ (accessed August 31, 2020).
6. Suhrcke M, Pillas D, Selai C. *Economic Aspects of Mental Health In Children and Adolescents. Social Cohesion For Mental Well-Being Among Adolescents*. Copenhagen: WHO/HBSC Forum (2007).
7. Xie X., Xue Q, Zhou Y, Zhu K, Liu Q, Zhang J, et al. Mental health status among children in home confinement during the coronavirus disease 2019 outbreak in Hubei province, China. *JAMA Pediatr*. (2020) 174:898–900. doi: 10.1001/jamapediatrics.2020.1619
8. Zhou SJ, Zhang LG, Wang LL, Guo ZC, Wang JQ, Chen JC, et al. Prevalence and socio-demographic correlates of psychological health problems in Chinese adolescents during the outbreak of COVID-19. *Eur Child Adolesc Psychiatry*. (2020) 29:749–58. doi: 10.1007/s00787-020-01541-4

9. Golberstein E, Wen H, Miller BF. Coronavirus Disease 2019 (COVID-19) and mental health for children and adolescents. *JAMA Pediatr*. (2020) 174:819–820. doi: 10.1001/jamapediatrics.2020.1456
10. World Health Organization. *Child and Adolescent Mental Health, Information Extracted* (2020). Available online at https://www.who.int/mental_health/maternal-child/child_adolescent/en/ (accessed July 29, 2020).
11. UNAIDS. *Global AIDS Update: Seizing the Moment* (2020). Available online at: https://www.unaids.org/en/resources/documents/2020/global-aids-report (accessed August 31, 2020).
12. Klinkenberg WD, Sacks S, HIV/AIDS, Treatment Adherence, Health Outcomes, Cost Study, Group. Mental disorders and drug abuse in persons living with HIV/AIDS. *AIDS Care*. (2004) 16(supppl. 1):22–42. doi: 10.1080/09540120412331315303
13. Remien RH, Stirratt MJ, Nguyen N, Robbins RN, Pala AN, Mellins CA. Mental health and HIV/AIDS: the need for an integrated response. *AIDS*. (2019) 33:1411–20. doi: 10.1097/QAD.0000000000002227
14. Lund C, Breen A, Flisher AJ, Kakuma R, Corrigall J, Joska JA, et al. Poverty and common mental disorders in low- and middle-income countries: A systematic review. *Soc Sci Med*. (2010) 71:517–28. doi: 10.1016/j.socscimed.2010.04.027
15. Hargreaves J, Davey C. Three lessons for the COVID-19 response from pandemic HIV. *Lancet HIV*. (2020) 7:e309–11. doi: 10.1016/S2352-3018(20)30110-7
16. GAGE. *Emerging Findings From Interviews With Adolescents In Ethiopia In the Context of Covid-19* (2020). Available online at: https://www.gage.odi.org/adolescent-experiences-of-covid-19/ (accessed August 31, 2020).
17. Idele P, Anthony D, Damoah KA, You D. *COVID-19 May Pose Greater Risk to Children Than Originally Thought. UNICEF Connect Blog* (2020). Available online at: https://blogs.unicef.org/evidence-for-action/covid-19-may-pose-greater-risk-to-children-than-originally-thought/ (accessed August 31, 2020).
18. Khangura S, Konnyu K, Cushman R, Grimshaw J, Moher D. Evidence summaries: the evolution of a rapid review approach. *Syst Rev*. (2012) 1:1–9. doi: 10.1186/2046-4053-1-10
19. Govindasamy D, Seeley J, Olaru ID, Wiyeh A, Mathews C, Ferrari G. Informing the measurement of wellbeing among young people living with HIV in sub-Saharan Africa for policy evaluations: a mixed-methods systematic review. *Health Qual Life Outcomes*. (2020) 18:120. doi: 10.1186/s12955-020-01352-w
20. Hartog K, Hubbard CD, Krouwer AF, Thornicroft G, Kohrt BA, Jordans MJD. Stigma reduction interventions for children and adolescents in low- and middle-income countries: systematic review of intervention strategies. *Soc Sci Med*. (2020) 246:112749. doi: 10.1016/j.socscimed.2019.112749
21. Toska E, Pantelic M, Meinck F, Keck K, Haghighat R, Cluver L. Sex in the shadow of HIV: A systematic review of prevalence, risk factors, and interventions to reduce sexual risk-taking among HIV-positive adolescents and youth in sub-Saharan Africa. *PLoS ONE*. (2017) 12:e0178106. doi: 10.1371/journal.pone.0178106
22. Han HR, Floyd O, Kim K, Cudjoe J, Warren N, Seal S, et al. Intergenerational interventions for people living with HIV and their families: a systematic review. *AIDS Behav*. (2019) 23:21–36. doi: 10.1007/s10461-018-2223-1
23. Chi P, Li X. Impact of parental HIV/AIDS on children's psychological well-being: a systematic review of global literature. *AIDS Behav*. (2013) 17:2554–74. doi: 10.1007/s10461-012-0290-2
24. Qiao S, Li X, Stanton B. Disclosure of parental HIV infection to children: a systematic review of global literature. *AIDS Behav*. (2013) 17:369–89. doi: 10.1007/s10461-011-0069-x
25. Gourlay A, Birdthistle I, Mburu G, Iorpenda K, Wringe A. Barriers and facilitating factors to the uptake of antiretroviral drugs for prevention of mother-to-child transmission of HIV in sub-Saharan Africa: a systematic review. *J Int AIDS Soc*. (2013) 16:18588. doi: 10.7448/IAS.16.1.18588
26. Sherr L, Croome N, Bradshaw K, Castaneda KP. A systematic review examining whether interventions are effective in reducing cognitive delay in children infected and affected with HIV. *AIDS Care*. (2014) 26(Suppl. 1): S70–77. doi: 10.1080/09540121.2014.906560
27. Sherr L, Croome N, Castaneda KP, Bradshaw K. A systematic review of psychological functioning of children exposed to HIV: using evidence to plan for tomorrow's HIV Needs. *AIDS Behav*. (2014) 18:2059–74. doi: 10.1007/s10461-014-0747-6
28. Sherr L, Mueller J, Varrall R. Evidence-based gender findings for children affected by HIV and AIDS - a systematic overview. *AIDS Care*. (2009) 21(Suppl. 1):83–97. doi: 10.1080/09540120902923105
29. Haines C, Loades ME, Coetzee BJ, Higson-Sweeney N. Which HIV-infected youth are at risk of developing depression and what treatments. *Int J Psychiatry Med*. (2008) 38:43–51. doi: 10.1515/ijamh-2019-0037
30. Sherr L, Mueller J, Varrall R. A systematic review of cognitive development and child human immunodeficiency virus infection. *Psychol Health Med*. (2009) 14:387–404. doi: 10.1080/13548500903012897
31. Sherr L, Croome N, Castaneda KP, Bradshaw K, Romero RH. Developmental challenges in HIV infected children—An updated systematic review. *Child Youth Serv Rev*. (2014) 45:74–89. doi: 10.1016/j.childyouth.2014.03.040
32. Vreeman RC, Gramelspacher AM, Gisore PO, Scanlon ML, Nyandiko WM. Disclosure of HIV status to children in resource-limited settings: a systematic review. *J Int AIDS Soc*. (2013) 16:18466. doi: 10.7448/IAS.16.1.18466
33. Spies G, Afifi TO, Archibald SL, Fennema-Notestine C, Sareen J, Seedat S. Mental health outcomes in HIV and childhood maltreatment: a systematic review. *Syst Rev*. (2012) 1:30. doi: 10.1186/2046-4053-1-30
34. Kimera E, Vindevogel S, De Maeyer J. Challenges and support for quality of life of youths living with HIV/AIDS in schools and larger community in East Africa: a systematic review. *Syst Rev*. (2019) 8:64. doi: 10.1186/s13643-019-0980-1
35. Goldberg RE, Short S. What do we know about children living with HIV-infected or AIDS-ill adults in Sub-Saharan Africa? A systematic review of the literature. *AIDS Care*. (2016) 28(Suppl. 2):130–41. doi: 10.1080/09540121.2016.1176684
36. Skeen SA, Sherr L, Croome N, Gandhi N, Roberts KJ, Macedo A, et al. Interventions to improve psychosocial well-being for children affected by HIV and AIDS: a systematic review. *Vulnerable Child Youth Stud*. (2017) 12:91–116. doi: 10.1080/17450128.2016.1276656
37. King E, De Silva M, Stein A, Patel V. Interventions for improving the psychosocial well-being of children affected by HIV and AIDS. *Cochrane Database Syst Rev*. (2009) 2009:CD006733. doi: 10.1002/14651858.CD006733.pub2
38. Barry MM, Clarke AM, Jenkins R, Patel V. A systematic review of the effectiveness of mental health promotion interventions for young people in low and middle income countries. *BMC Public Health*. (2013) 13:835. doi: 10.1186/1471-2458-13-835
39. Klasen H, Crombag A.What works where? A systematic review of child and adolescent mental health interventions for low and middle income countries. *Soc Psychiatry Psychiatr Epidemiol*. (2013) 48:595–611. doi: 10.1007/s00127-012-0566-x
40. Sherr L, Mueller J. Where is the evidence base? Mental health issues surrounding bereavement and HIV in children. *Prof Psychol Res Pr*. (2008) 39:113–21. doi: 10.1108/17465729200800027
41. Kuo C, Operario D. Caring for AIDS-orphaned children: a systematic review of studies on caregivers. *Vulnerable Child Youth Stud*. (2009)4:1–12. doi: 10.1080/17450120802270418
42. Britto C, Mehta K, Thomas R, Shet A. Prevalence and correlates of HIV disclosure among children and adolescents in low-and middle-income countries: a systematic review. *J Dev Behav Pediatr*. (2016) 37:496–505. doi: 10.1097/DBP.0000000000000303
43. van Wyhe KS, van de Water T, Boivin MJ, Cotton MF, Thomas KGF. Cross-cultural assessment of HIV-associated cognitive impairment using the Kaufman assessment battery for children: a systematic review. *J Int AIDS Soc*. (2017) 20:21412. doi: 10.7448/IAS.20.1.21412
44. Lloyd S, Operario D. HIV Risk among men who have sex with men who have experienced childhood sexual abuse: systematic review and meta-analysis. *AIDS Educ Prev*. (2012) 24:228–41. doi: 10.1521/aeap.2012.24.3.228
45. Medley A, Kennedy C, O'Reilly K, Sweat M. Effectiveness of peer education interventions for HIV prevention in developing countries: a systematic review and meta-analysis. *AIDS Educ Prev*. (2009) 21:181–206. doi: 10.1521/aeap.2009.21.3.181
46. Krauss BJ, Letteney S, De Baets AJ, Baggaley R, Okero FO. Disclosure of HIV status to HIV-positive children 12 and under: a systematic cross-national review of implications for health and well-being. *Vulnerab Chil Youth Stud*. (2013) 8:99–119. doi: 10.1080/17450128.2012.750774

47. Hudelson C, Cluver L. Factors associated with adherence to antiretroviral therapy among adolescents living with HIV/AIDS in low- and middle-income countries: a systematic review. *AIDS Care*. (2015) 27:805–16. doi: 10.1080/09540121.2015.1011073
48. McAteer CI, Truong NT, Aluoch J, Deathe AR, Nyandiko WM, Marete I, et al. A systematic review of measures of HIV/AIDS stigma in paediatric HIV-infected and HIV-affected populations. *J Int AIDS Soc*. (2016) 19:21204. doi: 10.7448/IAS.19.1.21204
49. Hanass-Hancock J. Disability and HIV/AIDS - a systematic review of literature on Africa. *JIAS*. (2009) 12:34. doi: 10.1186/1758-2652-2-9
50. Ottisova L, Hemmings S, Howard L, Zimmerman C, Oram S. Prevalence and risk of violence and the mental, physical and sexual health problems associated with human trafficking: an updated systematic review. *Epidemiol Psychiatr Sci*. (2016) 25:317–41. doi: 10.1017/S2045796016000135
51. Kilburn K, Thirumurthy H, Halpern CT, Pettifor A, Handa S. *Effects of a Large-Scale Unconditional Cash Transfer Program on Mental Health Outcomes of Young People in Kenya: A Cluster Randomized Trial*. Chapel Hill: University of North Carolina (2014).
52. Biaggi A, Conroy S, Pawlby S, Pariante CM. Identifying the women at risk of antenatal anxiety and depression: a systematic review. *J Aff Disord*. (2016) 191:62–77. doi: 10.1016/j.jad.2015.11.014
53. Cluver LD, Orkin MF, Yakubovich AR, Sherr L. Combination social protection for reducing HIV-risk behavior amongst adolescents in South Africa. *J Acq Immune Defici Syndr (1999)*. (2016) 72:96. doi: 10.1097/QAI.0000000000000938
54. Handa S, Halpern CT, Pettifor A, Thirumurthy H. The government of Kenya's cash transfer program reduces the risk of sexual debut among young people age 15–25. *PLoS ONE*. (2014) 9:e85473. doi: 10.1371/journal.pone.0085473
55. Miller C, Tsoka MK, Reichert. *Targeting Report: External Evaluation of the Mchinji Social Cash Transfer Pilot. Center for International Health and Development, Boston University and Center for Social Research*. Boston; Lilongwe: University of Malawi (2008).
56. Heymann J, Earle A, Rajaraman D, Miller C, Bogen K. Extended family caring for children orphaned by AIDS: balancing essential work and caregiving in a high HIV prevalence nations. *AIDS Care*. (2007) 19:3, 337–345. doi: 10.1080/09540120600763225
57. Maniglio R. Child sexual abuse in the etiology of depression: a systematic review of reviews. *Depress Anxiety*. (2010) 27:631–42. doi: 10.1002/da.20687
58. Devries KM, Mak JY, Bacchus LJ, Child JC, Falder G, Petzold M, et al. Intimate partner violence and incident depressive symptoms and suicide attempts: a systematic review of longitudinal studies. *PLoS Med*. (2013) 10:e1001439.
59. UNICEF. *Childcare In a Global Crisis: The Impact of COVID-19 on Work and Family Life* (2020). Available online at: https://www.unicef-irc.org/publications/1109-childcare-in-a-global-crisis-the-impact-of-covid-19-on-work-and-family-life.html (accessed August 31, 2020).
60. UNWOMEN. *COVID-19 and Ending Violence Against Women and Girls* (2020). Available online at: https://www.unwomen.org/-~/media/headquarters/attachments/sections/library/publications/2020/issue-brief-covid-19-and-ending-violence-against-women-and-girls-en.pdf?la=en&vs=5006 (accessed August 31, 2020).
61. Patel V, Lancet Commissioners. The lancet commission on global mental health and sustainable development. *Lancet*. (2018) 392:1553–98. doi: 10.1016/S0140-6736(18)31612-X
62. Mwai G, Torpey K, Frost P, Ford N, Seeley J. Role and outcomes of community health workers in HIV care in sub-Saharan Africa: a systematic review. *J Int AIDS Soc*. (2013) 16:18586. doi: 10.7448/IAS.16.1.18586
63. Schneider H, Hlophe H, van Rensburg D. Community health workers and the response to HIV/AIDS in South Africa: tensions and prospects. *Health Policy Plan*. (2008) 23:179–87. doi: 10.1093/heapol/czn006
64. Ameratunga S, Clark T, Banati P. Changing school climates to promote adolescent wellbeing: two trials with one goal. *Lancet*. (2018) 392:2416–8. doi: 10.1016/S0140-6736(18)32280-3
65. Viner RM, Russell SJ, Croker H, Packer J, Ward J, Stansfield C, et al. School closure and management practices during coronavirus outbreaks including COVID-19: a rapid systematic review. *Lancet Child Adol Health*. (2020) 4:397–404. doi: 10.1016/S2352-4642(20)30095-X
66. Gardner F, Montgomery P, Knerr W. Transporting evidence-based parenting programs for child problem behavior (Age 3–10) between countries: systematic review and meta-analysis. *J Clin Child Adol Psychol*. (2015) 45:6, 749–762 doi: 10.1080/15374416.2015.1015134
67. Cluver LD, Meinck F, Steinert JI, Shenderovich Y, Doubt J, Romero RH, et al. Parenting for lifelong health: a pragmatic cluster randomised controlled trial of a noncommercialised parenting programme for adolescents and their families in South Africa. *BMJ Glob Health*. (2018) 3:e000539. doi: 10.1136/bmjgh-2017-000539
68. Ward CL, Wessels IM, Lachman JM, Hutchings J, Cluver LD, Kassanjee R, et al. Parenting for lifelong health for young children: a randomized controlled trial of a parenting program in South Africa to prevent harsh parenting and child conduct problems. *J Child Psychol Psychiatry*. (2020) 61:503–12. doi: 10.1111/jcpp.13129
69. Cluver L, Lachman JM, Sherr L, Wessels I, Krug E, Rakotomalala S, et al. Parenting in a time of COVID-19 published correction appears in Lancet. *Lancet*. (2020) 395:e64. doi: 10.1016/S0140-6736(20)30736-4
70. World Health Organization. *Guidelines on HIV Disclosure Counselling For Children up to 12 Years of Age* (2011). Available online at: https://apps.who.int/iris/bitstream/handle/10665/44777/9789241502863_eng.pdf;jsessionid=8CC7F4B5B0903DB3DA047427466E97CF?sequence=1 (accessed August 31, 2020).
71. BBC. *Report on Kenyan Nurse: 'I Was Shunned Over Coronavirus Fears* (2020). Available online at: https://www.bbc.com/news/world-africa-52630804 (accessed August 31, 2020).
72. Moreno C, Wykes T, Galderisi S, Nordentoft M, Crossley N, Jones N, et al. How mental health care should change as a consequence of the COVID-19 pandemic. *Lancet Psychiatry*. (2020) 7:813–24. doi: 10.1016/S2215-0366(20)30307-2
73. Thorpe V. *Balcony Singing In Solidarity Spreads Across Italy During Lockdown. The Guardian News Report* (2020). Available online at: https://www.theguardian.com/world/2020/mar/14/solidarity-balcony-singing-spreads-across-italy-during-lockdown (accessed August 31, 2020).
74. Banati P, Jones N, Youssef S. Intersecting vulnerabilities: Impact of COVID on the mental health and emotional lives of young people in low- and middle-income countries. *Eur J Dev Res*. (2020) 32:1613–38. doi: 10.1057/s41287-020-00325-5
75. Katz IT, Ryu AE, Onuegbu AG, Psaros C, Weiser SD, Bangsberg DR, et al. Impact of HIV-related stigma on treatment adherence: systematic review and meta-synthesis. *J Int AIDS Soc*. (2013) 16:18640. doi: 10.7448/IAS.16.3.18640
76. Campbell C, Skovdal M, Gibbs A. Creating social spaces to tackle AIDS-related stigma: reviewing the role of church groups in Sub-Saharan Africa. *AIDS Behav*. (2011) 15:1204–19.
77. O'Leary, Kennedy M, Pappas-DeLuca KA, Nkete M, Beck V, Galavotti C. Association between exposure to an HIV story line in 'The Bold and the Beautiful' and HIV-related stigma in Botswana. *AIDS Educ Prev*. (2007) 19:209–17. doi: 10.1521/aeap.2007.19.3.209
78. Ragavan MI, Culyba AJ, Muhammad FL, Miller E. Supporting adolescents and young adults exposed to or experiencing violence during the COVID-19 pandemic. *J Adolesc Health*. (2020) 67:18–20. doi: 10.1016/j.jadohealth.2020.04.011

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Public Health

ORIGINAL RESEARCH
published: 29 June 2021
doi: 10.3389/fpubh.2021.562600

COVID-19 Preparedness and Response: Validation of a Rapid Assessment Tool to Evaluate Priorities of Health Workers at the Grassroots Level

Bach Xuan Tran[1,2], Chi Linh Hoang[3], Nguyen Thao Thi Nguyen[4], Huong Thi Le[1], Hai Quang Pham[5,6], Men Thi Hoang[5,7], Tu Huu Nguyen[8], Carl A. Latkin[2], Cyrus S. H. Ho[9] and Roger C. M. Ho[10,11]*

[1] The Department of Health Economic, Institute for Preventive Medicine and Public Health, Hanoi Medical University, Hanoi, Vietnam, [2] Bloomberg School of Public Health, Johns Hopkins University, Baltimore, MD, United States, [3] Center of Excellence in Behavioral Medicine, Nguyen Tat Thanh University, Ho Chi Minh City, Vietnam, [4] Duke University School of Medicine, Duke University, Durham, NC, United States, [5] Institute for Global Health Innovations, Duy Tan University, Da Nang, Vietnam, [6] Faculty of Medicine, Duy Tan University, Da Nang, Vietnam, [7] Faculty of Pharmacy, Duy Tan University, Da Nang, Vietnam, [8] Vietnam Young Physicians' Association, Hanoi, Vietnam, [9] Department of Psychological Medicine, National University Hospital, Singapore, Singapore, [10] Department of Psychological Medicine, Yong Loo Lin School of Medicine, National University of Singapore, Singapore, Singapore, [11] Institute for Health Innovation and Technology, National University of Singapore, Singapore, Singapore

OPEN ACCESS

Edited by:
Manasi Kumar,
University of Nairobi, Kenya

Reviewed by:
Eric Mayor,
University of Basel, Switzerland
Manh-Toan Ho,
Phenikaa University, Vietnam

****Correspondence:***
Bach Xuan Tran
bach.ipmph2@gmail.com;
bach@jhu.edu

Specialty section:
This article was submitted to Infectious Diseases – Surveillance, Prevention and Treatment, a section of the journal Frontiers in Public Health

Received: *28 July 2020*
Accepted: *03 June 2021*
Published: *29 June 2021*

Citation:
Tran BX, Hoang CL, Nguyen NTT, Le HT, Pham HQ, Hoang MT, Nguyen TH, Latkin CA, Ho CSH and Ho RCM (2021) COVID-19 Preparedness and Response: Validation of a Rapid Assessment Tool to Evaluate Priorities of Health Workers at the Grassroots Level. Front. Public Health 9:562600. doi: 10.3389/fpubh.2021.562600

Since the initial phases of the COVID-19 outbreak, international recommendations for disease control have been readily available. However, blind implementation of these recommendations without grassroot-level support could result in public distrust and low adherence. This study evaluated the use of a public health priorities survey to rapidly assess perceptions of local health workers. A cross-sectional study using a web-based survey was conducted among 5,847 health workers and medical students from January to February 2020 to evaluate the level of prioritization of various public health measures. Measures with the highest levels of prioritization were "Early prevention, environmental sanitation, and improvement of population health" and "Mobilization of community participation in disease control," which were concordant with policies implemented by the Vietnamese government. This study also demonstrated a high level of internal validity among survey items and shared ranking of priorities among all occupational groups. The use of this public health priorities survey was found to be effective in identifying priorities as identified by grassroots health workers to provide real-time feedback to the national government. However, future iterations of this survey should consider limiting the use of each prioritization score to ensure that responses represent the reality of source limitations and consider focusing on medical professionals and community workers due medical students' limited experience with Vietnam's healthcare infrastructure.

Keywords: COVID-19, setting priority, medical student, health workers, Vietnam

INTRODUCTION

On 31 December 2019, the World Health Organization (WHO) China detected a cluster of pneumonia cases of unknown etiology at Wuhan Jinyintan Hospital in Hubei province, China (1). One week later, on 7 January 2020, the virus now called SARS-CoV-2 was isolated (1). On 11 February 2020, the WHO officially named the disease associated with SARS-CoV-2 infection as COVID-19 (2). Though COVID-19 is associated with lower case-fatality rates, it has proven to be more infectious (3) than both SARS-CoV and MERS-CoV, which caused the severe acute respiratory syndrome (SARS) outbreak in 2003 (4) and of Middle East respiratory syndrome (MERS) in 2012, respectively (5, 6). These differences are likely due to variations in viral reproduction rates along with a large number of asymptomatic SARS-CoV-2 cases contributing to high rates of transmission (5, 7). By 7 April 2020, there were 1,279,722 confirmed cases globally, with over 72,600 deaths in 203 countries across the world (8).

Previous studies have argued that the rapid acceleration of the COVID-19 pandemic was a consequence of inadequate preventative measures (9, 10). This pandemic has demonstrated that no matter how robust a country's health system may be, preparedness is crucial to preventing disease spread (11). Indeed, even some of the most developed health systems in the world have faltered due to a lack of early preventative measures (12–14). For middle-income countries such as Vietnam, unpreparedness could result in even worse consequences given the constrained healthcare infrastructure and resource limitations (15). As such, mechanisms for early and efficient public health planning and priority setting are critical to ensure appropriate disease prevention and control (16–19).

Since the initial phases of the COVID-19 outbreak in Hubei province, there has been widespread guidance from health authorities globally regarding disease prevention and control measures. Standard public health interventions, including isolation and quarantine, physical distancing, and community containment measures, were recommended to control disease transmission (20). The WHO also issued guidelines regarding the importance of establishing research priorities, facilitation of clinical trials, and coordination of efforts to contain SARS-CoV-2 spread (21).

Yet, though international recommendations were readily available, blind implementation of these recommendations without grassroots-level support could result in public distrust and low adherence (22). As such, input from local health workers would be helpful in ensuring that public health interventions reflect the specific needs of each community and increase local support. To supplement data-driven disease control measures, this study evaluated the priorities of Vietnamese health workers and medical students regarding public health interventions to prevent SARS-CoV-2 spread in Vietnam. Health workers and medical students were chosen because they are more likely to be knowledgeable about COVID-19 and Vietnam's healthcare infrastructure. Beyond identifying public health priorities by grassroots health workers during the initial phase of COVID-19 in Vietnam, this study aims to validate the use of a public health priorities survey to rapidly assess local needs during times of pandemic.

METHODS

Study Setting and Participants

Due to its shared border with China, ground zero of the COVID-19 epidemic, Vietnam was at a higher risk of importing positive cases from Hubei province when the pandemic began in January 2020. As such, from January to February 2020, a web-based survey was conducted among 5,847 health workers and medical students in Vietnam to study the perceptions of COVID-19 in the country. Participants were asked to take part in this survey if they met the following criteria: (1) involvement in Vietnam's COVID-19 response either as a medical student, medical professional, or community worker, (2) age 18 years or older, (3) living in Vietnam for at least 6 months, (4) agreement to participate in the study through online informed consent, and (5) ability to read and respond to the questionnaire.

The recruitment process was initially focused on several core groups consisting of individuals from the Vietnam Young Physician Association and medical universities in Hanoi, Da Nang, and Ho Chi Minh City. These groups were selected to reflect diversity in demographics, including age, gender, and occupation. Individuals in these groups were more likely to be well-connected to peers whom they recruited to participate in the study. Using snowball sampling, a total of 5,847 people were recruited through online invitations to take part in this study.

Measurements and Instruments

General characteristics collected included gender, age, marital status, level of education, and work-related characteristics, which included the administration level, occupation, and workplace location. Participant occupation was designated as either a medical student, medical professional, or community worker—with community workers defined as those working to prevent spread COVID-19 at the local level. Given that Vietnam's health system is divided into the central, provincial, and district/communal level clinics along with academic health centers associated with universities, participants were also asked to report the administration level in which they are employed. Not all participants answered all questions in the survey, so we only include questions with response rates >95%.

The questionnaire was designed based on the rapid response of Vietnamese government on COVID-19. The content not only covers considerable efforts of public health measures, such as quarantine, wearing masks, isolation, enforcing border closure, but also efforts to strengthen the healthcare system, scientific research capacity. Therefore, it can assess the measure of disease control with a multiple perspective. Participants were assessed for their level of prioritization of various public interventions to contain COVID-19 with questions relating to 12 public health measures including environmental sanitation, knowledge enhancement, development of epidemic forecast systems to provide early warning, and coordination of local actors. For the level of prioritization, scores ranged from 0 beings "not important" to 10 being "extremely important."

These items were categorized into two domains: "Intersectoral approaches to disease prevention" and "Systemic approaches to preventative medicine." Intersectoral approaches were defined as interventions that rely on coordination of various community-level actors, a bottom-up approach, whereas systemic approaches were defined as interventions that rely on governmental-level organization, or top-down. These domains were constructed using the mean score of all items in each domain.

Statistical Analysis

The collected data were analyzed by using STATA 15.0 (Stata Corp. LP, College Station, TX, USA). Exploratory factor analysis (EFA) was utilized to evaluate the construct validity of the questionnaire. The Horn's parallel analysis was used to define number of factors. An orthogonal varimax rotation with Kaiser normalization was applied for exploring the scale of items to increase the interpretability of study results. The cut-off point for factor loading was defined at a value of 0.46. Confirmatory Factor Analysis (CFA) was applied to calculate some model fit indices (Model chi-square, RMSEA: Root Mean Square Error of Approximation, CFI: Confirmatory factor index, NFI: Normed Fit Index, SRMR: Standardized Root Mean Square Residual). We measured the internal consistency of each factor using Cronbach's alpha.

Descriptive statistics were used to characterize data frequency, percent, mean, and standard deviation. Inferential statistics were applied to compare the three occupational groups by T-test or Mann Whitney test for quantitative variables and by the Fisher-exact test or Chi-square test for qualitative variables. A Tobit multivariable regression model was applied to identify factors associated with each type of channel. Poisson regression models were used to examine factors related to information content. To obtain reduced models, the stepwise forward selection was utilized. Only predictors which have log-likelihood ratio test with a p-value less than of 0.2 were included in the final model. Statistical significance was defined at a p-value of less than 0.05.

RESULTS

Table 1 shows the basic information of the respondents, including occupation, gender, age, marital status, and area of residence. Participants were classified by occupation as either a medical professional, medical student, or community worker. The majority of the respondents were medical students (89.7%), female (71.9%), living in urban areas (86.6%), and single (92.3%). The mean ages of medical professionals, medical students, and community workers were $M = 31.9$ (SD $= 7.8$), $M = 20.5$ (SD $= 1.7$), and $M = 32.1$ (SD $= 4.6$), respectively. There were significant differences in the level of participation in community activities with medical students demonstrating the lowest levels of participation at 41.5%.

As demonstrated in **Table 2**, the two domains, "Intersectoral approaches to disease prevention" and "Systemic approaches in preventive medicine," were evaluated by EFA. The Cronbach alpha of the intersectoral approaches and systemic approaches were 0.97 and 0.94, respectively. "Early prevention, environmental sanitation, and population health improvement" had the highest percentage of participants (42.4%) rating it as "extremely important," whereas "Increasing coordination among local actors" had the lowest percentage of participants (27.2%) rate it as extremely important. The intersectoral and systemic domains had similar mean scores [$M = 8.0$ (SD $= 1.8$) and $M = 8.0$ (SD $= 1.9$), respectively]. According to CFA, the model had some acceptable fit indices (CFI $= 0.966$, NFI $= 0.965$, SRMR: 0.021).

Table 3 reports the assessment of medical professionals, medical students, and community workers on the importance of various measures in disease control. Overall, the mean score of all measures was 8.0. The highest-scoring measures were "Mobilization of community participation in disease control" $M = 8.2$ (SD $= 2.0$) in the intersectoral domain and "Early prevention, environmental sanitation, and population health improvement" $M = 8.2$ (SD $= 2.1$) in the systemic domain. In contrast, lowest-scoring measures were "Improvement of interdisciplinary scientific research capacity" $M = 7.9$ (SD $= 2.0$) and "Developing systems of epidemic forecasts and early warning" $M = 7.9$ (SD $= 2.1$) in the intersectoral and systemic domains, respectively.

Table 3 also demonstrates significant differences between occupation and level of prioritization across both domains and 10/12 measures, with the exception of "Raising awareness of the impacts of climate change" and "Improvement of interdisciplinary scientific research capacity." Medical students consistently gave lower prioritization scores in comparison to other occupations on all measures. Nonetheless, despite differences within each measure, when measures are ranked by mean prioritization scores within each occupational group, all three occupations share the same order prioritization for measures within each domain.

Table 4 demonstrates the results of multivariate regression to identify demographic factors associated with disease prevention priorities across intersectoral and systemic domains. Females in this study appeared to give significant higher scores in both domains compared to males ($B = 0.27$; SE $= 0.07$ and $B = 0.37$; SE $= 0.07$). Residence in rural areas tend to have lower score ($B = -0.20$; SE $= 0.09$ and $B = -0.18$; SE $= 0.09$). Living with a spouse were also positively associated with higher scores in both domains ($B = 0.81$; SE $= 0.19$ and $B = 0.97$; SE $= 0.19$). Those 25 years or older gave higher scores in the systemic approach domain in comparison to their counterparts ($B = 0.50$; SE $= 0.17$; $p < 0.01$). No significant differences between scores were found between the medical professional and community workers vs. medical students.

DISCUSSION

This study implemented a newly developed tool to rapidly assess local disease control priorities of grassroots healthcare workers and medical students. We found a high level of priority across both intersectoral and systemic approach domains. The measures with the highest levels of prioritization were "Early prevention, environmental sanitation, and population health improvement" in the systemic domain and "Mobilization of community

TABLE 1 | Demographics of participants by occupation.

	Medical professionals		Medical students		Community workers		Total		*p*-value
	n	%	*n*	%	*n*	%	*n*	%	
Total	510	8.7	5,247	89.7	90	1.5	5,847	100.0	
Gender									
Male	275	54.4	1,306	25.1	52	59.1	1,633	28.1	<0.01
Female	231	45.7	3,903	74.9	36	40.9	4,170	71.9	
Living area									
Urban	358	71.2	4,551	88.0	77	87.5	4,986	86.6	<0.01
Rural	145	28.8	619	12.0	11	12.5	775	13.5	
Marital status									
Single	190	37.9	5,125	98.6	26	29.2	5,341	92.3	<0.01
Living with spouse	301	60.1	11	0.2	60	67.4	372	6.4	
Others	10	2.0	64	1.2	3	3.4	77	1.3	
Administration level									
Central	67	13.3	518	10.1	22	26.2	607	10.6	<0.01
Province	235	46.6	601	11.7	40	47.6	876	15.4	
Below province level	155	30.8	88	1.7	22	26.2	265	4.6	
College/University	47	9.3	3,911	76.4	0	0.0	3,958	69.4	
Participation in community activities									
Yes	407	80.6	2,160	41.5	89	100.0	2,656	45.8	<0.01
No	98	19.4	3,041	58.5	0	0.0	3,139	54.2	
Age group									
Under 25	62	13.0	4,844	98.7	3	3.5	4,909	89.7	<0.01
25 and above	415	87.0	64	1.3	83	96.5	562	10.3	
	Mean	**SD**	**Mean**	**SD**	**Mean**	**SD**	**Mean**	**SD**	***p*-value**
Age	31.9	7.8	20.5	1.7	32.1	4.6	21.7	4.5	<0.01

participation in disease control" in the intersectoral domain. There was a high level of internal validity of the questionnaire in addition to the shared ranking of public health measures between all three occupational groups despite significant differences in scores within each measure between groups. These significant differences in prioritization scores across both domains and most measures with medical students consistently giving lower scores than other occupations. Important predictors of higher prioritization among participants included a rural residence, age, and participation in community activities.

Given Vietnam's status as a middle-income country and overall scarcity of healthcare resources, preventative health strategies have been critical to contain COVID-19 spread within the country since the outbreak began in Hubei province, China, in early January 2020. Particularly in resource-scarce countries, experts have recommended the early implementation of social distancing and quarantine to ensure that newly diagnosed infections are adequately contained (23). The high levels of prioritization of "Early prevention, environmental sanitation, and population health improvement" echo these recommendations and highlight the healthcare sector's overall support of aggressive early preventative measures to prevent more severe downstream consequences. Moreover, given the limited capacity of Vietnam's healthcare system, participants in this study also demonstrated a high level of prioritization of community mobilization to support disease control measures. Indeed, in previous outbreaks in resource-constrained settings, community-based surveillance and implementation of preventative strategies were crucial in preventing disease spread (24).

In Vietnam, the first COVID-19 case was identified in Ho Chi Minh City on 22 January 2020 (25), and we see the national government's response coinciding with priorities of grassroots health workers, as identified by our study. Shortly after the initial case, the national government implemented measures to restrict SARS-CoV-2 spread through social distancing, quarantine, health status declarations, and improved sanitation (26). At the same time, there was also increasing mobilization of resources to improve local surveillance (26), which allowed for the rapid quarantining and tracing of tens of thousands of individuals (27). Whereas, other countries, such as Korea, initiated mass production of test kits for early detection (28), Vietnam did not have the infrastructure in place to implement widespread testing and as such, relied on social isolation and rapid quarantining of identified cases to reduce dependence on testing. Indeed, through the early collaborative efforts of the government and Vietnamese citizens, the country was able to effectively control the COVID-19

TABLE 2 | Participant satisfaction with and exploratory factor analysis of measures for disease control.

Items	Extremely important priority		Intersectoral approaches to disease prevention	Systemic approaches in preventive medicine
	n	%		
Early prevention, environmental sanitation, and population health improvement	2,480	42.4		0.77
Mobilization of community participation in disease control	2,223	38.4	0.67	
Training on up to date scientific knowledge	2,190	37.7	0.72	
Raising awareness of the impacts of climate change	2,052	35.3	0.65	
Ensuring adequate budget for disease prevention	1,978	34.1		0.67
Periodic surveillance for infectious diseases	1,958	33.6		0.79
Strengthening health communication and education programs	1,853	31.9		0.66
Development of epidemic forecasts systems to provide early warning	1,779	30.6		0.74
Improvement of interdisciplinary scientific research capacity	1,693	29.2	0.77	
Workforce support for preventive medicine sectors	1,688	29.1	0.70	
Development of guidelines for disease prevention	1,662	28.7	0.78	
Increasing coordination among local actors	1,572	27.2	0.80	
Cronbach's alpha			0.97	0.94
Mean			8.0	8.0
SD			1.8	1.9

Fits for model: Chi-square (p-value) = 3,198.03 (<0.05), RMSEA = 0.102; CFI = 0.966, NFI = 0.965, SRMR: 0.021.

pandemic. For instance, in response to the first case of COVID-19 on January 23, the public have warned to be on the alert for the new infectious disease through reliable channels (i.e., Daily news and up-to-date messages from Ministry of Health) (29). Besides, the journalists also picked up selective terms in order to improve the attitude and the awareness of individuals in fighting the spread of COVID-19 (30). As of 13 April 2020, there were only 266 confirmed cases and zero deaths in the entire country (31).

Beyond highlighting the overall concordance between grassroots health worker and governmental priorities in Vietnam, this study also demonstrates the efficacy of using a public health priorities evaluation to rapidly assess priorities of grassroots health workers across the country, provide the national government with real-time feedback, and ensure health worker participation in national public health planning. In resource-constrained settings, having such a tool allows the central government to allocate resources according to regional needs, as dictated by those directly involved with local public health interventions. This study found a high level of internal validity of the questionnaire within both intersectoral and systemic domains. Further, our data illustrate the shared ranking of public health measures between all three occupational groups, as determined by each group's mean prioritization scores, further highlighting the high level of agreement on public health priorities in this study.

Despite similarities in the ranking of public health measures, when scores within each measure were examined, there were significant differences in mean scores between occupational groups for both domains and most public health measures with medical students consistently giving lower scores than other occupations. This may be due to less experience among medical students with Vietnam's healthcare infrastructure and lower awareness of its limitations—a factor that may also explain why older age was associated with higher prioritization scores. This finding may also be mediated by lower rates of contact with COVID-19 patients among medical students in comparison to medical professionals and community workers. In the first wave of COVID-19, while the public have put on high alert about new infectious disease, this outbreak also accompanied sensemaking (32). Sensemaking is a term that refers to uncertainty surrounding a sudden event and the attempt to find the explanation, and it might decrease the trust on public health measures by ancient phenomenon or cultural deficiency (33). Previous documents had reported related cases regarding infectious disease, for example, AIDS, SARS, avian flu and Ebola (34–37). Thus, our paper suggests further studies to continuously validate the rapid tool in order to evaluate the awareness of public in the later waves of COVID-19. In addition, we see a similar trend when urban vs. rural location was considered in which participants living in urban areas had significantly higher prioritization scores. This is likely related to the higher numbers of confirmed COVID-19 cases in Hanoi and Ho Chi Minh City, resulting in greater levels of interaction with infected patients and/or awareness of nearby infection (31). Though previous reports have indicated that COVID-19 could pose a greater risk to rural areas due to inadequate healthcare facilities (38), it appears from our data that the concrete threat of confirmed COVID-19 cases nearby is associated with higher prioritization of public health measures than the theoretical risk of inadequate healthcare infrastructure in areas low infection rates.

Given these findings, future attempts to use this tool to rapidly assess public health priorities among grassroots health workers could implement some modifications to improve the interpretability of results. First, because healthcare resources are limited, future iterations should

TABLE 3 | Assessing the importance of local disease control measures of health workers and medical students in Vietnam, 2020.

Assess the importance (range: 0–10)	Medical professional		Medical students		Community workers		Total		*p*-value
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
Intersectoral approaches to disease prevention	8.3	1.7	8.0	1.8	8.2	1.5	8.0	1.8	<0.01**
Mobilization of community participation in disease control	8.6	1.9	8.2	2.0	8.6	1.8	8.2	2.0	<0.01**
Training to up to date scientific developments	8.5	1.9	8.2	2.0	8.5	1.8	8.2	2.0	<0.01**
Raising awareness of the impacts of climate change	8.3	1.9	8.1	2.0	8.4	1.9	8.1	2.0	0.66
Improvement of interdisciplinary scientific research capacity	8.0	2.0	7.9	2.0	8.0	1.7	7.9	2.0	0.06
Workforce support for preventive medicine sectors	8.1	2.0	7.9	2.0	8.0	1.9	7.9	2.0	<0.01**
Development of guidelines for disease prevention	8.3	1.9	7.9	2.0	8.1	2.1	7.9	2.0	0.02*
Increasing coordination among local actors	8.1	1.9	7.8	2.0	8.0	1.8	7.9	2.0	<0.01**
Systemic approaches in preventive medicine	8.4	1.7	8.0	1.9	8.6	1.3	8.0	1.9	<0.01**
Early prevention, environmental sanitation, and population health improvement	8.6	1.9	8.2	2.1	9.3	1.2	8.2	2.1	<0.01**
Ensuring adequate budget for disease prevention	8.3	2.0	8.0	2.0	8.4	2.0	8.0	2.0	<0.01**
Periodic surveillance for infectious diseases	8.3	1.9	7.9	2.1	8.6	1.5	8.0	2.1	<0.01**
Strengthening health communication and education programs	8.4	1.9	7.9	2.0	8.5	1.6	8.0	2.0	<0.01**
Development of epidemic forecast systems to provide early warning	8.2	2.0	7.8	2.1	8.3	1.9	7.9	2.1	<0.01**

*$p < 0.05$, **$p < 0.01$.

limit the number of times in which participants could use each prioritization score—for instance, participants might only be able to assign 10 ("extremely important") to one public health measure—to ensure that responses represent the reality of source limitations. Second, given medical students' limited experience working within Vietnam's healthcare infrastructure, along with the observed differences in prioritization among medical students vs. medical professionals/community workers, future iterations should consider focusing on medical professionals and community workers.

Limitations of this study included its cross-sectional design, which limits our ability to infer causal relationships. Further, due to the implementation of snowball sampling, the results of this study are not generalizable to the health worker population in Vietnam, though we have attempted to increase external validity with high sample size. In addition, this study implemented self-reporting, which may have introduced recall bias and social desirability bias. We have attempted to avert this by ensuring the confidentiality of all responses.

CONCLUSION

This study evaluated the use of a public health priorities survey to rapidly assess priorities of grassroots healthcare workers and medical students during the initial phases of the COVID-19 pandemic in Vietnam. This study highlights a high level of concordance between priorities identified by health workers and those implemented by the government—those measures being "Early prevention, environmental sanitation, and improvement of population health" and "Mobilization of community participation in disease control." This study also validated the use of our public health priorities survey and found its efficacy in identifying priorities as identified by grassroots health workers to provide real-time feedback to the national government. Future iterations of this survey should consider limiting the use of each prioritization score to ensure that responses represent the reality of source limitations and consider focusing on medical professionals and community workers due to medical students' limited experience with Vietnam's healthcare infrastructure.

TABLE 4 | Demographic factors associated with disease control priorities among health workers and medical students in Vietnam, 2020.

	Intersectoral approaches to disease prevention			Systemic approaches in preventive medicine		
	B	95% CI	SE	B	95% CI	SE
Gender (Female vs. male)	0.27***	0.14; 0.41	0.07	0.37***	0.23; 0.50	0.07
Occupation (Community workers vs. medical professional)	−0.39	−0.90; 0.12	0.26			
Participated in community activities (Yes vs. no)	0.13**	0.01; 0.25	0.06	0.12*	−0.00; 0.25	0.06
Living area (Rural vs. urban)	−0.20**	−0.37; −0.02	0.09	−0.18**	−0.36; −0.00	0.09
Marital status (Living with spouse vs. single)	0.81***	0.44; 1.18	0.19	0.97***	0.59; 1.35	0.19
Age group (> 25 years vs. < 25)	0.31*	−0.01; 0.64	0.16	0.50***	0.18; 0.83	0.17
Level of health system management						
College/University (vs. central)	0.28***	0.13; 0.43	0.07	0.34***	0.19; 0.49	0.08
Below province level (vs. central)	−0.48***	−0.80; −0.16	0.16	−0.50***	−0.83; −0.17	0.17

$^{***}p < 0.01$, $^{**}p < 0.05$, $^{*}p < 0.1$.

DATA AVAILABILITY STATEMENT

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by the Scientific and Ethical Research Committee by Vietnam Youth Research Institute code (DT.KXDTN.19-13).

AUTHOR CONTRIBUTIONS

BT, CLH, HP, and NN: conceptualization. BT, CLH, HL, and MH: methodology. BT, CLH, and HP: formal analysis and investigation. BT and CLH: writing – original draft preparation. NN, TN, CL, CSH, and RH: writing – review and editing. All authors contributed to the article and approved the submitted version.

FUNDING

Research was supported by Vingroup Innovation Foundation (VINIF) in project code VINIF.2020.Covid-19.DA03.

ACKNOWLEDGMENTS

We would like to express the greatest gratitude the support of Vingroup Innovation Foundation (VINIF).

REFERENCES

1. WHO. *Novel Coronavirus – China.* (2020). Available from: https://www.who.int/csr/don/12-january-2020-novel-coronavirus-china/en/
2. WHO. *Naming the Coronavirus Disease (COVID-19) and the Virus That Causes It.* (2020). Available from: https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-(covid-2019)-and-the-virus-that-causes-it
3. Callaway E, Cyranoski D, Mallapaty S, Stoye E, Tollefson J. The coronavirus pandemic in five powerful charts. *Nature.* (2020) 579:482–3. doi: 10.1038/d41586-020-00758-2
4. WHO. *Summary of Probable SARS Cases With Onset of Illness From 1 November 2002 to 31 July 2003.* (2003). Available from: https://www.who.int/csr/sars/country/table2003_09_23/en/
5. Guarner J. Three emerging coronaviruses in two decades: the story of SARS, MERS, and Now COVID-19. *Am J Clin Pathol.* (2020) 153:420–1. doi: 10.1093/ajcp/aqaa029
6. WHO. *Middle East Respiratory Syndrome Coronavirus (MERS-CoV).* (2019). Available from: https://www.who.int/news-room/fact-sheets/detail/middle-east-respiratory-syndrome-coronavirus-(mers-cov)
7. Wang Y, Wang Y, Chen Y, Qin Q. Unique epidemiological and clinical features of the emerging 2019 novel coronavirus pneumonia (COVID-19) implicate special control measures. *J Med Virol.* (2020) 497–506. doi: 10.1002/jmv.25748
8. WHO. *Coronavirus Disease 2019 (COVID-19) Situation Report – 78*. Available from: https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200407-sitrep-78-covid-19.pdf?sfvrsn=bc43e1b_2
9. Xu S, Li Y. Beware of the second wave of COVID-19. *Lancet.* (2020) 1321–22. doi: 10.1016/S0140-6736(20)30845-X
10. Liu Q, Liu Z, Zhu J, Zhu Y, Li D, Gao Z, et al. Assessing the global tendency of COVID-19 outbreak. *MedRXiv.* (2020). doi: 10.1101/2020.03.18.20038224
11. Tan BYQ, Chew NWS, Lee GKH, Jing M, Goh Y, Yeo LLL, et al. Psychological impact of the COVID-19 pandemic on health care workers in Singapore. *Ann Intern Med.* (2020) 24:39–47. doi: 10.7326/M20-1083
12. Emanuel EJ, Persad G, Upshur R, Thome B, Parker M, Glickman A, et al. Fair allocation of scarce medical resources in the time of Covid-19. *New Engl J Med.* (2020) 2049–55. doi: 10.1056/NEJMsb2005114
13. Stephanie SD, G. *The Global Economic Impacts of COVID-19.* (2020). Available from: https://www.csis.org/analysis/global-economic-impacts-covid-19
14. Assessment OIE. *Coronavirus: The World Economy at Risk.* (2020). Available from: https://www.oecd.org/berlin/publikationen/Interim-Economic-Assessment-2-March-2020.pdf
15. David EM. *The Economic Impact of COVID-19 in Low- and Middle-Income Countries.* (2020). Available from: https://www.cgdev.org/blog/economic-impact-covid-19-low-and-middle-income-countriesx
16. UNDP. *COVID-19: Looming Crisis in Developing Countries Threatens to Devastate Economies and Ramp Up Inequality.* (2020). Available from: https://www.undp.org/content/undp/en/home/news-centre/news/2020/COVID19_Crisis_in_developing_countries_threatens_devastate_economies.html
17. Bank TW. *World Bank Group Launches First Operations for COVID-19 (Coronavirus) Emergency Health Support, Strengthening Developing Country Responses.* (2020). Available online at: https://www.worldbank.org/en/news/p

ress-release/2020/04/02/world-bank-group-launches-first-operations-for-covid-19-coronavirus-emergency-health-support-strengthening-developing-country-responses/ (accessed 5 June, 2020)
18. News U. *UN Releases Emergency Funds to Help Vulnerable Countries Fight Coronavirus COVID-19*. (2020). Available from: https://news.un.org/en/story/2020/03/1058391
19. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *Int J Environ Res Public Health*. (2020) 17:1729. doi: 10.3390/ijerph17051729
20. Wilder-Smith A, Freedman DO. Isolation, quarantine, social distancing and community containment: pivotal role for old-style public health measures in the novel coronavirus (2019-nCoV) outbreak. *J Travel Med*. (2020) 27. doi: 10.1093/jtm/taaa020
21. WHO. *Critical Preparedness, Readiness and Response Actions for COVID-19*. (2020). Available from: https://www.who.int/publications-detail/critical-preparedness-readiness-and-response-actions-for-covid-19
22. Betsch C, Wieler LH, Habersaat K. Monitoring behavioural insights related to COVID-19. *Lancet*. 1255–56. doi: 10.1016/S0140-6736(20)30729-7
23. Hopman J, Allegranzi B, Mehtar S. Managing COVID-19 in low-and middle-income countries. *JAMA*. (2020) 323:1549–50. doi: 10.1001/jama.2020.4169
24. Lokuge K, Caleo G, Greig J, Duncombe J, McWilliam N, Squire J, et al. Successful control of Ebola virus disease: analysis of service based data from rural Sierra Leone. *PLoS Negl Trop Dis*. (2016) 10:e0004498. doi: 10.1371/journal.pntd.0004498
25. Minh Duc N DHH, Anh Tuan T, Lien Bang MT, Hong Duc P, Minh Thong P. From first COVID-19 case to current outbreak: a Vietnamese report. *Electron J Gen Med*. (2020) 17:em208. doi: 10.29333/ejgm/7867
26. MOH. *Directive No. 15 / CT-TTg of the Prime Minister: On Continuing to Boost COVID-19 Prevention and Control*. (2020). Available from: https://moh.gov.vn/documents/176127/356256/27.3.2020+CT+15+CT-TTg.pdf/9c07d0c0-3bde-4003-a605-786b752f335c
27. Reuters. *Vietnam Says 15,000 People Linked to COVID-19 Hotspot Tested Negative*. (2020). Available from: https://www.nytimes.com/reuters/2020/04/09/world/asia/09reuters-health-coronavirus-vietnam.html
28. *COVID-19: Lessons From South Korea*. (2020). Available from: https://www.healthsystemsglobal.org/blog/406/COVID-19-Lessons-from-South-Korea.html
29. Minh H. *xut phuong án phòng dch viêm phi cp t Trung Quc [Plans to Prevent a New Neumonia From China]*. (2021). Available from: http://baochinhphu.vn/Suc-khoe/De-xuat-phuong-an-phong-dich-viemphoi-cap-tu-Trung-Quoc/384647.vgp
30. La V-P, Pham T-H, Ho M-T, Nguyen M-H-P, Nguyen K-L, Vuong T-T, et al. Policy response, social media and science journalism for the sustainability of the public health system amid the COVID-19 outbreak: the Vietnam lessons. *Sustainability*. (2020) 12:2931. doi: 10.3390/su12072931
31. *Acute Inflammatory Disease (COVID-19) Situation Dashboard in Vietnam*. Available from: https://ncov.moh.gov.vn/
32. Maridor M, Ruch S, Bangerter A, Emery V. Skepticism toward emerging infectious diseases and influenza vaccination intentions in nurses. *J Health Commun*. (2017) 22:386–94. doi: 10.1080/10810730.2017.1296509
33. Eicher V, Bangerter A. *Social Representations of Infectious Diseases*. Cambridge: Cambridge University Press (2020). p. 385–96.
34. Joffe H, Bettega N. Social representation of AIDS among Zambian adolescents. *J Health Psychol*. (2003) 8:616–31. doi: 10.1177/1359105303008501 1
35. Washer P. Representations of SARS in the British newspapers. *Soc Sci Med*. (2004) 59:2561–71. doi: 10.1016/j.socscimed.2004.03.038
36. Gilles I, Bangerter A, Clemence A, Green EG, Krings F, Mouton A, et al. Collective symbolic coping with disease threat and othering: a case study of avian influenza. *Br J Soc Psychol*. (2013) 52:83–102. doi: 10.1111/j.2044-8309.2011.02048.x
37. Joffe H, Haarhoff G. Representations of far-flung illnesses: the case of Ebola in Britain. *Soc Sci Med*. (2002) 54:955–69. doi: 10.1016/S0277-9536(01)00068-5
38. Dan KL. *Rural Areas May be the Most Vulnerable During the Coronavirus Outbreak*. Available from: https://www.washingtonpost.com/nation/2020/03/19/rural-areas-may-be-most-vulnerable-during-coronavirus-outbreak/?arc404=true

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Psychiatry

REVIEW
published: 19 July 2021
doi: 10.3389/fpsyt.2021.631008

Emergent Crisis of COVID-19 Pandemic: Mental Health Challenges and Opportunities

Amir Radfar[1], *Maria M. Ferreira*[2]*, *Juan P. Sosa*[3] *and Irina Filip*[4]

[1] Assistant Professor of Medical Education, University of Central Florida, Orlando, FL, United States, [2] Division of Research, Universidad Autónoma de Bucaramanga, Bucaramanga, Colombia, [3] Division of Research, Universidad Nacional de Tucuman, San Miguel de Tucumán, Argentina, [4] Department of Clinical Psychiatry, Western University of Health Sciences, Pomona, CA, United States

Mental health is a fundamental human right and is part of the well-being of society. The public health burden of mental health disorders affects people's social and economic status around the world. Coronavirus's (COVID-19) negative impact on the economy and mental health worldwide is concerning. This is a worldwide emergency, and there is an urgent need for research about this topic to prevent long-lasting adverse effects on the population. Unpreparedness and inconsistencies in guidelines, lockdowns, containment strategies, unemployment, financial losses, physical distancing, isolation, chaos, and uncertainty are among factors that lead to a rise in emotional distress, anxiety, and depression. Governments' decisions affect the socioeconomic status of a country and the psychological well-being of the people. COVID-19 pandemic exposed disparities in multiple mental health care systems by having adverse mental health effects in people with pre-existing mental health disorders and previously healthy individuals. Aggregation of concurrent or cumulative comorbid risk factors for COVID-19 disease and its psychosocial sequelae could provide invaluable information for the public health stakeholders. This review aims to address the burden and the psychosocial impact of the COVID-19 pandemic, the challenges and opportunities facing mental health systems, and proposes new strategies to improve the mental health outcomes in the post-COVID era.

Keywords: mental health services, mental health, COVID-19, pandemic, economic crisis, policy development, public health

OPEN ACCESS

Edited by:
Joanna Lai,
UNICEF United Nations International Children's Emergency Fund, United States

Reviewed by:
Prama Bhattacharya,
O.P. Jindal Global University, India
Migita Michael D'Cruz,
National Institute of Mental Health and Neurosciences (NIMHANS), India

***Correspondence:**
Maria M. Ferreira
mferreira@unab.edu.co

Specialty section:
This article was submitted to Public Mental Health, a section of the journal Frontiers in Psychiatry

Received: *19 November 2020*
Accepted: *25 June 2021*
Published: *19 July 2021*

Citation:
Radfar A, Ferreira MM, Sosa JP and Filip I (2021) Emergent Crisis of COVID-19 Pandemic: Mental Health Challenges and Opportunities. Front. Psychiatry 12:631008. doi: 10.3389/fpsyt.2021.631008

INTRODUCTION

The Burden of Mental Disorders

Public Health is a fundamental human right, and governments are responsible for providing a healthy environment for the population. Mental health is part of public health and is defined by the World Health Organization (WHO) as a "state of wellbeing in which the individual realizes his or her own abilities can cope with the normal stresses of life, can work productively and fruitfully and is able to make a contribution to his or her community" (1). Public health systems are influential in providing, maintaining, shaping mental health services, and designing policies for the mentally ill and the population at risk.

The mental and addictive disorders' point prevalence worldwide in 2016 was 1,110,075,000 (16% of the world's population) (2). Mental and addictive disorders caused the loss of 162.5 million Disability-Adjusted Life Years (DALYs) and comprised 7% of all global burden of disease as measured in DALYs and 19% of all global Years Lived with Disability (YLD) in 2016 (2).

Based on the Global Burden of Disease study's findings, poor mental health and substance use disorders increased by 11% in the U.S. between 1990 and 2016 (3). Mental health issues are among the top 10 causes of premature death and disability in males and females in 2016 (3).

Additionally, it is currently one of the most expensive health care issues, affecting the health care industry, lowering productivity, and increasing costs in the U.S. economy (4). United States indicators estimate that 47.6 million adults aged 18 or older (19.1 %) had any mental illness, 11.4 million adults (23.9%) had a severe mental illness (SMI) and 3.5 million adolescents (14.4%) had a major depressive episode in 2018 (5).

There is also a geographical variation and socio-demographic status in the U.S.'s prevalence of mental health problems (6). East South-Central U.S. had the highest prevalence rate, with 14.88%, and West North-Central had the lowest rate, with 9.42% (6).

Mental disorders also affect social stability and reduce the quality of life. This leads to low educational attainment, decreases motivation and performance, impairment in personal and family functioning, discrimination, low income, increased poverty, violence, and higher mortality and suicide rates (7). The consequences of non-treatment increase the likelihood of violent and aggressive behaviors. Individuals with untreated or partially treated schizophrenia and bipolar disorder commit about 10% of all homicides in the U.S. and 33% of mass killings (8). Those with severe mental illness have 11 times increased likelihood of being victims of violence, assault, rape, or robbery (9). One-third of the homeless population is made up of individuals with an untreated mental illness (10). About 20% of jail inmates and 15% in state prisons have a severe mental illness (11). Failure to provide adequate care to patients with mental illness can turn into a social disaster.

Although the understanding of mental problems has evolved in the past decades, America's mental health system crisis has been a problem for many years. Despite all efforts made to deliver high-quality mental care, there are still gaps that need to be addressed. A 2018 survey from the National Council on Behavioral Health (NCBH) showed that 56% of patients want to access a mental healthcare provider, but many face barriers to care (12). Delivery of mental health care is determined by the financial resources available and has been a responsibility of the states, government insurances (Medicare and Medicaid), private providers (private insurance and out-of-pocket), and NGOs.

This review tries to shed light on the status of the mental health post-COVID-19 era, underscores the U.S. mental health care system's shortages, and proposes strategies and opportunities to improve mental health outcomes.

DISCUSSION

COVID-19 Pandemic and Mental Health Issues

Past tragedies have shown long-lasting consequences on mental health and could contribute to a greater prevalence of mental disorders than the pandemic itself (13). It has been reported that the rates of suicide may momentarily decrease immediately after the initial disaster period, and inversely followed by a consequent increase in suicidal behaviors (14). Vulnerable populations such as people with mental health problems incarcerated population, victims of sexual and physical violence, the bereaved, minorities such as lesbian, gay, bisexual, transgender, and queer (LGBTQ) community are especially at risk.

COVID-19 pandemic can lead to a secondary mental illness paradigm. The pandemic's burden on mental health triggered an economic crisis by posing an increased risk of suicide and long-standing emotional distress. The economic decline due to unemployment, financial worries, increased isolation and lack of support, increased strain and violence in relationships due to confinement at home, decreased contact with people from outside the home who can provide support, decreased access to mental health services are among factors contributing to the increased risk of psychological distress and suicide and highlights the need and necessities of mental health programs such as suicide prevention programs (15). A web-based survey conducted post-COVID-19 outbreak in China shows that young individuals are more prone to developing depressive and generalized anxiety disorders and lower sleep quality than older people. The study found that younger people with a higher time spent on social media and healthcare workers overthinking about the outbreak were at high risk of mental illness (16). Fear of infection, anxiety, anger, post-traumatic stress disorder, stigma, avoidant behaviors, boredom, and frustration could contribute to individuals' mental health post COVID. The hypochondriac concerns add to other psychosocial and economic stressors, limited socialization, and isolation problems (17).

As the COVID-19 pandemic brings gaps in mental health services back to attention, it raises additional concerns. Prior studies conducted during the HIN1 and SARS outbreaks emphasize the mental health burden on health professionals. Feelings of uncertainty, vulnerability, fear of death, irritability, psychological distress, restriction of social contacts, and intentional absenteeism were seen in quarantined medical staff and are anticipated to be seen during the COVID-19 pandemic (18, 19).

Mental health care gaps between the need for treatment and the available services always existed but were amplified by the COVID-19 pandemic and became a worldwide emergency.

Recent findings reveal substantial neuropsychiatric morbidities in the 6 months after COVID-19 infection. These risks were higher in, but not limited to, patients who had severe COVID-19 (20).

Some of these challenges include limited access to care, limited availability and affordability of mental health care services, lack of funding, high priced drugs, lack of psychiatric beds, insurance and policies gaps, physician shortage, unintegrated

system, treatment gaps, insufficient mental health care policies, stigma, post-COVID-19 syndrome, and lack of education on mental illness (21).

MENTAL HEALTH CARE IN UNITED STATES AND ITS CHALENGES

In the United States, based on the U.S. Constitution and the U.S. federalist system, the federal and state governments are responsible for their citizens' mental health. They are responsible for developing mental health policies and setting standards that effectively allow the public and private sectors to deliver mental health care, which can influence shaping services and policies for mentally ill patients.

The federal government participates in developing laws and regulations of mental health systems and providers; they also play a role in protecting individuals' rights with mental health disorders and supporting and funding services, research, and innovation (35). On the other hand, the states' mental health system must meet specific federal government standards since they have significant power in making decisions to expand beyond what exists at the federal level and improve services, access, and protections for consumers (36).

Mental Health Financial Budget Shortages

The financing of mental health services changed dramatically over the years. The U.S. government allocated about $723 million for mental health services, $150 million for community behavioral health centers, $125 million for children's mental health services, and $133 million for school violence prevention in 2020 (37). The U.S. government's Fiscal Year 2020 budget revealed critical shortages and cutbacks for Medicaid, Medicare, and mental health research, putting at risk the quality of mental health care (22). This fund reduction created more gaps in the mental health system.

Public mental health services significantly deteriorated over the past three decades, suggesting that a fair amount of mental health care funds is lost to fraud, excess profits, or are wasted, rather than being used toward mental health care (38). With Medicare (national health insurance programs in the United States) being the largest source of funds for institutionalized patients and lacking incentives to finance a more extended inpatient stay, patients continue to be discharged from hospitals to live on the streets ending up being homeless or in jails. In addition, for the fiscal year 2021, National Tobacco Control Program, Pediatric Mental Healthcare Access grants, children's hospitals graduate medical education (CHGME) budgets either eliminated or flat-funded from previous year levels (22).

Physicians, Mental Health Care Providers Shortage and Treatment Gaps

The gaps in treatment, diagnosis, and knowledge of mental disorders are a worldwide and public health problem and priority. Common treatment barriers of the psychiatric population are lack or difficulty in accessing mental health care, physician shortage, increasing prevalence and incidence of mental disorders, lack of infrastructure and psychiatric beds, financial gaps, rising drug pricing, lack of insurance, and more.

The federal and states governments provide many supportive programs to assist individuals with mental illnesses, and it connects them with job placement services, housing, behavioral health, and housing to divert them from the criminal justice system. However, these agencies do not specifically focus on assisting individuals with serious mental illness, which has led to fragmentation among these programs due to a lack of coordination among agencies (23).

According to The Substance Abuse and Mental Health Services Administration (SAMHSA), nearly 91 million Americans live in regions with severe shortages in available mental health professionals and estimates that a minimum of 1,846 psychiatrists and 5,931 other practitioners would be necessary to fill these gaps (24). The Association of American Medical Colleges projects that the United States will see a shortage of up to 122,000 physicians by 2032, with demands exceeding supply not only in primary care but also among specialist physicians (25).

In addition, there is an increase in severe mental illnesses among young adults (18–25 years old) and adults (26–49 years old) in 2018 (39). About 46.5% of young adults and 36.3% of adults were untreated in 2018 (39).

The Government Accountability Office reported 112 federal programs supporting individuals with serious mental illness and found a lack of interagency coordination and a lack of completed program evaluations (23). The uncoordinated agencies and care delivery, the lack of monitoring and assessment of the efficacy of programs, stigma, and the failure to detect and treat mental health conditions create gaps in the mental health care system leading to failure to meet the needs of this vulnerable population. Furthermore, new policies seeking the repealing and replacement of the Patient Protection and Affordable Care Act (ACA), which were developed since creating the American Health Care Act (AHCA) in 2017, lead to new disparities and limitations in mental health care and substance abuse disorders, affecting the quality and access to mental health services.

Moreover, even though more interventions and drugs are available every year, not everyone will have access to them due to the rising costs. The drug pricing system is a highly complex process that involves manufacturers, states, wholesalers, and pharmacies. The more significant limitation of this system is that there is no direct transaction between manufacturers and patients. Instead, there are at least three transaction systems in between (manufacturer to wholesaler, wholesaler to the pharmacy, and pharmacy to the patient), leading to variations of drug pricing in the U.S.

COVID-19 pandemic has highlighted the treatment gaps in the mental health care system. Among these gaps, one can name insurance barriers, financial resources, shortages in mental and behavioral health providers, emergency rooms overload, insufficient beds to hospitalize severely mentally ill patients, uncoordinated mental health providers networks, tele-mental health implementation barriers, as well as disparities to access to care in low-income population and communities of color.

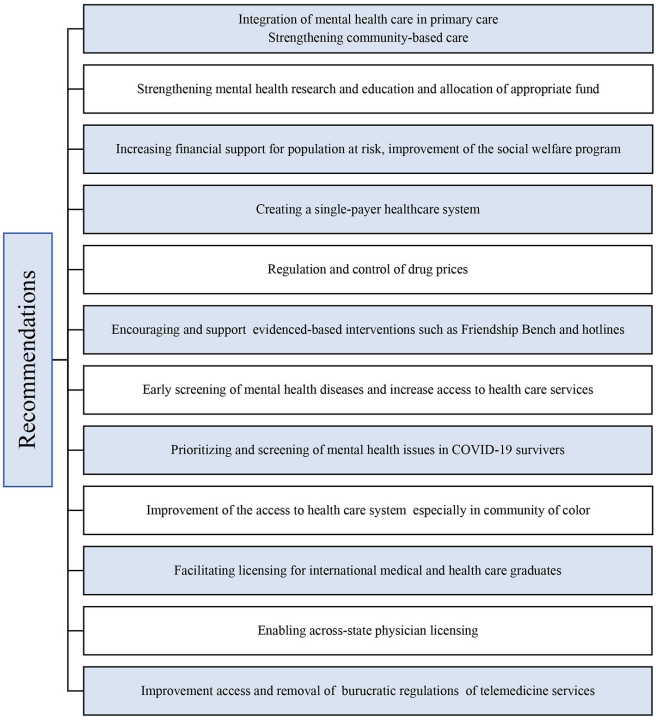
A recent report by the Center for the Study of Latino Health and Culture (CESLAC) shows Latinos and Native and black Americans are disproportionately affected by a higher rate of Covid 19 infection, hospitalization, and death (21, 40).

Emergence of New Neuropsichiatric Disorders

It has been reported that 4 weeks from the onset of COVID-19 viral illness, some post-acute residual effects, complications, or persistent symptoms affect different organs and systems of the body (26). The post-acute COVID-19 syndrome involves the neuropsychiatric system by immune dysregulation, inflammation, accumulation of memory T cells, neuronal injury, dysfunctional lymphatic drainage, microvascular thrombosis, iatrogenic effects of medications, or psychosocial impacts of COVID-19 (26).

Studies have reported that 30–40% of COVID-19 survivors presented anxiety, fatigue, psychological distress, depression, sleep abnormalities, and PTSD after the acute phase of COVID-19 (26). It is recommended that survivors of COVID-19 at high risk for post-acute COVID-19, including those with severe illness during COVID-19 acute phase, admission to ICU, advanced age, or presence of comorbidities, be given integrated outpatient care including screening for neuropsychiatric impairments, neuropsychological evaluation, and imaging studies (26).

TABLE 1 | Recommendations to improve the burden of mental illnesses in the post-COVID era (22–34).



OPPORTUNITIES TO IMPROVE MENTAL HEALTH CARE

Mental health care should concern government and public health advocates to assess and develop better policies and response programs to overcome these gaps and challenges. Policy decisions should focus on strengthening community-based care, support, building local public mental health research capacity, and easy access to treatment and health care services.

Integrating mental health care into the primary care setting could provide a more comprehensive approach to health care following the bio-psycho-social model, enabling early detection, treatment, and accessibility to psychiatric care, minimizing the stigma associated with seeking psychiatric care. The integration process needs adequate financial resources and specialized education and training for primary health care providers (27).

As an approach to address the funding shortages in different mental health sectors, a transfer of funds between different departments could provide a feasible solution (23). The federal government could efficiently address this gap and step forward in fixing the mental health system by removing the Medicaid restriction of funding the patients with mental health issues only in hospitals (28).

Strengthening acts such as the ACA can fill some gaps in the quality and coverage policies by improving access to mental health coverage and addiction treatment. ACA improved preventive care coverage, including screening for depression and alcohol misuse, autism, and behavioral assessments for children. Similarly, ACA expanded the coverage of the essential health benefits involving mental health, substance abuse, and prescription drugs.

Another important action is to increase mental care access and affordability by creating a single-payer healthcare system rather than multiple competing health insurance companies. Due to the lack of transparency and cost control, it is necessary to establish control measures to address this problem. Government and the states should address the cost control of interventions and prescription drugs available to the population (29, 30).

To address mental health during this pandemic, other resources should develop to provide responses and support. Many hotlines such as the National Suicide prevention lifeline, disaster distress helpline, crisis text line, national domestic violence hotline, and the partnership for drug-free kids' helpline can be used as immediate responses. Additionally, financial support resources should be available to relieve financial stress and address its adverse outcomes over mental health.

Evidence-based interventions, such as the Friendship Bench, consisting of a task-sharing approach and implementing a validated assessment tool delivered by trained personnel for early detection and early therapy of mental health problems, are a great way to bridge the mental health treatment gaps (31, 32). Furthermore, implementing early screening and detection of mental illness plays an essential role in improving the mental health system (26). Some actions, such

as increasing access to suicide hotlines, are essential to decrease the burden of mental health problems, especially in the Post Covid 19 era.

Continuous evaluation and inter-agency coordination of social welfare programs, such as those addressing homelessness, are deemed to improve mental health and are instrumental in accomplishing the government's strategic planning goals and standards. Coordination of severe mental illness programs requires specific legislation and an appropriate leadership level to achieve successful management (23).

COVID-19 pandemic raises the concerns of a health system with a growing shortage of trained personnel. It is difficult to incentivize mental health professionals to work in areas with limited resources and state licensure regulations.

The U.S. medical graduates are not enough to face the weaknesses of a challenged mental health system. This shortage could be quickly addressed by facilitating licensing for international medical graduates, enabling across-state licensing, and increasing access to trained international medical graduates to areas of need (24, 25). Telemedicine and other digital tools can tackle the barriers in mental health care delivery, improve access, affordability, and shortages of services, especially in the post-COVID 19 era (33). Recommendations to improve the burden of mental illnesses in the post-COVID era are mention on **Table 1**.

CONCLUSION

Mental illness has been a public health problem for a long time due to its high prevalence. Public mental health services significantly deteriorated over the past three decades, suggesting that a fair amount of mental health care funds is lost to fraud, excess profits, or are wasted, rather than being used toward mental health care (38).

Delivering high-quality mental care to the U.S. population has been challenged due to the numerous gaps in the mental health care system such as treatment disparities, high drug pricing, uncoordinated systems, failure of effective policies, structural issues, workforce shortages, lack of funding, inaccessibility, and financial barriers. Addressing these gaps and challenges is more alarming nowadays due to increasing mental health issues caused by the COVID-19 pandemic.

The mental health care system needs to evolve and be integrated with primary care. By strengthening the leadership and governance for mental health, reducing mental health stigma, assuring the provision of adequate integrated mental health and social community-based services, implementing strategies for promotion, prevention, and early detection, implementing e-health, increasing trained personnel, and strengthening the information systems, the U.S. federal government could overcome current challenges, assist the delivery of adequate mental health and social well-being to its citizens and eliminate disparities. It is important to educate health care workers to monitor and support mental health needs. Also, there is an increased need for research to assess psychological factors, understand causal mechanisms, and propose interventions to improve mental health. The findings of this manuscript could help in service planning and identification of research priorities.

AUTHOR CONTRIBUTIONS

AR made contributions to conception, design of the work, acquisition, and interpretation of the findings, has drafted the work, and substantially revised it. MF and JS contributed to data acquisition, interpretation of findings, drafted the work, and substantially revised the manuscript. IF supervised the acquisition, interpretation of findings and drafted the work, and substantially revised the manuscript. All authors approved the final submitted version, agreed to be personally accountable for its own contributions and ensures that questions related to the accuracy or integrity of any part of the work, even ones in which the author was not personally involved, are appropriately investigated, resolved, and the resolution documented in the literature, and agreed with the order of authors.

ACKNOWLEDGMENTS

The content of this manuscript has been presented (IN PART) at the (NEI CONFERENCE/CNS SPECTRUM) (21).

REFERENCES

1. World Health Organization. *Promoting Mental Health: Concepts, Emerging Evidence, Practice (Summary Report)*. Geneva: World Health Organization. (2004). Retrieved from: https://www.who.int/mental_health/evidence/en/promoting_mhh.pdf (accessed October 1, 2020).
2. Rehm J, Shield KD. Global burden of disease and the impact of mental and addictive disorders. *Curr Psychiatry*. (2019) 21:10. doi: 10.1007/s11920-019-0997-0
3. Institute for Health Metrics and Evaluation (IHME). *Infographic State Burden Mental-Health Risk Profile*. Seattle, WA: IHME, University of Washington. (2016). Retrieved from: http://www.healthdata.org/sites/default/files/files/infographics/Infographic_State_burden_Mental-Health_risk_profile_Page_1_0.png (accessed September 24, 2020).
4. Scarbrough JA. The growing importance of mental health parity. *Am J Law Med.* (2018) 44:453–74. doi: 10.1177/0098858818789432
5. Substance Abuse and Mental Health Services Administration. *Key Substance Use and Mental Health Indicators in the United States: Results From the 2018 National Survey on Drug Use and Health*. (2019). Retrieved from: https://www.samhsa.gov/data/sites/default/files/cbhsq-reports/NSDUHNationalFindingsReport2018/NSDUHNationalFindingsReport2018.pdf (accessed October 1, 2020).
6. Charara R, El Bcheraoui C, Kravitz H, Dhingra SS, Mokdad AH. Mental distress and functional health in the United States. *Prev Med.* (2016) 89:292–300. doi: 10.1016/j.ypmed.2016.06.011
7. Kohn R, Ali A, Puac-Polanco V, Figueroa C, López-Soto V, Morgan K, et al. Mental health in the Americas: an overview of the treatment gap. *Rev Panam Salud Publica*. (2018) 42:e165. doi: 10.26633/RPSP.2018.165
8. Treatment Advocacy Center. *Serious Mental Illness and Homicide*. (2016). Retrieved from: https://www.treatmentadvocacycenter.org/storage/documents/backgrounders/smi-and-homicide.pdf (accessed September 25, 2020).

9. Treatment Advocacy Center. *Victimization and Serious Mental Illness.* (2016). Retrieved from: https://www.treatmentadvocacycenter.org/evidence-and-research/learn-more-about/3630-victimization-and-serious-mental-illness (accessed October 5, 2020).
10. Treatment Advocacy Center. *Serious Mental Illness and Homelessness.* (2016). Retrieved from: https://www.treatmentadvocacycenter.org/storage/documents/backgrounders/smi-and-homelessness.pdf (accessed October 5, 2020).
11. Treatment Advocacy Center. *Serious Mental Illness Prevalence in Jails and Prisons.* (2016). Retrieved from: https://www.treatmentadvocacycenter.org/storage/documents/backgrounders/smi-in-jails-and-prisons.pdf (accessed October 10, 2020).
12. National Council for Behavioral Health. *New Study Reveals Lack of Access as Root Cause for Mental Health Crisis in America.* (2018). Retrieved from: https://www.thenationalcouncil.org/press-releases/new-study-reveals-lack-of-access-as-root-cause-for-mental-health-crisis-in-america/ (accessed 13 September 2020).
13. Ornell F, Schuch JB, Sordi AO, Kessler FH. "Pandemic fear" and COVID-19: mental health burden and strategies. *Braz J Psychiatry*. (2020) 42:232–5. doi: 10.1590/1516-4446-2020-0008
14. Kõlves K, Kõlves KE, De Leo D. Natural disasters and suicidal behaviours: a systematic literature review. *J Affect Disord.* (2013) 146:1–14. doi: 10.1016/j.jad.2012.07.037
15. Wasserman D, Iosue M, Wuestefeld A, Carli V. Adaptation of evidence-based suicide prevention strategies during and after the COVID-19 pandemic. *World Psychiatry.* (2020) 19:294–306. doi: 10.1002/wps.20801
16. Huang Y, Zhao N. Generalized anxiety disorder, depressive symptoms and sleep quality during COVID-19 outbreak in China: a web-based cross-sectional survey. *Psychiatry Res.* (2020) 288:112954. doi: 10.1016/j.psychres.2020.112954
17. Mian A, Al-Asad S, Khan, S. Mental health burden of COVID-19. *Fam Pract.* (2020) 38:cmaa100. doi: 10.1093/fampra/cmaa100
18. Goulia P, Mantas C, Dimitroula D, Mantis D, Hyphantis T. General hospital staff worries, perceived sufficiency of information and associated psychological distress during the A/H1N1 influenza pandemic. *BMC Infect Dis.* (2010) 10:322. doi: 10.1186/1471-2334-10-322
19. Chong MY, Wang WC, Hsieh WC, Lee CY, Chiu NM, Yeh WC, et al. Psychological impact of severe acute respiratory syndrome on health workers in a tertiary hospital. *Br J Psychiatry.* (2004) 185:127–33. doi: 10.1192/bjp.185.2.127
20. Taquet M, Geddes JR, Husain M, Luciano S, Harrison PJ. 6-month neurological and psychiatric outcomes in 236379 survivors of COVID-19: a retrospective cohort study using electronic health records. *Lancet Psychiatry.* (2021) 8:416–27. doi: 10.1016/S2215-0366(21)00084-5
21. Radfar A, Caceres M, Sosa J, Filip I. Overcoming the challenges of the mental health care system in United States in the aftermath of COVID-19. *CNS Spectr.* (2021) 26:176–6. doi: 10.1017/S1092852920002886
22. Canady VA. Proposed FY 2020 budget reveals critical cuts in MH supports. *Mental Health Weekly.* (2019) 29:4–5. doi: 10.1002/mhw.31819
23. United States Government Accountability Office. *Mental Health: HHS Leadership Needed to Coordinate Federal Efforts Related to Serious Mental Illness*. GAO-15-113 (2014). Retrieved from: https://www.gao.gov/products/gao-15-113 (accessed September 13, 2020).
24. National Alliance on Mental Illness. *The Doctor is Out. Continuing Disparities in Access to Mental and Physical Health Care.* (2017). Retrieved from: https://www.nami.org/Support-Education/Publications-Reports/Public-Policy-Reports/The-Doctor-is-Out/DoctorIsOut (accessed September 10, 2020).
25. Association of American Medical Colleges. *The Complexities of Physician Supply and Demand: Projections From 2017-2032.* (2020). Retrieved from: https://aamc-black.global.ssl.fastly.net/production/media/filer_public/31/13/3113ee5c-a038-4c16-89af-294a69826650/2019_update_-_the_complexities_of_physician_supply_and_demand_-_projections_from_2017-2032.pdf?utm_medium=email&utm_source=transaction (accessed October 10, 2020).
26. Nalbandian A, Sehgal K, Gupta A, Madhavan MV, McGroder C, Stevens JS, et al. Post-acute COVID-19 syndrome. *Nat Med.* (2021) 27:601–15. doi: 10.1038/s41591-021-01283-z
27. Saxena S, Funk M, Chisholm D. World health assembly adopts comprehensive mental health action plan 2013–2020. *Lancet.* (2013) 381:1970–1. doi: 10.1016/S0140-6736(13)61139-3
28. Fuller ET, Kennard SA, Esliger SD, Lamb R, Pavle J. *More Mentally Ill Persons are in Jails and Prisons Than Hospitals: A Survey of the States.* (2020). Retrieved from: http://www.treatmentadvocacycenter.org/storage/documents/final_jails_v_hospitals_study.pdf (accessed October 6, 2020).
29. Gronde TV, Uyl-de Groot CA, Pieters T. Addressing the challenge of high-priced prescription drugs in the era of precision medicine: a systematic review of drug life cycles, therapeutic drug markets and regulatory frameworks. *PLoS ONE.* (2017) 12:e0182613. doi: 10.1371/journal.pone.0182613
30. Kesselheim AS, Avorn J, Sarpatwari A. The high cost of prescription drugs in the United States: origins and prospects for reform. *JAMA.* (2016) 316:858–71. doi: 10.1001/jama.2016.11237
31. Chibanda D, Bowers T, Verhey R, Rusakaniko S, Abas M, Weiss HA, et al. The Friendship Bench programme: a cluster randomised controlled trial of a brief psychological intervention for common mental disorders delivered by lay health workers in Zimbabwe. *Int J Ment Health Syst.* (2015) 9:21. doi: 10.1186/s13033-015-0013-y
32. Chibanda D. Reducing the treatment gap for mental, neurological and substance use disorders in Africa: lessons from the Friendship Bench in Zimbabwe. *Epidemiol Psychiatr Sci.* (2017) 26:342–7. doi: 10.1017/S2045796016001128
33. Wind TR, Rijkeboer M, Andersson G, Riper H. The COVID-19 pandemic: the 'black swan' for mental health care and a turning point for e-health. *Int Interv.* (2020) 20:100317. doi: 10.1016/j.invent.2020.100317
34. Kilbourne AM, Beck K, Spaeth-Rublee B, Ramanuj P, O'Brien RW, Tomoyasu N, et al. Measuring and improving the quality of mental health care: a global perspective. *World Psychiatry.* (2018) 17:30–8. doi: 10.1002/wps.20482
35. Mental Health America. *The Federal and State Role in Mental Health.* (2020). Retrieved from: https://www.mhanational.org/issues/federal-and-state-role-mental-health (accessed October 3, 2020).
36. Zhou W, Yu Y, Yang M, Chen L, Xiao S. Policy development and challenges of global mental health: a systematic review of published studies of national-level mental health policies. *BMC Psychiatry.* (2018) 18:138. doi: 10.1186/s12888-018-1711-1
37. National Council for Behavioral Health. *President Trump Releases FY 2020 Budget Proposal.* (2019). Retrieved from: Retrieved from: https://www.thenationalcouncil.org/capitol-connector/2019/03/president-trump-releases-fy-2020-budget-proposal/ (accessed September 10, 2020).
38. OPEN MINDS Market Intelligence Report. *The U.S. Mental Health Market $225.1 Billion in Spending in 2019 an OPEN MINDS Market Intelligence Report.* (2020). Retrieved from: https://www.openminds.com/intelligence-report/the-u-s-mental-health-market-225-1-billion-in-spending-in-2019-an-open-minds-market-intelligence-report/ (accessed October 9, 2020).
39. McCance-Katz EF. *The National Survey on Drug Use and Health.* Substance Abuse and Mental Health Services Administration (2018). Retrieved from: https://www.samhsa.gov/data/sites/default/files/cbhsq-reports/Assistant-Secretary-nsduh2018_presentation.pdf (accessed October 10, 2020).
40. Martinez LE, Balderas-Medina Y MPH, Vargas-Bustamante A, Martinez CV, Santizo-Greenwood S, Hernandez S, et al. *California's Physician Shortage During COVID-19. A Policy Roadmap to Expand Access to Care.* Retrieved from: https://latino.ucla.edu/wp-content/uploads/2020/04/LPPI-CPS-COVID-19-.pdf (accessed May 22, 2021).

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Public Health

REVIEW
published: 29 September 2021
doi: 10.3389/fpubh.2021.590335

Public Policy Responses to Address the Mental Health Consequences of the COVID-19 Pandemic: Evidence From Chile

Matias Irarrazaval[1,2], *Pablo Norambuena*[1,3], *Cristian Montenegro*[2,4], *Olga Toro-Devia*[3]*, *Belen Vargas*[1] and *Alejandra Caqueo-Urízar*[5]

[1] Department of Mental Health, Ministry of Health, Santiago, Chile, [2] Millenium Institute for Research in Depression and Personality, Santiago, Chile, [3] School of Public Health, Faculty of Medicine, Universidad de Chile, Santiago, Chile, [4] Wellcome Centre for Cultures and Environments of Health, University of Exeter, Exeter, United Kingdom, [5] Instituto de Alta Investigación, Universidad de Tarapacá, Arica, Chile

OPEN ACCESS

Edited by:
Keng-yen Huang,
NYU Grossman School of Medicine,
United States

Reviewed by:
Konstantinos Kotsis,
University of Ioannina, Greece
Konstantina Magklara,
National and Kapodistrian University of Athens, Greece

***Correspondence:**
Olga Toro-Devia
olga.toro@uchile.cl

Specialty section:
This article was submitted to Public Mental Health, a section of the journal Frontiers in Public Health

Received: 01 August 2020
Accepted: 30 August 2021
Published: 29 September 2021

Citation:
Irarrazaval M, Norambuena P, Montenegro C, Toro-Devia O, Vargas B and Caqueo-Urízar A (2021) Public Policy Responses to Address the Mental Health Consequences of the COVID-19 Pandemic: Evidence From Chile. Front. Public Health 9:590335. doi: 10.3389/fpubh.2021.590335

Objectives: This paper reviews the mental health policies that have been implemented in Chile in response to the COVID-19 pandemic and the international context of countries' responses. Even before the start of the pandemic, there were significant barriers to access mental health services in Chile, coupled with a scenario of nationwide social unrest and protests that questioned the legitimacy of public institutions; now the rapidly worsening outbreaks of COVID-19 are exacerbating the pre-existing mental health crisis.

Methods: We conducted a bibliometric and content analysis of the Chilean mental health public policies implemented during the COVID-19 pandemic and then compared these policies with international experiences and emerging scientific evidence on the mental health impact of pandemics.

Results: Our analysis of the policies identifies five crucial points of action developed in Chile: (i) an established framework to address mental health in emergency and disaster situations; (ii) a timely COVID-19 Mental Health Action Plan; (iii) inclusion of mental health in the public health agenda; (iv) development of a presidential strategy during the pandemic for comprehensive mental health and well-being; and (v) emerging research assessing the mental health implications of COVID-19.

Conclusions: In Chile, the public policy responses to address the mental health consequences of the COVID-19 pandemic has been characterized by the coordinated implementation of mental health plans, ranging from a health sectoral initiative to inter-agency and intersectoral efforts. However, it is imperative that increased funding is allocated to mental health, and efforts should be made to promote the participation of people with lived experiences and communities in the design and implementation of the proposed actions. This aspect could be of key importance to social peace and community recovery after the pandemic.

Keywords: mental health, health policies, COVID-19, pandemic, Latin America

INTRODUCTION

The coronavirus pandemic, an unprecedented global socio-sanitary crisis, has impacted the mental health of the general population worldwide, and particularly that of individuals with prior mental illness, those infected with SARS-CoV-2, and health workers (1). The exact extent of this impact has varied by country, as it is strongly shaped by local mental health policies that were implemented as part of the initial response to the pandemic (2, 3). The pre-pandemic development of each country's mental health system, and its unique social and economic context, largely define its ability to implement the proposed policies, especially in light of the economic recession that could deepen inequalities in access to and quality of mental health care (4). Under these circumstances, mental disorders co-occur with other chronic diseases that are rooted in social and economic inequities (5, 6). International technical organizations recommend emergency policies that can create safe and dignified conditions for the entire population, by strengthening communities and families, expanding the reach of primary mental health care services, and preserving access to specialized services (2, 7–9). Policies can play a relevant role in mitigating the impact of crises on mental health, either through new initiatives or by deepening health systems reforms, aimed at uplifting communities and increasing user participation (7, 10). Health systems across the Americas often lack resources to develop mental health services in response to crises, which results in an imbalance between the burden of mental disorders and the allocated mental health budget. There is also a wide variation between countries: before the pandemic, it was estimated that this imbalance ranged from 1.8 to 72.1 times the burden of mental illness in relation to spending, with a median of 6.1 in the region (11).

In May 2020, the Americas concentrated the largest number of COVID-19 cases in the world. The first confirmed case in Latin America was registered in Brazil (February 2020), and the first case in Chile was confirmed on March 3rd (12). Chile has a decades-long trajectory of promoting community-based mental health, with mental health services integrated into primary health care centers and general hospitals, in a consistent and sustained way, as outlined in three national mental health plans (from 1993, 2000, and 2017). Before the pandemic, these plans had achieved greater access to community care for people with mental illness, trained mental health workers in the community model, and developed evidence-based, technical guidelines that have improved the quality of care and contributed to a progressive construction of an information system on mental health services. Nevertheless, strategies to encourage user involvement in mental health services have been insufficient (13, 14). Although the public budget is growing, there is a significant gap between what is laid out in the country's mental health plans and the reality of services.

The proportion of the total burden of disease attributable to mental disorders is 9.6 times the proportion of the health budget allocated to mental health (11). The current national mental health plan (2017–2025) includes cross-cutting principles and approaches, such as the respect and promotion of human rights, people-centered health services and equity, evidence-based practices, life-course and multisectoral interventions, and empowerment of persons with mental disorders and psychosocial disabilities. The plan prioritizes seven pillars of action: (i) policy, law, and human rights; (ii) mental health services; (iii) financing the mental health system; (iv) quality, information, and research systems; (v) human resource development; (vi) social participation, and (vii) intersectoral coordination (15).

Chile faced the start of the pandemic in the midst of a profound social and political crisis. In October 2019, a popular uprising emerged, demanding social justice and equity in numerous areas, including health (16). This "Social Outburst," triggered by secondary students in the face of a rise in the price of the metro ticket, paralyzed the country. Demonstrations in the streets turned violent and questioned the legitimacy of institutions, such as the police, military, and political system. The political crisis gave rise to a referendum for a new constitution, which was postponed because of the pandemic by ultimately passed with overwhelming public support on October 25th, 2020.

Calls for greater equity in access to health services, in particular for mental health, foreshadowed that the impact of the COVID-19 pandemic on mental health; the sanitary crisis has deepened social unrest and increased demands on the health system. For the first time, traditional political opinion polls incorporated questions about mental health (17), and 49.3% of the respondents said that their mood worsened during the pandemic (feelings of rage, sadness, and fear), although 15% perceived that it improved. Toward the beginning of the pandemic, a presidential commission known as the "National Social Committee," made up of national and local government representatives, health specialists, and academics was formed to "strengthen the country's strategy and organize a single voice in the fight against the coronavirus," and the Committee incorporated mental health into the national plan to confront the pandemic (18). Given the aforementioned context in Chile, recently implemented mental health policies may play a relevant role in mitigating the pandemic's impact on the population's mental health; however, to do so, these new policies should be coherent with international recommendations and Chile's previously defined plans and policies, while also considering the ongoing scenario of protests and broad social demands.

The international literature has addressed the consequences of the pandemic on mental health, and recommendations or policy papers can be found (19, 20), as well as documents that report the impacts of the pandemic on mental health services (21). One article describes experiences of mental health service response, based on an evaluation of lessons learned by a panel of experts in 16 locations in Australia, Denmark, Italy, Spain, Taiwan, Great Britain, and the United States (22). There is also literature presenting developments in specific countries, such as Rwanda (23), China (24), and Great Britain (25). Similarly, a recent scoping review of how governments, agencies, and organizations responded to the mental health challenges of the pandemic found information on country-specific responses in New Zealand, Australia, China, Finland, India, Iran, Italy, Lebanon, Spain, United States (26). However, there is no literature on government policy and health service responses in Latin American countries that would improve the global learning of other countries and

how to drive better local decision-making in mental health care. A "global" approach—can enhance the understanding of how countries are coping with the mental health consequences of the pandemic, taking into account the specific characteristics of the Region and the detrimental effects that the COVID pandemic has caused over other regions of the world. Finally, the experience of Chile, examining how system-level interventions, prevention strategies, mitigation policies, and social responses during the COVID-19 epidemic can improve the knowledge and provision of mental health services in other countries.

This paper aims to critically examine and gather a set of knowledge and lessons learned on public policy in Chile, which can provide evidence and support to vulnerable populations at risk of developing mental health problems in other parts of the world, and heighten the health services demand at this critical period of a global pandemic.

MATERIALS AND METHODS

The primary aim of this paper is to describe the public policy responses that have been implemented in Chile to address the mental health consequences of the pandemic during its early stages and compare it with the available experiences of other countries. Two further objectives were (i) to analyze the continuity and discontinuity of this response within the trajectory of mental health policies established before the pandemic, and (ii) to analyze the articulation of this response with international experiences and emerging scientific evidence on aspects of the pandemic that impacts mental health.

The study is based on a general literature review of policies addressing the mental health implications of the COVID-19 pandemic in Chile, including health system interventions to adapt procedures to the context of the pandemic and policies to mitigate the consequences of the pandemic on mental health. We reviewed government-originated responses, as well as those led by civil society organizations that targeted the general population.

Search Strategy and Selection Criteria

The search strategy was aimed at documents that are publicly available, including scientific literature, official documents and archives, working documents, scientific presentations, press archives, official web pages, and audiovisual archives. The search period ranged from the date of the first COVID-19 case in Chile (March 3, 2020) to the announcement of the "step-by-step" gradual deconfinement plan (July 20, 2020) (27).

Documents were eligible for inclusion if: (i) the population was any population living in Chile; (ii) the intervention was any policy intervention from March 3 to July 20, 2020, that was enacted or implemented by any national government agency, ministry, or government department; and (iii) the outcome measured the consequences of COVID-19 on mental health.

Data Analysis

Content analysis was used to determine the presence of certain categories within the given qualitative data. Information was organized into four predefined categories and one emerging category. The predefined categories were key actions of the public response (in chronological order): A first response strategy based on a Mental Health and Disaster Risk Management Model; the COVID-19 Mental Health Action Plan; the "National Social Committee;" and, finally, the presidential initiative is known as "SaludableMente." An emergent category covered research initiatives that directly addressed COVID-19 and mental health. To interpret the results, pre-pandemic mental health policy developments in Chile (objective 2) and international experiences that address the mental health consequences of the pandemic and the scientific evidence published to date (objective 3) was used as a general framework.

All the authors participated in the data extraction and analysis, and the coding process was always verified by at least two authors. Disagreements were resolved by a third author and discussed among the other co-authors.

RESULTS

Mental Health and Disaster Risk Management Model

Chile began developing a Mental Health Care and Disaster Risk Management (MHCDRM) Model in 2018, in collaboration with Japan. The evidence-based Model highlights national experience gleaned through major natural disasters that have affected Chile, and it complies with international humanitarian standards. Essential elements of the Model include reducing vulnerability through strengthening community resilience and capacities and focusing on preventive, rather than reactive, interventions. It proposes the implementation of mental health and psychosocial support (MHPSS) actions throughout the risk management cycle and effective disaster risk reduction, adopting the integration of interventions at different levels, according to the Inter-Agency Standing Committee's (IASC) recommendations (2). The MHCDRM Model is organized in eight strategic pillars—(i) intersectoral coordination; (ii) information management; (iii) social communication; (iv) community empowerment; (v) education; (vi) focus on vulnerable groups; (vii) technical guidelines; and (viii) care for frontline workers—and has led to the implementation of intersectoral mental health and psychosocial support committees and the development of a psychological first aid (PFA) training plan, which has a network of over 900 trainers and has produced more than 10,000 people qualified to provide PFA throughout the country.

Though the Quintero-Puchuncaví socio-environmental conflict and the social uprisings that recently affected the country were very different types of crises, they both effectively used the MHCDRM Model. In both emergencies, mental health was included in the first line of response, for the very first time, and the Model was relevant to define and organize pertinent actions. This Model has also been used as a referential framework to implement strategies to protect mental health during the COVID-19 pandemic, including strategies, focused on providing mental health support and responding to the psychosocial needs of specific groups that are in greater biopsychosocial vulnerability (28).

COVID-19 Mental Health Action Plan, Headed by the Ministry of Health

To articulate and organize multiple interventions to protect mental health during the COVID-19 pandemic, an Action Plan on Mental Health was developed by the Ministry of Health. The Plan includes seven areas of action (**Table 1**): (i) Continuity of care and strengthening of mental health services; (ii) Intersectoral coordination; (iii) Specific populations; (iv) Care of the healthcare workforce; (v) Community strengthening and social communication; (vi) Information management; and (vii) Training and technical guidelines for the intervention.

As part of the implementation process of the Plan, mental health care in primary health centers and outpatient specialty services were improved (29), and mental health services were incorporated into the rural and remote health care facilities. Additionally, inpatient psychiatric services were adapted to meet COVID-19 protocols, registration systems were updated, and an online monitoring system for the mental health network was developed.

Another achievement was the organization of a Mental Health Personnel Commission in the Ministry of Health, which recommended the implementation of a nationwide institutional care program with psychological support strategies for healthcare workers (30). To support this process, technical recommendations were distributed (31).

Furthermore, online and telephone support services were made available for health workers and the general population. With over 100 helplines from academic and civil society initiatives, a national registry was built, to strengthen technical capacities and coordinate actions, establishing referral flowcharts, and management protocols. These developments are detailed in two bulletins that provide information on remote mental health helplines and psychosocial support in the context of COVID-19 (32, 33).

Another relevant initiative within the framework of the Plan was the organization of webinars and teleconferences, as an education and training strategy, targeting the workforce of health and social programs, to improve their preparation to provide psychosocial support for COVID-19 patients and their families. To date, 13 webinars have been developed, in partnership with the School of Public Health of Universidad de Chile and the Department of Mental Health of the Ministry of Health, covering topics such as outpatient and inpatient mental health care, mental health for the elderly, mental health for children and adolescents, alcohol and other drugs prevention, and the mental health of health care workers (34). Presenters and trainers included advisors from the Ministry of Health and researchers and mental health teams working in Chile, Peru (Huánco), and Spain (Madrid and Valencia). In addition, a series of online training resources, including remote help and psychological first aid tools and open teleconferences on mental health topics, have been implemented (35, 36).

The framework set forth by the Mental Health Action Plan during COVID-19 continues to support the organization, implementation, and monitoring of public policy responses to the pandemic.

National Social Committee: Mental Health Strategy on the Political Agenda

The National Social Committee worked on a national strategy for mental health, formulated by researchers and academics from the Universidad de Chile. Their proposal was subsequently enriched with the contributions of other committee members and academics from other universities. The final Strategy included mental health guidelines from the Ministry of Health and recommended adopting an intervention pyramid to provide mental health and psychosocial support during emergencies (2). As such, mental health became a part of the national pandemic response. The Strategy called for the protection of individuals who were most vulnerable to experiencing mental health crises during and after the pandemic, and it declared that efforts should not be limited to simply providing intensive care in hospitals. The main message was that "mental health is one of the keys to surviving this pandemic and all that it entails in the short, medium, and long term, from preventing a potential crisis in the provision of health services, to preserving and rebuilding a post-pandemic society" (37).

The Strategy includes three goals: (i) to reduce population risk by strengthening psychosocial protective factors for mental health; (ii) to facilitate access to comprehensive, equitable, and quality mental health services; and (iii) to develop knowledge, practices. and mental health competencies among mental health workers. The document states that mental health policy must meet four criteria: (i) territorial articulation; (ii) intersectoral action; (iii) user involvement and participation; and (iv) economic, social, and human development. This statement emphasizes the need to conduct community-based interventions, and work with social institutions, to avoid reducing mental health problems to an individual level. The mental health policy thus conceived a "comprehensive perspective, without prioritizing economic factors over social and human ones," to respond to the pandemic.

SaludableMente[1] Initiative: the Presidential Strategy on Mental Health

On May 17, 2020, during a nationwide television broadcast, President Sebastián Piñera announced the creation of the Healthy Mind Initiative (Iniciativa SaludableMente) whose goal was "to improve the public and private mental health services in [Chile]." SaludableMente is defined as a "comprehensive pandemic response plan for mental health and well-being," which includes two pillars: (i) a digital mental health platform and (ii) an experts committee.

The digital platform (38), created to immediately strengthen mental health services, houses all the current programs that promote the mental health and the emotional well-being of different priority groups, including children and adolescents, older adults, parents and caregivers, women who are victims of violence, and individuals with COVID-19, as well as the general population. The platform provides direct access to remote psychological support, which has been integrated into the

[1] "SaludableMente" in Spanish means Both "Healthy Mind" and "Healthily".

TABLE 1 | COVID-19 Mental Health Action Plan: areas of action, objectives, and strategies.

General objective

Strengthen capacities to mitigate the impact on the population's mental health in the context of the COVID-19 pandemic, through the adaptation of mental health services, intersectoral coordination, and targeting of groups with the greatest biopsychosocial vulnerabilities.

Area 1: Continuity of care and strengthening of mental health services

Objective: Strengthen contingency strategies in the public health network to address mental health and safeguard access, opportunity, and continuity of mental health care in primary care centers, an outpatient services, hospitals, and residential facilities.

Strategies:

- Adaptation of the health network for the care of people with mental health needs.
- Support for the continuity of mental health actions at the regional level (SEREMI).
- Delivery of mental health recommendations in the context of the COVID-19 pandemic.
- Optimization of resources to maintain essential functions and the management of complementary resources in the mental health network.
- Protection of the management of the mental health network for addressing mental health problems and ensuring continuity of care for people at high risk of suicidal behavior, decompensated psychosis, and behavioral disorders.

Area 2: Intersectoral coordination

Objective: To facilitate the articulated and synergistic action of multiple public actors and civil society in the approach to mental health and psychosocial support in the context of COVID-19.

Strategies:

- Constitution of a network of remote helplines.
- Cooperation between intersectoral agencies and organized civil society.
- Installation and operation of a National Intersectoral Technical Coordination Table.

Area 3: Specific populations

Objective: Reduce the mental health risk of specific groups that are in conditions of greater biopsychosocial vulnerability during the pandemic, through timely and pertinent actions relevant to their particular characteristics and needs.

Strategies:

- Delivery of recommendations for the implementation of preventive actions, early detection, and treatment of mental health problems and/or diseases in populations directly affected by COVID-19.
- Implementation of actions that promote access to mental health and psychosocial support services in the context of COVID-19, which are pertinent and timely for people at greater risk of discrimination, violence, and social exclusion.
- Development of technical guidelines aimed at caregivers of people in situations of disability and/or dependency, aimed at reducing risk factors and promoting protective factors for mental health, for themselves and the people under their care.
- Technical support for the implementation of actions in the context of COVID-19 for the promotion of the psychosocial well-being of people living in residential facilities and in contexts of institutionalization.

Area 4: Care of the healthcare workforce

Objective: To mitigate the impact on mental health of the health workforce in the context of COVID-19, through the promotion of self-care, mutual care, and institutional care.

Strategies:

- Remote psychological support systems for health personnel from the Digital Health Department.
- Institutional Care of Health Personnel through the development of local action plans and support resources.

Area 5: Community strengthening and social communication

Objective: To promote social support and mobilization of the communities' own resources for the mitigation and reduction of psychosocial risk factors resulting from the pandemic through mechanisms of community participation, interaction, and social organization, and through strategies for social communication and education for the protection of mental health.

Strategies:

- Preparation and dissemination of communication materials for the population.
- Guidelines for the design and implementation of education and social communication strategies aimed at the population.
- Support for collaborative work with community-based organizations, community leaders, and stakeholders, to facilitate actions of social support and mutual care.
- Promote community participation in detecting mental health needs and proposing territorial actions.

Area 6: Information management

Objective: To establish mechanisms to have valid and timely information for informed decision-making, including diagnosis, systematization, analysis of information, and monitoring, that allow efficient actions to be taken to protect mental health during COVID-19, in both sectoral and intersectoral networks.

Strategies:

- Development of systems that allow monitoring of the actions carried out by the health network.
- Implementation of a system for registering user follow-up actions.
- Systematic monitoring of the situation of the Mental Health Network.
- Support the dissemination of experiences and practices of the network and other sectors.
- Generation of information exchange mechanisms at the sectoral and intersectoral levels.

Area 7: Training and technical guidelines for the intervention

Objective: To develop technical guidelines for mental health protection and psychosocial support actions during COVID-19, based on available evidence and national and international standards, as well as instances for their technical transfer to healthcare workers and teams.

(Continued)

TABLE 1 | Continued

Strategies:
· Preparation of a technical reference framework for the protection of mental health and psychosocial support in the context of COVID-19.
· Preparation of thematic guidelines for the work of health teams and psychosocial teams in the context of COVID-19.
· Preparation of guidelines for remote mental health care strategies for the health network.
· Adaptation of the First Psychological Aid model to the context of COVID-19.
· Development of dissemination strategies, technical transfer, and training of technical guidelines during COVID-19.
· Collaboration in technical transfer and training processes developed by other sectors and civil society organizations.

Based on Ministry of Health data.

geographical network of services to improve the continuity of care for patients with mental disorders.

At the same time, the initiative convened a panel of experts to develop proposals and guidelines to respond to the mental health needs of the population during the pandemic (39). The Healthy Mind Committee was officially established and convened its first meeting on June 1, with a period of 90 days to fulfill its mandate. Over thirty representatives were invited to form part of the Committee, including academic experts, representatives of scientific societies and other civil society organizations, members of Congress, and representatives of different ministries. The Committee's first task was to review and expand the Ministry of Health's diagnosis of the mental health situation in the context of COVID-19. From there, working groups were formed on specific topics. Each group developed a roadmap that includes a summary of the current situation, actions, expected results, monitoring activities, and a timeframe, to create an integrated strategy with clear deadlines.

SaludableMente generated a broad, intra-sectoral dialogue that guided government actions around the well-being and mental health of the population, beyond health services. This strategy is still ongoing but has already managed to give greater visibility to mental health, secure new resources, and facilitate the articulation of different perspectives and capacities.

Emerging Research in Mental Health and COVID-19

The academic community has also reacted quickly to the pandemic, and several research projects related to its mental health effects are underway. Initially, in light of the urgency of the situation, these projects began functioning without public funds, and most of them were based out of academic institutions or programs. Later on, however, the National Research and Development Agency (ANID, for its acronym in Spanish) developed a funding scheme called "Competition for the Rapid Allocation of Resources for Research Projects on Coronavirus (COVID-19)," that financed year-long projects, for a maximum of 90 million Chilean pesos (∼USD 118,000), in the broad spectrum of COVID-19 diagnosis, control, prevention, treatment, monitoring, and other aspects related to the pandemic and its consequences, across scientific, technological, health, social, economic, cultural, and humanistic fields (40).

From a total of 1,056 submitted project proposals, 63 projects (6.6%) were awarded funding. Although several projects touched on psychosocial aspects—such as intra-family violence or research on behaviors or attitudes—only three of the awarded projects directly addressed mental health. Although ANID's funding source (the Ministry of Science and Technology) is not considered as part of the health budget (overseen by the Ministry of Health), the small proportion of projects awarded projects to mental health topics is an expression of the same phenomenon of imbalance between health and mental health, that is seen in the small proportion of the Ministry of Health budget dedicated to mental health.

The three financed projects deal with the impact of physical distancing measures on subjective well-being, the impact of the pandemic on the psychosocial well-being of older people, and the evaluation of anxiety and depressive symptoms and risk behaviors during this crisis (40).

Within the 147 projects that were included in the waiting list for the ANID grant, there are 8 projects related to mental health or subjective and psychosocial well-being. There is no information about whether these projects will be carried out or not, but their focuses cover research areas of local interest, including the mental health of the adolescent population, the evaluation of depressive symptoms related to severe COVID-19, the mental health of survivors of intensive care, the psychosocial well-being of migrant children, the mental health of health workers, the use of technologies for psychoeducation, suicide prevention, and post-COVID-19 mental health (40).

In terms of pandemic-focused research that has been developed in Chile, apart from the ANID financing system, one project that is notable for its magnitude and international scope is the COVID-19 HEalth caRe wOrkErS (HEROES) study, aimed at understanding the impact of the pandemic on the mental health of health care workers. This is a prospective cohort study that considers an initial evaluation and three follow-up evaluations (3, 6, and 12 months), led by the School of Public Health of the Universidad de Chile, and which is being implemented in over 30 countries, including The United States, Mexico, Spain, Italy, South Africa, China, and Australia (41).

According to its mid-June progress report, 1,177 health workers had been included in Spain, and 1,213 in Italy. Preliminary results show that 57.3% of workers report sleeping problems, 65.6% have frequently felt emotionally overwhelmed, 51.5% have depressive symptoms, and 35.3% have acute stress symptoms. In most of the sample (71.6%), the participants' scores indicate a "possible case" of anxiety or depressive disorder, while 7.2% have had suicidal thoughts, and 1.7% have had suicidal attempts (within the last few weeks) (42). The study is under development, and these initial trends have yet to be validated.

DISCUSSION

In Chile, five lines of action in mental health policy were included in the pandemic response. First, a pre-existing Mental Health Care and Disaster Risk Management Model that acknowledged the importance of preparedness to reduce vulnerability and negative outcomes at both the individual and community levels. Second, a COVID-19 Mental Health Response Plan, led by the Ministry of Health, that seeks to meet the population's mental health and wellbeing needs to reduce the negative impacts of the pandemic in the short and long term. Third, the establishment of the National Social Committee, to ensure effective governance, intersectoral coordination, and implementation of mental health policies as part of the response to the pandemic. Fourth, partnerships and collaborations across health services, universities, and other sectors through SaludableMente enabled the optimum use of resources to deliver cohesive and coordinated care and support, although the participation of people with lived experiences and caregivers was very limited. Fifth, research support generates a local body of evidence around the impact of the pandemic on mental health.

These policies are characterized by a coordinated implementation of the mental health plan, from health system initiatives to inter-agency and inter-sectoral work, that included mental health in the national pandemic agenda. Decades of dedicated intersectoral collaborative work, and the trajectory of past mental health policies, has paved the way for mental health to be accepted into the mainstream political dialogue and included in the pandemic response, a recognition that has not been achieved since the first national mental health plan in 1993. However, the pandemic has also revealed areas that need to be urgently addressed and exposed cracks in our already fragile mental health system.

Starting in the early 1990s, after the end of civic-military dictatorship, Chile has set a clear path toward a community-based mental health system, with the following national mental health plans, in 2000 and 2,917, consolidating this transition (15, 43, 44). The gradual deinstitutionalization of former psychiatric inmates, the development of territorialized mental health care services, and the integration of these services in the larger health system are key achievements in the implementation of a community-based model in mental health in the country (13).

This groundwork, and its achievements, have proved useful to the adequate deployment of emergency response strategies. On the one hand, the existence of a coherent network of services at primary, secondary, and tertiary care levels facilitates the provision of mental health services that are more connected to local contexts and needs. At the same time, this prior set of aims—expressed and organized in the latest mental health plan—has provided a strong and practical foundation: The Mental Health Strategy of the National Social Committee, the Mental Health Action Plan, and the SaludableMente Initiative follows the basic principles and structure of the National Mental Health Plan 2017–2021 which, in turn, follows the foundational community-based model. The model provides a shared language across the mental health field.

Nonetheless, two key weaknesses in the transformation of services in the country have also expressed themselves in the mental health response toward the pandemic. The first weakness is the low budget allocated to mental health (45) in the country, a decades-long "debt." This impacts the ability to increase direct mental health services in the face of the growing demands of the population due to the pandemic. It also narrows the margin of actions that can be carried out beyond clinical care, such as community strengthening and directly supporting grassroots, bottom-up forms of services that have nonetheless emerged during the crisis.

Directly related to this, Chile's second historical debt is the lack of participation of local communities and especially of mental health service users (14, 46). COVID-19 related mental health policy has been developed without the participation of user groups. The SaludableMente initiative, while giving a place for experts and other civil society groups, did not incorporate user organizations in its original design, despite the existence of such groups in the country. On the other hand, the current mechanisms of participation set in place in the healthcare sector have no binding power and are therefore limited in their ability to effectively influence policy (47).

Despite having a community-based model, over the last 30 years, mental health policymaking in Chile has largely considered communities to be passive settings where clinical services are provided. The socio-political agitations of 2020, with the "social outburst" and the current sanitary crisis have, nonetheless, turned mental health into a public concern, and the political system is only just reacting to this. Chile faces the coming challenge of deepening its original, democratic vocation and establishing solid forms of participation for users and communities. This will be especially critical to regain the health system's full capacity to address the population's mental health needs.

The mental health policies that were implemented in Chile during the pandemic are concordant with international recommendations and the available scientific evidence in various aspects, from the adoption of a humanitarian response model for socio-health emergencies to the identification of numerous target populations, including: (i) the general population, due to the risk associated with quarantine measures and confinement; (ii) those with pre-existing mental illnesses, due to the risk of exacerbation of symptoms, obstacles to treatment continuity, and discrimination in care due to COVID-19; (iii) the survivors and the families of victims, due to the trauma of contagion and the experience of mourning; and (iv) health workers, due to the risk of burnout and stress. The Chilean policies are also in line with leading recommendations that mental health services should be organized according to a community model, with priority given to strengthening primary care; that efforts should be made to ensure the continuity of care for mental health services users, by incorporating remote care and providing personal protection elements to community-based teams; and that intersectoral policies should be formulated. The previous experience in the country and the development of such an approach explain the rapid organization in Chile of mental health

planning to address the pandemic, incorporating various health policy governance strategies, including the priority assigned by the presidency and the intersectoral participation. This appears to be a differentiating element, compared to the initial response described for other countries, which is more focused on service management.

Nevertheless, certain aspects of international recommendations and scientific evidence have not been sufficiently developed in Chile: (i) the focus on health rights (although this principle is included in the 2017–2025 National Mental Health Plan); (ii) the participation of users and their families; (iii) the neuropsychiatric effects of COVID-19 survivors; (iv) the impact of the pandemic-related economic recession on mental health; and (v) the amount of funding required or allocated to mental health. The lack of resources and preparedness are common in many countries dealing with the consequences of an unprecedented scenario (22). The mental health approach to emergencies and disasters, well developed in Chile due to long exposure to natural disasters—including trained technical and human resources—could have compensated for the lack of mental health funding and specific technical preparedness for the COVID-19 pandemic.

It is also possible to observe in other countries and regions the primordial need to develop rapid response strategies to mental health crises as a consequence of the pandemic, adapting services to ensure continuity of care and access to care for the new demand that has arisen (22). Of particular relevance during the pandemic seems to be the development of online and telephone support strategies, such as those compiled by McCartan et al. (26) for Afghanistan, Egypt, Iran, Iraq and Palestine, as well as, the establishment of an online portal to address mental health issues, such as the one described by the same authors in The Netherlands. The Chilean experience can well be placed within these frameworks.

The emerging idea—from a review of pandemic coping in several countries—that the crisis offers some opportunities, such as intersectoral collaboration and increased investment (26), is consistent with what has been experienced in Chile. However, we also agree that even greater changes are required to address the social inequalities that are at the heart of the mental health consequences of the pandemic.

Limitations

The authors are policy stakeholders, either from the Ministry of Health or from the School of Public Health of Universidad de Chile, and they acknowledge that the risk of bias could be a limitation in the execution of the study. To address this potential bias, only publicly available documents were selected, so that they could be analyzed, evaluated, and interpreted by readers of this manuscript and other interested parties.

CONCLUSION

In this paper, we have described the main aspects of the policy responses to the mental health challenges derived from the COVID-19 pandemic in Chile, analyzing their integration within the pre-pandemic mental health policy framework and service trajectory, and comparing the policies with available evidence and experiences from other countries and international agencies, such as the World Health Organization. Using available local materials developed during the pandemic, we have identified five key elements, consisting of four broad policy initiatives and research efforts based out of local universities and institutions.

In light of the multiple strengths of the Chilean response to mental health challenges during the pandemic, it is surprising that a community participation approach was not observed. This discrepancy reflects a tension, between a response focused on intensive hospital beds vs. initiatives that strengthen communities and non-specialized mental health services. This tension was noted in the mental health strategy document that was provided to the National Social Committee, and it is a priority policy area that Chile has worked on developing in recent national mental health plans. To face the predicted post-pandemic increase in demand for mental health services, priority resource allocation must consider community settings.

The pandemic, however, is far from over, and its impact upon the population's mental health will continue to be revealed over time. As such, the effects of these mental health policy responses in the real world have yet to be estimated. What is clear is that these initiatives need to be documented, evaluated, and shared to create a pool of experiences that can guide other countries in this process. In Chile, the pandemic has created opportunities to increase policy action in mental health, and this can also be the case for our regional neighbors. Positioning the community mental health model as a framework for pandemic policymaking, the government-led mental health response could contribute to social peace and play a key role in building a post-pandemic Chilean society. For this reason, citizen participation will be of key importance. The pandemic could be considered the greatest current challenge of mental health policy in Chilean modern history, and the principles and visions outlined in the National Mental Health Plan 2017–2025 should be urgently implemented in the actual practice of health services.

AUTHOR CONTRIBUTIONS

MI, PN, CM, OT-D, BV, and AC-U contributed to the design and implementation of the research, to the analysis of the results, and to the writing of the manuscript. All authors contributed to the article and approved the submitted version.

REFERENCES

1. Moreno C, Wykes T, Galderisi S, Nordentoft M, Crossley N, Jones N, et al. How mental health care should change as a consequence of the COVID-19 pandemic. *Lancet Psychiatry*. (2020) 7:813–24. doi: 10.1016/S2215-0366(20)30307-2
2. Inter-Agency Standing Committee (IASC). *IASC Guidelines for Mental Health and Psychosocial Support in Emergency Settings*. Geneva: IASC (2007). Available online at: https://www.who.int/mental_health/emergencies/guidelines_iasc_mental_health_psychosocial_june_2007.pdf (accessed July 31, 2020).
3. Inter-Agency Standing Committee (IASC). *Briefing Note on Addressing Mental Health and Psychosocial Aspects of COVID-19*. Outbreak Version 1.1. Geneva: Inter-Agency Standing Committee (IASC) (2020). Available online at: http://www.socialserviceworkforce.org/system/files/resource/files/Briefing-Note-Addressing-Mental-Health-and-PSS-COVID-19.pdf (accessed July 31, 2020).
4. World Health Organization Europe. *Impact of Economic Crises on Mental Health*. World Health Organization (2011). Available online at: https://www.euro.who.int/__data/assets/pdf_file/0008/134999/e94837.pdf (accessed August 14, 2021).
5. Singer M. *Introduction to Syndemics: A Critical Systems Approach to Public and Community Health, 1st Edn*. San Francisco, CA: Jossey-Bass (2009).
6. Mendenhall E, Kohrt BA, Norris SA, Ndetei D, Prabhakaran D. Non-communicable disease syndemics: poverty, depression, and diabetes among low-income populations. *Lancet*. (2017) 389:951–63. doi: 10.1016/S0140-6736(17)30402-6
7. United Nations. *Policy Brief: COVID-19 and the Need for Action on Mental Health*. (2020). Available online at: https://unsdg.un.org/sites/default/files/2020-05/UN-Policy-Brief-COVID-19-and-mental-health.pdf (accessed July 31, 2020).
8. International Federation of Red Cross and Red Crescent Societies. *Mental Health and Psychosocial Support for Staff, Volunteers and Communities*. Geneva: Red Cross International (2020). Available online at: https://pscentre.org/wp-content/uploads/2020/02/MHPSS-in-nCoV-2020_ENG-1.pdf (accessed July 31, 2020).
9. Pan American Health Organization. *COVID-19 Recommended Interventions in Mental Health and Psychosocial Support (MHPSS) During the Pandemic*. PAHO (2020). Available online at: https://iris.paho.org/bitstream/handle/10665.2/52485/PAHONMHMHCOVID-19200026_eng.pdf?sequence=1&isAllowed=y (accessed July 31, 2020).
10. Wahlbeck K, McDaid D. Actions to alleviate the mental health impact of the economic crisis. *World Psychiatry*. (2012) 11:139–45. doi: 10.1002/j.2051-5545.2012.tb00114.x
11. Vigo DV, Kestel D, Pendakur K, Thornicroft G, Atun R. Disease burden and government spending on mental, neurological, and substance use disorders, and self-harm: cross-sectional, ecological study of health system response in the Americas. *Lancet Public Health*. (2019) 4:e89–e96. doi: 10.1016/S2468-2667(18)30203-2
12. Dong E, Du H, Gardner L. An interactive web-based dashboard to track COVID-19 in real time. *Lancet Infect Dis*. (2020) 20:533–4. doi: 10.1016/S1473-3099(20)30120-1
13. Minoletti A, Sepúlveda R, Gómez M, Toro O, Irarrázabal M, Díaz R, et al. Análisis de la gobernanza en la implementación del modelo comunitario de salud mental en Chile. *Rev Panam Salud Publ*. (2018) 42:e131. doi: 10.26633/RPSP.2018.131
14. Montenegro CR, Cornish F. Historicising involvement: the visibility of user groups in the modernisation of the Chilean Mental Health System. *Crit Public Health*. (2019) 29:61–73. doi: 10.1080/09581596.2017.1400659
15. Ministerio de Salud. *Plan Nacional de Salud Mental 2017-2025*. Santiago: Ministerio de Salud (2017). Available online at: https://www.minsal.cl/wp-content/uploads/2017/12/PDF-PLAN-NACIONAL-SALUD-MENTAL-2017-A-2025.-7-dic-2017.pdf (accessed June 1, 2020).
16. Fuentes-García A. El clamor de las inequidades: estallido social y salud en Chile. *Rev Chil Salud Públ*. (2019) 23:93–4. doi: 10.5354/0719-5281.2019.56343
17. DESOC. *Núcleo Milenio en Desarrollo Social, Centro de Microdatos (CMD), Universidad de Chile, Centro de Estudios de Conflicto y Cohesión Social (COES)*. Termómetro Social (2019). Available online at: http://nucleodesoc.cl/wp-content/uploads/2019/11/TERM%C3%93METRO-SOCIAL-DESOC_CMD_COES.pdf (accessed July 31, 2020).
18. Gobierno de Chile. *Mesa Social COVID-19*. (2020). Available online at: https://www.gob.cl/mesasocialcovid19/ (cite July 28, 2020).
19. HM Government. *COVID-19 Mental Health and Wellbeing Recovery Action Plan*. HM Government (2021). Available online at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/973936/covid-19-mental-health-and-wellbeing-recovery-action-plan.pdf (cite March 27, 2021).
20. CAMH. *Mental Health in Canada: Covid-19 and Beyond*. (2020). Available online at: https://www.camh.ca/-/media/files/pdfs---public-policy-submissions/covid-and-mh-policy-paper-pdf.pdf (accessed August 14, 2021).
21. World Health Organization. *The Impact of COVID-19 on Mental, Neurological and Substance Use Services*. (2020). Available online at: https://www.who.int/publications/i/item/978924012455 (accessed August 14, 2021).
22. Rosenberg S, Mendoza J, Tabatabaei-Jafari H. Pandemic-Mental Health International Network (Pan-MHIN), Salvador-Carulla L. International experiences of the active period of COVID-19 - Mental health care. *Health Policy Technol*. (2020) 9:503–9. doi: 10.1016/j.hlpt.2020.08.016
23. Louis EF, Ingabire W, Isano S, Eugene D, Blanc J. Rwanda's response during COVID-19. *Psychol Trauma*. (2020) 12:565–6. doi: 10.1037/tra0000801
24. Qiu D, Li Y, Li L, He J, Ouyang F, Xiao S. Policies to improve the mental health of people influenced by COVID-19 in China: a scoping review. *Front Psychiatry*. (2020) 11:588137. doi: 10.3389/fpsyt.2020.588137
25. Demkowicz O, Panayiotou M, Parsons S, Feltham A, Arseneault L, Ingram B, et al. Looking back to move forward: reflections on the strengths and challenges of the COVID-19 UK mental health research response. *Front Psychiatry*. (2021) 12:622562. doi: 10.3389/fpsyt.2021.622562
26. McCartan C, Adell T, Cameron J, Davidson G, Knifton L, McDaid S, et al. A scoping review of international policy responses to mental health recovery during the COVID-19 pandemic. *Health Res Policy Syst*. (2021) 19:58. doi: 10.1186/s12961-020-00652-3
27. Gobierno de Chile. *Paso a Paso: Nos Cuidamos*. (2020). Available online at: https://www.gob.cl/coronavirus/pasoapaso/ (cite July 28, 2020).
28. Ministerio de Salud. *Consideraciones de Salud Mental y Apoyo Psicosocial durante COVID-19, versión 2.0*. Ministerio de Salud (2020). Available online at: https://degreyd.minsal.cl/wp-content/uploads/2020/04/Consideraciones-de-Salud-Mental-y-apoyo-Psicosocial-durante-Covid-19-versi%C3%B3n-2.0-1.pdf
29. Ministerio de Salud. *Orientaciones Para la Atención de Personas en Tratamiento por Salud Mental en APS*. Contexto COVID-19. Ministerio de Salud (2020). Available online at: https://degreyd.minsal.cl/wp-content/uploads/2020/04/Orientaciones-para-la-atencio%CC%81n-de-personas-en-tratamiento-por-salud-mental-en-APS_COVID-19_160420.pdf
30. Ministerio de Salud. *Ordinario B-2 N°1132, Envía Recomendaciones Para el Cuidado del Personal en el Contexto de COVID-19*. (2020).
31. Ministerio de Salud. *Recomendaciones Para el Cuidado del Personal de Salud Durante COVID-19*. Ministerio de Salud (2020). Available online at: http://www.saludpublica.uchile.cl/documentos/recomendaciones-para-el-cuidado-del-personal-de-salud-durante-covid-19-minsal_163384_2_3345.pdf
32. Mesa Técnica Intersectorial de Salud Mental y Apoyo Psicosocial en la Gestión del Riesgo de Desastres, Red Nacional de Líneas de Atención no presencial. Boletín N°1. *Catastro de Líneas de Ayuda Remota en Salud Mental y Apoyo Psicosocial, en Contexto de COVID-19*. Mesa Técnica Intersectorial de Salud Mental y Apoyo Psicosocial en la Gestión del Riesgo de Desastres (2020). Available online at: https://degreyd.minsal.cl/wp-content/uploads/2020/04/Bolet%C3%ADn-N%C2%BA1.-Catastro-de-l%C3%ADneas-de-ayuda-remota-en-salud-mental-y-apoyo-psicosocial-en-contexto-de-COVID19.pdf
33. Mesa Técnica Intersectorial de Salud Mental y Apoyo Psicosocial en la Gestión del Riesgo de Desastres, Red Nacional de Líneas de Atención no presencial. Boletín N°2. *Catastro de Líneas de Ayuda Remota en Salud Mental y Apoyo Psicosocial, en Contexto de COVID-19*. Mesa Técnica Intersectorial

de Salud Mental y Apoyo Psicosocial en la Gestión del Riesgo de Desastres (2020). Available online at: https://degreyd.minsal.cl/wp-content/uploads/2020/04/Bolet%C3%ADn-2-Catastro-l%C3%ADneas-de-ayuda-SMAPS-COVID19-versi%C3%B3n-final-08.06.2020.pdf
34. Escuela de Salud Pública, Universidad de Chile, Ministerio de Salud. *Conversatorios Salud Mental en Contexto COVID-19.* (2020). Available online at: http://www.saludpublica.uchile.cl/escuela/conversatorios-salud-mental-covid-19/162853/pesentacion-conversatorios-salud-mental-en-contexto-covid19 (cite July 27, 2020).
35. Ministerio de Salud. *Hospital Digital.* (2020). Available online at: https://www.hospitaldigital.gob.cl/ (cite July 29, 2020).
36. Ministerio de Salud. *Hospital Digital: Canal de YouTube.* (2020). Available online at: https://www.youtube.com/channel/UC872b9D5yH7BYKIP0SqFjEw (cite July 30, 2020).
37. Universidad de Chile. *Salud Mental en Situación de Pandemia. Documento para Mesa Social COVID-19.* (2020). Available online at: https://www.uchile.cl/documentos/salud-mental-en-situacion-de-pandemia-documento-para-mesa-social-covid-19-descargar_163020_0_5138.pdf (cite July 28, 2020).
38. Gobierno de Chile. *Plataforma SaludableMente*. Available online at: https://www.gob.cl/saludablemente/ (cite August 21, 2021).
39. Ministerio de Salud. *Estrategia Integral SaludableMente*. Available online at: https://www.minsal.cl/saludablemente/estrategia-integral/ (cite August 14, 2021).
40. Agencia Nacional de Investigación y Desarrollo de Chile (ANID). *Concurso Adjudicado: Concurso para la Asignación Rápida de Recursos para Proyectos de Investigación sobre el Coronavirus (Covid-19) Año* 2020 (2020). Available online at: https://www.anid.cl/concursos/concurso/?id=379
41. Alvarado R. *The Covid-19 HEalth caRe wOrkErS Study (HEROES).* (2020). Available online at: https://clinicaltrials.gov/ct2/show/NCT04352634
42. Ramírez J. Evidencia sobre efectos en la salud mental de los trabajadores de la salud, en la pandemia de COVID-19. The COVID-19 health care workers study. In: *Simposio Virtual sobre Salud Mental y COVID-19: La investigación HEROES en la Región de las Américas.* Santiago: Organización Panamericana de la Salud (2020). Available online at: https://www.paho.org/es/eventos/simposio-virtual-sobre-salud-mental-covid-19-investigacion-heroes-region-americas
43. Ministerio de Salud. *Políticas y Plan Nacional de Salud Mental y Psiquiatría*. Santiago: Ministerio de Salud (1993).
44. Ministerio de Salud. *Plan Nacional de Salud Mental y Psiquiatría*. Santiago: Ministerio de Salud (2000).
45. Errázuriz P, Valdés C, Vöhringer PA, Calvo E. Financiamiento de la salud mental en Chile: una deuda pendiente. *Rev Méd Chile*. (2015) 143:1179–86. doi: 10.4067/S0034-98872015000900011
46. Ministerio de Salud. *Sistema de Salud Mental de Chile. Segundo informe WHO-AIMS.* (2014). Available online at: https://www.who.int/mental_health/who_aims_country_reports/who_aims_report_chile.pdf?ua=1
47. Muñoz C. *La Salud en Chile: Una Historia de Movimientos, Organización y Participación Social.* Valdivia: Universidad Austral de Chile (2019).

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

frontiers in Public Health

ORIGINAL RESEARCH
published: 09 December 2021
doi: 10.3389/fpubh.2021.590458

Anxiety, Anger and Depression Amongst Low-Income Earners in Southwestern Uganda During the COVID-19 Total Lockdown

Victor Archibong[1], Ibe Michael Usman[2]*, Keneth Iceland Kasozi[3]*, Eric Osamudiamwen Aigbogun Jr.[2], Ifie Josiah[2], Ann Lemuel Monima[1], Robinson Ssebuufu[4], Gaudencia Chekwech[5], Swase Dominic Terkimbi[2], Okon Owoisinke[6], Ngala Elvis Mbiydzenyuy[7], Azeez Adeoye[2], Joshua Ojodale Aruwa[2], Adam Moyosore Afodun[8], Saidi Odoma[9], Fred Ssempijja[2], Emmanuel Tiyo Ayikobua[10], John Tabakwot Ayuba[2], Viola Nankya[11], Comfort Onongha[11], Sussan Henry[11], Kevin Matama[9], Helen Yusuf[12], Halima Nalugo[13], Ewan MacLeod[3] and Susan Christina Welburn[3,14]**

[1] Department of Anatomy, College of Medicine, King Ceasor University, Kampala, Uganda, [2] Faculty of Biomedicals Sciences, Kampala International University Western Campus, Bushenyi, Uganda, [3] Infection Medicine, Deanery of Biomedical Sciences, College of Medicine and Veterinary Medicine, The University of Edinburgh, Edinburgh, United Kingdom, [4] Uganda Medical and Dental Practitioners' Council, Kampala, Uganda, [5] Faculty of Clinical Medicine and Dentistry, Kampala International University Teaching Hospital, Bushenyi, Uganda, [6] Faculty of Allied Medical Sciences, University of Calabar, Calabar, Nigeria, [7] Department of Basic Medical Science, School of Medicine, Copperbelt University, Ndola, Zambia, [8] Department of Anatomy and Cell Biology, Faculty of Health Sciences, Busitema University, Busitema, Uganda, [9] School of Pharmacy, Kampala International University Western Campus, Kampala, Uganda, [10] Department of Physiology, School of Health Sciences, Soroti University, Soroti, Uganda, [11] School of Nursing, Kampala International University Teaching Hospital, Bushenyi, Uganda, [12] Department of Human Anatomy, College of Medicine and Health Science, Ahmadu Bello University, Zaria, Nigeria, [13] Department of Anatomy, School of Medicine, Mbarara University of Science and Technology, Mbarara, Uganda, [14] Zhejiang University-University of Edinburgh Institute, Zhejiang University School of Medicine, International Campus, Zhejiang University, Haining, China

Background: Low-income earners are particularly vulnerable to mental health, consequence of the coronavirus disease 2019 (COVID-19) lockdown restrictions, due to a temporary or permanent loss of income and livelihood, coupled with government-enforced measures of social distancing. This study evaluates the mental health status among low-income earners in southwestern Uganda during the first total COVID-19 lockdown in Uganda.

Methods: A cross-sectional descriptive study was undertaken amongst earners whose income falls below the poverty threshold. Two hundred and fifty-three ($n = 253$) male and female low-income earners between the ages of 18 and 60 years of age were recruited to the study. Modified generalized anxiety disorder (GAD-7), Spielberger's State-Trait Anger Expression Inventory-2 (STAXI-2), and Beck Depression Inventory (BDI) tools as appropriate were used to assess anxiety, anger, and depression respectively among our respondents.

Results: Severe anxiety (68.8%) followed by moderate depression (60.5%) and moderate anger (56.9%) were the most common mental health challenges experienced by low-income earners in Bushenyi district. Awareness of mental healthcare increased

OPEN ACCESS

Edited by:
Joanna Lai,
UNICEF United Nations International Children's Emergency Fund, United States

Reviewed by:
Herbert Ainamani, Kabale University, Uganda
Jose Balmori De La Miyar, Universidad Anáhuac México, Mexico

***Correspondence:**
Victor Archibong
victorarchibong3@gmail.com
Ibe Michael Usman
gopama13@gmail.com
Keneth Iceland Kasozi
kicelandy@gmail.com
Susan Christina Welburn
sue.welburn@ed.ac.uk

Specialty section:
This article was submitted to Public Mental Health, a section of the journal Frontiers in Public Health

Received: 01 August 2020
Accepted: 14 October 2021
Published: 09 December 2021

Citation:
Archibong V, Usman IM, Kasozi KI, Aigbogun EO Jr, Josiah I, Monima AL, Ssebuufu R, Chekwech G, Terkimbi SD, Owoisinke O, Mbiydzenyuy NE, Adeoye A, Aruwa JO, Afodun AM, Odoma S, Ssempijja F, Ayikobua ET, Ayuba JT, Nankya V, Onongha C, Henry S, Matama K, Yusuf H, Nalugo H, MacLeod E and Welburn SC (2021) Anxiety, Anger and Depression Amongst Low-Income Earners in Southwestern Uganda During the COVID-19 Total Lockdown. Front. Public Health 9:590458. doi: 10.3389/fpubh.2021.590458

with the age of respondents in both males and females. A linear relationship was observed with age and depression ($r = 0.154$, $P = 0.014$) while positive correlations were observed between anxiety and anger ($r = 0.254$, $P < 0.001$); anxiety and depression ($r = 0.153$, $P = 0.015$) and anger and depression ($r = 0.153$, $P = 0.015$).

Conclusion: The study shows the importance of mental health awareness in low resource settings during the current COVID-19 pandemic. Females were identified as persons at risk to mental depression, while anger was highest amongst young males.

Keywords: COVID-19 response in Africa, socio-economic impacts of COVID-19, COVID-19 outcomes, psychosocial impacts of COVID-19, hunger and COVID-19, COVID-19 hits poor harder, women dangers in COVID-19

INTRODUCTION

COVID-19 emerged in Africa on February 14th, 2020 with the first case reported in Egypt. To date 54 countries on the African sub-continent have now reported cases of COVID-19 (1). Uganda reported its first confirmed case on 22 March 2020, from a 36-year-old male who had traveled from Dubai (2, 3). On 18th March 2020, the President of Uganda announced the first total national lockdown which included the international border closures; the closing of schools, private offices and banned public gatherings at places of worships/social events, initially for a period of 32 days (4). Efforts to prevent the spread of COVID-19, effectively closed off most sources of income for the majority of low-income earners, who were forced to stay at home. The resulting decrease in household income impacted on food security and hunger and boredom have impacted on mental health and well-being, complicating adjustment to existence under the COVID-19 lockdown (5). Social distancing measures proposed by health experts and adopted by government lead to social isolation, especially in low-income settings where resources are limited and social networks are cut off by a lack of disposable income. Incidence of domestic violence has increased under conditions of social lockdown, exacerbated by economic uncertainty and stress; reports of domestic violence have been reported as tripling in some countries following previously reported increased rates of child abuse, neglect, and exploitation during previous public health emergencies, for example during the 2014–2016 Ebola outbreak in West Africa (5).

Mental health illnesses and drug abuse are common consequences observed during infectious disease outbreaks because of psychological distress, frustration, and unemployment (6, 49). There are concerns that the COVID-19 pandemic will lead to a mental health crisis, especially in countries with high disease burden (7). Unpredictability, uncertainty, disease severity, misinformation, and social isolation all contribute to stress and mental morbidity (8). Asmundson and Taylor (9, 10) and Xiao et al. (11) reported anxiety to be the most common of individual mental health symptoms, associated with impaired sleep. Mitsuishi and Ries (12) reported that stigmatization from an infectious disease such as COVID-19 could lead to depression in those afflicted.

Elevated levels of stress or anxiety as a function of disruption of livelihoods that lead to an increase in levels of depression, loneliness, harmful alcohol use, self-harm, or suicidal behavior which interferes with how people adjust in difficult situations in this era of the pandemic (1). Studies assessing the mental health status of respondents in developing countries are however, scarce. Common stressors include the risk of being infected and infecting others, health anxiety manifesting in form of mistaking common symptoms of other health problems such as fever for COVID-19, leading to fear of infection (13, 14).

Constant fear, worry and uncertainty combined with individual stressors within the population is likely to have long-term consequences within communities, families and vulnerable individuals. This manifests in the form of possible higher emotional state, anger and aggression against government, frontline workers, partners, and children (13, 14) and sometimes, fear and behaviors are modeled by ignorance, and misinformation (13, 14).

Low-income earners are defined as individuals in work whose income falls below the poverty line and an average Ugandan survives on <$1 US per day (15). Economic pressure associated with the pandemic has not been explored in low resource settings, thus undermining the mental health status of most Africans. This is important since persons in these communities work longer hours, earn less, and have a high dependent-income ratio (16). This study aimed to assess the mental health status among low income earners in Bushenyi district of southwestern Uganda during the first total COVID-19 lockdown.

METHODOLOGY

Study Site and Design

This was a cross-sectional study conducted amongst low-income earners i.e., boda-boda riders, taxi drivers, taxi turn-boys in the taxi-park, market sellers, barbers, hairdressers, photocopier attendants, and street food sellers in Bushenyi district (**Figure 1**).

Inclusion and Exclusion Criteria

Inclusion Criteria

The study population consisted of males and females ($n = 253$) above 18 years of age, who have resided in the region for the past 12 months. This was important since these had permanent businesses and were residents in the area, thus able to assess how the pandemic has changed their work routine.

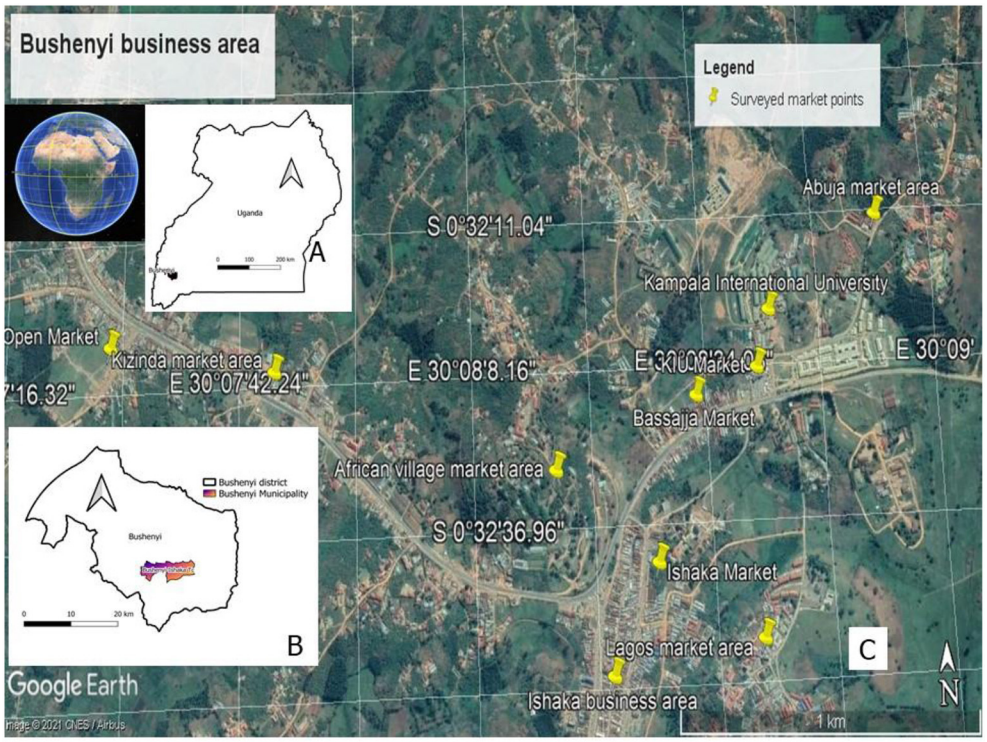


FIGURE 1 | Description of the study area. The study was conducted in Uganda **(A)** which is an East African country. In particular, the surveyed participants where located in Bushenyi Municipality **(B)**, covering a total of 10 market areas **(C)**. Market areas visited included: Kizinda market area, Kizinda open market, African village market area, Ishaka business area, Ishaka open market, Bassajja market, Kampala International University (KIU), KIU open market, Lagos market area, and Abuja market areas **(C)**.

Exclusion Criteria

Individuals who refused to participate in the study or casual laborers and those not involved in the financial management of the business. In addition, individuals who owned other businesses outside the study area, although residents in the area were excluded from the survey.

Data Collection and Management

Data Collection Method

An electronic questionnaire was shared with participants to assess their mental health, anger, anxiety, and depression status. Awareness of mental health care was assessed using simple questions and each of the options provided were assigned scores. Anxiety was assessed using a modified generalized anxiety disorder (GAD-7) item tool (17). Each of the responses attracted scores. Anger was assessed using a modified Spielberger's State-Trait Anger Expression Inventory-2 (STAXI-2) (18). Responses for each question were assigned scores. Depression was assessed using a modified Beck Depression Inventory (BDI) (19). Responses for each of the questions were assigned scores. The questionnaire consisted of multiple-choice unambiguous questions, and respondents who could not understand the questions had the questions interpreted in the local language for them by team members who could communicate effectively in the local vernacular. A Google format of the questionnaire was used to minimize physical contact and maintain social distancing according to the guidelines by WHO and the Ministry of Health in Uganda (**Supplementary Material 1**).

Data Management and Organization

Data from the survey was entered into Microsoft Excel (2016) and scores were assigned to each option as follows: Mental Health Care Awareness (Q5 – Q10): Numerical values – Mental Health Awareness [Correct response = 1, Incorrect response = 0]. Modified GAD Assessment of Anxiety (Q11 – Q16): Numerical values – Multiple response [For each option selected = 1, indifferent = 0].Modified STAXI-2 Assessment for Anger (Q17 – Q23): Numerical values – Multiple response [For each option selected = 1, indifferent = 0].Modified BDI Assessment for Depression (Q24 – Q30): Numerical values – Single graded response [Highest grade of 3, indifferent = 0].

Anxiety, Anger, and Depression were the mental health concerns of interest, while awareness was an influence variable of significant interest. These variables were obtained using interviewer-based questionnaires. The data were assessed for completeness and responses failing to meet the 75% cut-off (on all valid questions) were excluded. Scores of the multiple

options for the modified GAD, and STAXI-2 were obtained by assigning one (1) mark per response, and the averages were obtained by summing all scores (qt) and dividing the number of questions (n). While BDI had four (4) options graded as 3, 2, 1, and 0 (for indifferent). For specific graded questions (yes, sometimes, or no), scores; 2, 1, 0 were assigned and all questions in this form were cumulated (per row), added, then divided by the maximum assigned weight (w) and the distribution (n). This provided the score (Level-score), which is then rated (name of condition; awareness, anxiety, depression, or anger) using cut-offs. To determine the level of awareness and mental state, the composite scores were grade; awareness (no; <0.3, low; 0.30–0.69, high; ≥70) and mental state (no/mild; <0.20, moderate; 20–0.49 or severe; ≥50). This scoring and grading system allows for both linear and uni/multivariate logistic regression analysis.

Statistical Analysis

Data was transferred to Minitab® 18.1 (Minitab, Inc. 2017, Pennsylvania, USA) and all relevant analysis was carried out. The data was not uniformly distributed and principal component analysis (PCA) was used to observe the uncorrelatedness of the dependent variables and determine how they account for differences and separated the socio-demographic variables into components. Spearman Rho correlation was used to observe the relationship between age, awareness, anxiety, anger, and depression, then all significant correlates were regressed using a system-assisted regression model. All analyses were performed at a 95% confidence level and p-values < 0.05 were taken to be significant.

RESULTS

Sociodemographic Characteristics (Sex and Age-Group), Anxiety, Anger, and Depression

The study comprised of 150 males (59.3%) and 103 females (40.7%), with more middle-aged adults (170/253; 67.2%) compared to younger (65/253; 25.7%) and older (18/253; 7.1%) adults. The proportion of low-income earners in western Uganda with awareness of mental health care was 126/253 (49.8%). A high proportion of low-income earners reported to have experienced severe anxiety 174/253 (68.8%), moderate depression 144/253 (56.9) and moderate anger 153/253 (60.5) (**Table 1**).

The mean percentage score for awareness in male and female respondents were 63.8 and 63.2%, respectively. Female respondents reported anxiety, anger, and depression of 43.6, 56.5, and 27.5%, respectively, while male respondents reported anxiety, anger, and depression of 43.4, 54.5, and 25.4%, respectively (**Figure 2**).

The study also showed that older adults had higher awareness of mental health, lower anxiety, anger, and depression than middle-aged and younger adults (**Figure 3**); however, the difference in the scores was only significant for depression ($P = 0.03$).

TABLE 1 | Response and factor information.

Variables	Value/level	Frequency (%)	Median (95% CI)
Sex	Male	150 (59.3)	
	Female	103 (40.7)	
Age (adults)	Young (18–24 years)	65 (25.7)	23 (22.0–23.9)
	Middle-aged (25–40 years)	170 (67.2)	30 (29.0–31.0)
	Older (>40 years)	18 (7.1)	47 (43.3–57.7)
Awareness	High	126 (49.8)	43.7–66.0
	Low	62 (24.5)	19.5–30.1
	No	65 (25.7)	20.6–31.3
Anxiety	Severe	174 (68.8)	62.9–74.3
	Moderate	74 (29.2)	23.9–35.1
	No/Mild	5 (2.0)	0.7–4.3
Anger	Severe	85 (33.9)	28.0–39.6
	Moderate	144 (56.9)	50.8–62.9
	No/Mild	24 (9.5)	6.3–13.6
Depression	Severe	12 (4.7)	2.6–7.9
	Moderate	153 (60.5)	54.4–66.4
	No/Mild	88 (34.8)	29.1–40.8
Total		**253**	

Interactions Between COVID-19 Related Anxiety, Anger, and Depression Amongst Low-Income Earners in Uganda

The correlation analysis of the study variables was presented in **Table 2**. There was a negative relationship between age and depression ($r = -0.154$, $P = 0.014$), while a positive relationship was observed between anxiety and anger ($r = 0.254$, $P < 0.001$), anxiety and depression ($r = 0.153$, $P = 0.015$) and anger and depression ($r = 0.153$, $P = 0.015$).

The study also showed that there were relationships in participants anger score however all other variables were not related in both sexes (**Figure 4**).

DISCUSSION

Survivors of natural disasters as exemplified by the current COVID-19 pandemic often suffer from traumatic experiences, anxiety disorders (GAD), depression, panic disorders and substance abuse (20–22). The study provided evidence that generally the Ugandan population was aware of mental health issues and this was in agreement with previous studies amongst healthcare workers (23) and market workers (24).

Females who demonstrated severe anxiety, moderate anger and depression probably due to their relatively low knowledge as compared to males on COVID-19. Social-economic barriers in several developing countries have continued to predispose women to apathy, segregation and mistreatment at the hands of their men counterparts in several rural communities in Africa, thus accounting for the severe discrepancies in knowledge

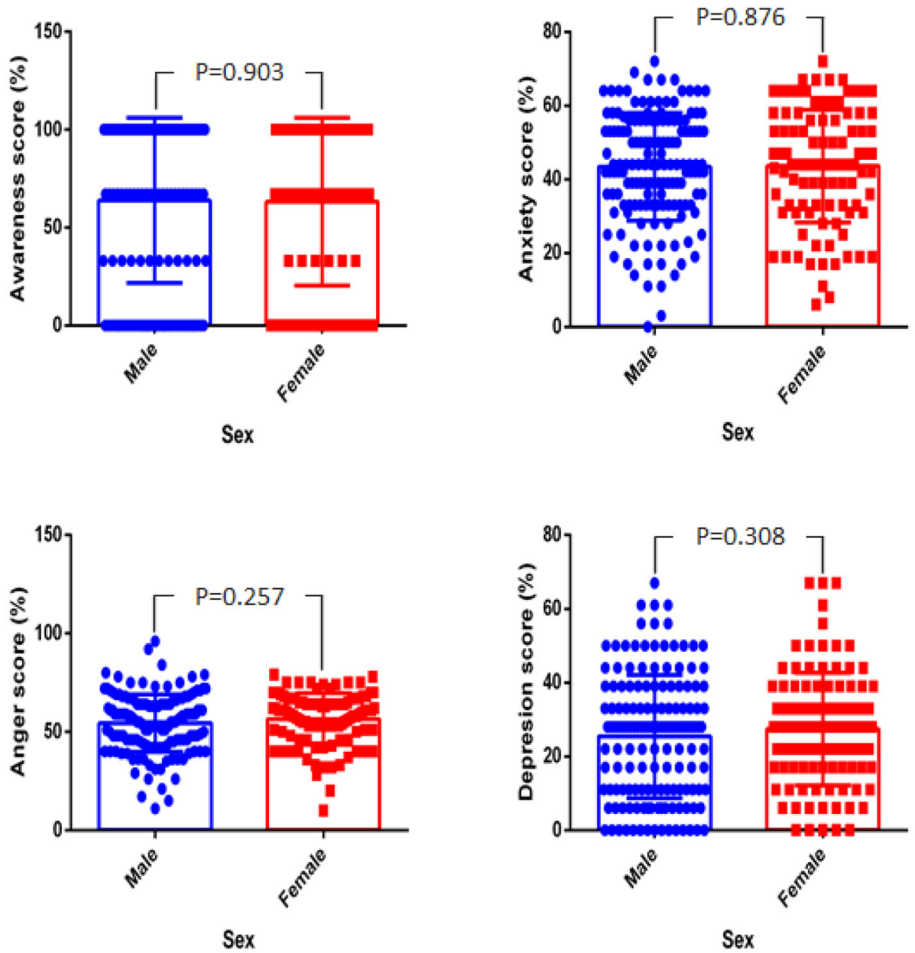


FIGURE 2 | Percentage score difference for awareness, anxiety, anger, and depression between male and female.

between the two sexes. The WHO has identified women as vulnerable persons in Africa who should be supported in response programs against COVID-19 (25) and this is re-emphasized by the current study. Findings in the study were elderly persons showed a keen awareness and interest on mental healthcare demonstrated their keen interest to improve on their lifestyle, contrary to young adults in this population.

Anxiety also increased with age amongst females due to the inherent responsibilities associated with women in African communities. A majority of homes in Africa are managed by single mothers, and elderly women taking care of orphaned grandchildren, thus social pressures associated with COVID-19 were amplified in this population group than in their male counterparts who generally live more reckless lifestyles (i.e., alcoholism, polygamy, and crime, vices not common with African women).

Anger and depression decreased with an increase in age in the study population. These findings though perplexing, help to demonstrate the fluidity associated with community health response projects, and the need for flexibility while dealing with different age populations. Generally, Africa has a young vibrant population and these findings may not be applicable in the global context. Females were found to be more depressed probably due to the associated pressures of lost time due to the total lockdown which led to a closure of all academic centers of learning, forcing many young girls into early marriage and teenage pregnancies, thus derailing their academic goals (25). In addition, the study identifies Ugandan females as vulnerable persons to depression and in great need of guidance and counseling services for the promotion of better public health policies (26, 48). Generally, females experience more stress than males on a monthly basis as a result of physiological processes associated with their gender, thus offering a foundation for the increased anxiety attacks common in the gender (27, 28). Furthermore, neurophysiology studies have revealed that there are structural and functional differences in the brain relevant to anxiety in males and females (29–31) and blood pressure and pulse have been reported to be more reactive to anxiety in females compared to males (32), although these were not investigated in the current study.

A strong relationship between anxiety and anger was found amongst the young study participants probably due to frustrations associated with the lockdown and the fact that

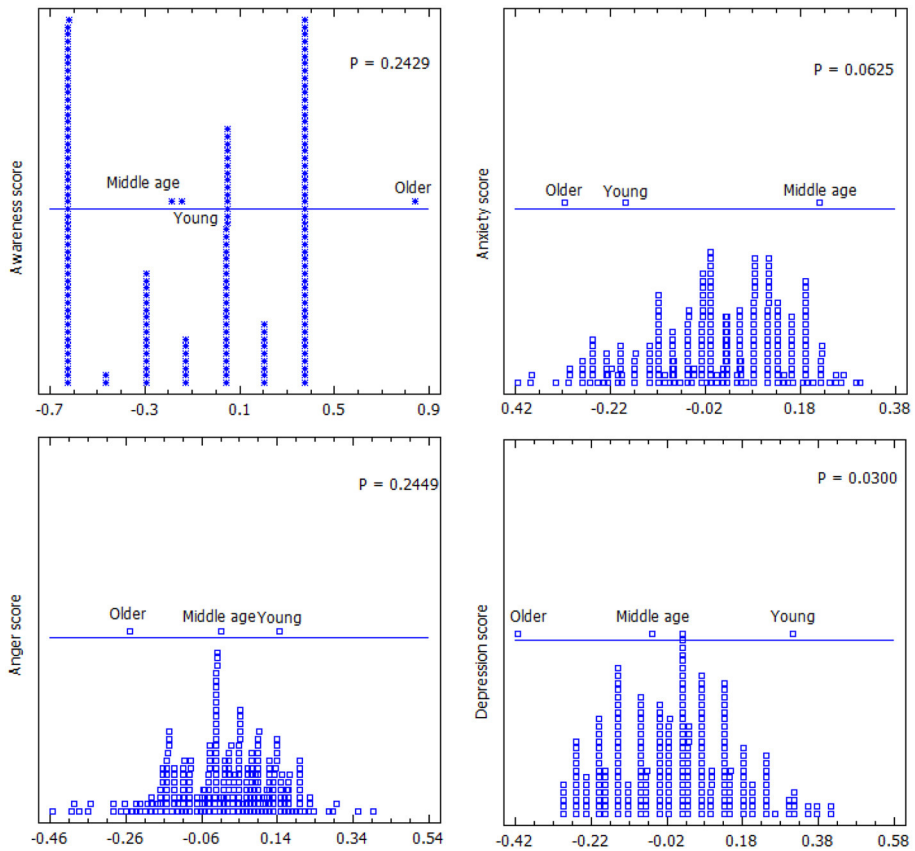


FIGURE 3 | Composite score difference for awareness, anxiety, anger, and depression between the different age groups.

a majority of the youth in Uganda are under/unemployed. Our findings are in agreement with Walsh et al. (47) who reported a similar relationship between anxiety and anger in younger people. Poverty amongst the young and the on-going presidential elections were COVID-19 guidelines are enforced by the police against the opposition parties could have played a role in saturating a hateful atmosphere (personal communication). Amongst the youth, anger is a psychological and physical health predictor (33), demonstrating a need for policymakers to work closely with this age group.

Anger refers to a basic and universal emotional state brought forth by a perception of threat and it is associated with cognitions centered on others' transgressions (34). In contrast, irritability is a physiological state which is characterized by a lowered threshold for responding with negative affect to stimuli, often with anger and aggression (35, 44). Anger has not been included as a feature or symptom associated with anxiety disorders during the diagnostic process, however, irritability has been included as part of generalized anxiety disorders (GAD) diagnosis. Evidence has emerged in samples of adults with anxiety disorders that the rate and intensity of anger are elevated when compared to healthy individuals and this is common during severe anxiety (36). Anger may be expressed differently depending on anxiety diagnosis. For instance, it was observed that individuals with GAD may experience angry feelings but suppress them more than healthy controls, leading to higher levels of anxiety severity in adulthood (37, 46). This simply means that younger people express anger more than adults because they cannot suppress it, while adults tend to suppress anger and this increases anxiety. In addition, the initial increase in anger-score may be due to the inability or difficulty for younger persons to rate anger and anxiety as distinct constructs. This supports the study done by Walsh et al. (47) which reported that younger people confused physical symptoms of anxiety which mimic some physical symptoms of anger for anger and this led to difficulty in rating anger and anxiety as separate constructs.

A positive relationship was found between anxiety and depression in the study showing that younger persons (20 years of age) experienced depression as anxiety score increased more than adults (40–60 years of age) in the study. This supports the statistics from the Substance Abuse and Mental Health Services Administration (SAMHSA) of 2017 which estimated depressive disorder to be 7.1% for adults and 13.3% for adolescents/teens (45). Anxiety disorders and major depression occur during development with anxiety disorders beginning during pre-adolescence and early adolescence, while major depression tends to emerge during adolescence and early to mid-adulthood

(38–40). Further studies have shown that anxiety disorders generally precede the presentation of major depressive disorder (39). Previous studies done in the USA revealed that depression is on the rise amongst teenagers and that females were three times more likely to experience depression compared to males. A 10-year study between 2007 and 2017 in the US revealed that the number of teenagers who experienced depression had increased by 59% and the rate was faster for females (66%) than males (44%) (41); the number of adults who experienced depression increased by 7% within the same period. Academic and social pressures were cited by experts as the reasons behind the increase in depression among the teens recruited in that study. About six out of 10 (61%) of the teens reported they felt a lot of pressure to get good grades while 29% of the teens reported they felt a lot of pressure to look good and 28% of the teens reported they felt pressured to fit socially (41). The results from our study showed that people at 20 years of age (this age bracket captures teens), had a depression score which increased as anxiety score increased. In Bushenyi district (Uganda), some of the students within the 20 years of age group do engage in low-income jobs after school hours and this may affect their academic performances or social life resulting in depression if not monitored and this observation is in agreement with postulations by Geiger and Leslie (41).

There was a positive relationship between anger score and depression score in our study. It was observed that as anger score increased depression score tends to increase. Anger is one of the ways that depression manifests and there is an association between the level of anger that people experience and the severity of depression (50). According to the Anxiety and Depression Association of America (ADAA), depression is expressed in different ways by different people. Females with depression tend to feel sad or guilty while males with depression are more likely to feel irritable and angry (ADAA). However, there is limited research available to support or show that anger can cause depression.

A general observation from our study showed that awareness of mental health care was high (49.8%) across the sample population ($n = 253$) and an increase in age-related to high awareness. 24.5% of the respondents had low awareness and 25.7% had no awareness of mental health care. 68.8% of the respondents experienced severe anxiety due to the COVID-19 lockdown and 29.2% experienced moderate anxiety while 2.0% experience no/mild anxiety based on anxiety score scale using a modified GAD-7 item tool. Also, 33.9% of the respondents experienced severe anger due to the COVID-19 lockdown, and 56.9% experienced moderate anger while 9.5% experienced no/mild anger based on the anger-score grading scale using a modified STAXI-2 item tool. About 4.7% of the

TABLE 2 | Spearman Rho correlation of age, awareness, anxiety, and anger on COVID-19 amongst low-income Ugandans.

Correlations	Age	Awareness	Anxiety	Anger
Awareness	0.049			
P-value	0.440			
Anxiety	0.081	−0.091		
P-value	0.199	0.151		
Anger	−0.024	0.033	0.245	
P-value	0.707	0.602	<0.001	
Depression	−0.154	−0.076	0.153	0.153
P-value	0.014	0.227	0.015	0.015

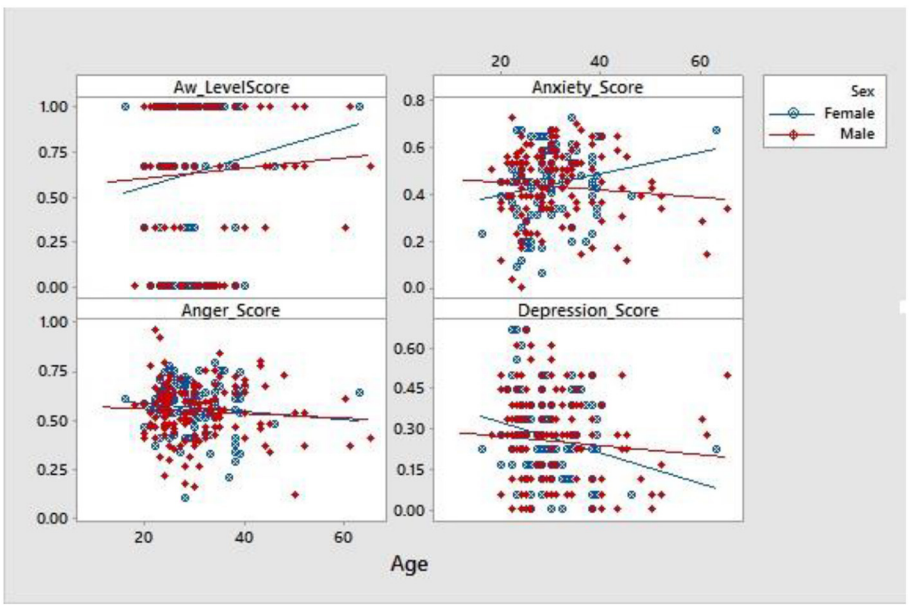


FIGURE 4 | Scatter plot of Sex influence on age associated changes in awareness, anxiety, anger, and depression.

respondents experienced severe depression due to the COVID-19 lockdown and 60.5% experienced moderate depression while 34.8% experienced no depression based on the depression score grading scale using a modified BDI. Other studies done elsewhere have reported different figures due to the variations in the study population and sample size. Wang et al. (42), in their study of mental health status related to COVID-19 among the general population ($n = 1{,}210$) in China reported that 16.5% experienced moderate to severe depression symptoms, 28.8% experienced moderate to severe anxiety symptoms and 8.1% experienced moderate to severe stress. The variation in statistics from our study in Uganda and Wang et al. (42) in China maybe because we targeted low-income earners which are persons who depend on day-to-day-business to make ends meet, tools used for assessment, and sample size. However, our study indicates that anxiety was the most common mental health challenge and this supports the study by Wang et al. (42), which also identified anxiety as the most common mental health challenge in their study. Other studies have reported increased traumatization related to COVID-19 among the public and non-front-line nurses in China (43). Xiao et al. (11), targeted individuals ($n = 170$) observing COVID-19 self-isolation for 14 days in China, and they reported that anxiety positively correlated with stress and negatively with sleep quality and social capital and social capital positively correlated with sleep quality. This indicates that COVID-19 lockdown, without doubt, affects the mental health status of individuals.

CONCLUSION

The study showed that pandemic mental health is a realistic public health concern which needs to be addressed. Poor and low knowledge on the pandemic precipitates anxiety which leads to a depressed population. In particular, females and the elderly were identified as vulnerable persons who should be prioritized in any community extension activities. The authors could not include the COVID-19 status of the respondents due to absence of clinical data at the time of the study (early COVID-19 period and no community testing was in place). We also did not have access to population data to access clinical mental status of study participants prior to the pandemic. Further studies to generate information on the impact of the pandemic in the general population could help guide policymakers draft community-practical policies which address mental health amongst the vulnerable communities of Uganda.

DATA AVAILABILITY STATEMENT

Data files can be accessed at https://figshare.com/s/88a0cf974d67f2654816.

ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Kampala International Ethical Review Board Kampala International University, Uganda. The patients/participants provided their written informed consent to participate in this study.

AUTHOR CONTRIBUTIONS

VA and IU conceptualized the study. IU, KK, FS, and SW designed the study. VA, IU, RS, AM, ETA, VN, JTA, and FS collected the data. VA, IU, and EOA conducted statistical analysis. VA, IU, KK, EOA, IJ, SH, EM, HN, and SW conducted data interpretation. VA, IU, and KK drafted the initial manuscript while EOA, IJ, AM, RS, GC, ST, OO, NM, AA, JOA, AMA, SO, FS, ETA, JTA, VN, HY, CO, SH, EM, HN, and SW reviewed it for intellectual content. All authors approved the final version for publication and remain in agreement to ensure that questions related to the integrity of any part of the work are resolved.

FUNDING

This work was supported by Zhejiang University Education Foundation Emergency Research Fund (SW and KK); Global Challenges Research Fund and the University of Edinburgh.

ACKNOWLEDGMENTS

Authors are grateful to colleagues who offered positive criticism and are not on the paper.

SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2021.590458/full#supplementary-material

Supplementary Material 1 | The questionnaire.

REFERENCES

1. World Health Organization. *World Health Organization Report on 7 April, 2020. Covid19 Cases Top 10,000 in Africa. WHO/2020 Report in Brazzaville/Cairo*. (2020). Available online at: https://www.afro.whoint.news (accessed April 12, 2020).
2. Obulutsa G. *Angola, Eritrea, Uganda Confirm First Cases as Coronavirus Spreads in Africa*. (2020). Available online at: https://www.reuters.com/article/us-health-coronavirus-africa-idUSKBN2180P4 (accessed March 22, 2020).
3. Ministry of Health-Uganda. *Uganda Confirms 1st Case of COVID-19*. Ministry of Health Uganda. (2020). Available online at: https://www.health.go.ug/covid/2020/03/23/uganda-confirms-1st-case-of-covid-19-saturday-21-march-2020/ (accessed March 22, 2020).
4. Javira S. *Full Speech: Uganda Bans Travellers From COVID-19Hit Countrises*. PML Daily. (2020). Available online at: https://www.pmldaily.com/features/tours-travel/2020/03/full-speech-uganda-bans-travellers-from-Covid-19-hit-countries.html (accessed May 10, 2020).

5. Lee J. *Mental Health Effects of School Closures During COVID-19*. (2020). Available online at: https://www.thelancet.com/journals/lanchi/article/PIIS2352-4642%2820%2930109-7/fulltext (accessed April 20, 2020).
6. Bao Y, Sun Y, Meng S, Shi J, Lu L. 2019-nCoV epidemic: address mental health care to empower society. *Lancet.* (2020) 22:e37–8. doi: 10.1016/S0140-6736(20)30309-3
7. Dong L, Bouey J. Public mental health crisis during COVID-19pandemic, China. *Emerg Infect Dis.* (2020) 23. doi: 10.3201/eid2607.202407
8. Zandifar A, Badrfam R. Iranian mental health during the COVID-19 epidemic. *Asian J Psychiatr.* (2020) 51:101990. doi: 10.1016/j.ajp.2020.101990
9. Asmundson GJG, Taylor S. How health anxiety influences responses to viral outbreaks like COVID-19: what all decision-makers, health authorities, and health care professionals need to know. *J Anxiety Disord.* (2020) 71:102211. doi: 10.1016/j.janxdis.2020.102211
10. Asmundson GJG, Taylor S. Coronaphobia: fear and the 2019-nCoV outbreak. *J Anxiety Disord.* (2020) 70. doi: 10.1016/j.janxdis.2020.102196
11. Xiao H, Zhang Y, Kong D, Li S, Yang N. Social capital and sleep quality in individuals who self-isolated for 14 days during the coronavirus disease 2019 (COVID-19) outbreak in January 2020 in China. *Med Sci Monit.* (2020) 26:e923921. doi: 10.12659/MSM.923921
12. Mitsuishi F, Ries J. *COVID-19 Can Have Serious Effects on People with Mental Health Disorders*. (2020). Available online at: https://www.healthline.com/health-news/Covid-19-serious-effects-people-with-mental-health-disorders (accessed April 20, 2020).
13. International Federation of Red Cross and Red Crescent Societies. *Mental Health and Psychosocial Support for Staff Volunteers and Communities in an Outbreak of Novel Coronavirus*. Hong Kong: IFRC (2020).
14. Inter-Agency Standing Committee. *Interim Briefing Note Addressing Mental Health and Psychosocial Aspects of COVID-19 Outbreak*. IASC. (2020). Available online at: https://interagencystandingcommittee.org/system/files/2021-03/IASC%20Interim%20Briefing%20Note%20on%20COVID-19%20Outbreak%20Readiness%20and%20Response%20Operations%20-%20MHPSS.pdf (accessed March 20, 2020).
15. Sykes J, Križ K, Edin K, Halpern-Meekin S. Dignity and dreams: what the earned income tax credit (EITC) means to low-income families. *Am Sociol Rev.* (2015) 80:243–67. doi: 10.1177/0003122414551552
16. Chowa G, Masa R, Ansong D. Determinants of saving among low-income individuals in rural uganda: evidence from assets Africa. *Adv Appl Sociol.* (2012) 2:280–91. doi: 10.4236/aasoci.2012.24037
17. Bystritsky A, Kerwin L, Feusner JD. A pilot study of Rhodiola rosea (Rhodax®) for generalized anxiety disorder (GAD). *J Alternat Complement Med.* (2008) 14:175–80. doi: 10.1089/acm.2007.7117
18. Trotter SE. Review of the state-trait anger expression inventory. In: BS Plake, JC Impara, editors, *The Fourteenth Mental Measurements Yearbook*. Lincoln, NE: Buros Institute of Mental Measurements (2001). p. 1183–4.
19. Steer RA, Rissmiller DJ, Beck AT. Use of the beck depression inventory with depressed geriatric patients. *Behav Res Ther.* (2000) 38:311–8. doi: 10.1016/S0005-7967(99)00068-6
20. Mason V, Andrews H, Upton D. The psychological impact of exposure to floods. *Psychol Health Med.* (2010) 15:61–73. doi: 10.1080/13548500903483478
21. Aciemo R, Ruggieri KJ, Galea S, Resnick HS, Koenen K, Roitzsch J, et al. Psychological sequalae resulting from the 2004 Florida Hurricanes: implications for post disaster intervention. *Am J Public Health.* (2007) 97:S103–8. doi: 10.2105/AJPH.2006.087007
22. Norris FH. Range magnitude and duration of the effects of disasters on mental health: review update. *Res Educ Disaster Ment Health.* (2005) 1–23. Available online at: https://medipe2.psu.ac.th/$\sim$disaster/disasterlast/FranNorris_Tsunami.pdf
23. Olum R, Chekwech G, Wekha G, Nassozi DR, Bongomin F. Coronavirus disease-2019: knowledge, attitude, and practices of health care workers at makerere university teaching hospitals, Uganda. *Front Public Health.* (2020) 8:181. doi: 10.3389/fpubh.2020.00181
24. Usman IM, Ssempijja F, Ssebuufu R, Lemuel AM, Archibong VB, Ayikobua ET, et al. Community drivers affecting adherence to WHO guidelines against COVID-19 amongst rural Ugandan Market Vendors. *Front Public Health.* (2020) 2020:340. doi: 10.3389/fpubh.2020.00340
25. Kasozi KI, MacLeod E, Ssempijja F, Mahero MW, Matama K, Musoke GH, et al. Misconceptions on COVID-19 risk among ugandan men: results from a rapid exploratory survey, April 2020. *Front Public Health.* (2020) 8:416. doi: 10.3389/fpubh.2020.00416
26. Beane ML, Cole MA, Spencer RL, Rudy JW. Neonatal handling enhances contextual fear conditioning and alter corticosterone stress responses in young rats. *HormBehav.* (2002) 41:33–40. doi: 10.1006/hbeh.2001.1725
27. Premier Health. *Your Gender May Be Causing Your Worries*. (2017). Available online at: https://www.premierhealth.com/your-health/articles/women-wisdom-wellness-/your-gender-may-be-causing-your-worries (accessed July 7, 2020).
28. McHenry J, Carrier N, Hull E, Kabbaj M. Gender differences in anxiety and depression: role of testosterone. *Front Neuroendocrinol.* (2014) 35:42–57. doi: 10.1016/j.yfrne.2013.09.001
29. Lebron-Milad K, Milad MR. Sex differences, gonadal hormones and the fear extinction network: implications for anxiety disorders. *Biol Mood Anxiety Disord.* (2012) 2012:2. doi: 10.1186/2045-5380-2-3
30. Segalas C, Alonso P, Labad J, Real E, Pertusa A, Jaurrieta N, et al. A case-control study of sex differences in strategic processing and episodic memory in obsessive-compulsive disorders. *Comprehens Psychiatry.* (2010) 51:303–11. doi: 10.1016/j.comppsych.2009.05.008
31. Lochner C, Hemmings SMJ, Kinnear CJ, Moolman-Smook JC, Corfield VA, Knowles JA, et al. Gender in obsessive-compulsive disorder clinical and genetic findings. *Eur Neuropsychopharmacol.* (2004) 14:105–13. doi: 10.1016/S0924-977X(03)00063-4
32. Altemus M. Sex differences in depression and anxiety disorders: potential biological determinants. *Hormon Behav.* (2006) 50:534–8. doi: 10.1016/j.yhbeh.2006.06.031
33. Kerr MA, Schneider BH. Anger expression in children and adolescents: a review of the empirical literature. *Clin Psychol Rev.* (2008) 28:559–77. doi: 10.1016/j.cpr.2007.08.001
34. Deater-Deckard K, Wang Z. Anger and irritability. In: M Zentner, RL Shiner, editors, *Handbook of Temperament*. New York, NY: Guilford Press (2012). p. 124–44. doi: 10.1093/obo/9780199828340-0016
35. Stoddard J, Stringaris A, Brotman MA, Montville D, Pine DS, Leibenluft E. Irritability in child and adolescent anxiety disorders. *Depress Anxiety.* (2014) 31:566–73. doi: 10.1002/da.22151
36. Hawkins KA, Cougle JR. Anger problems across the anxiety disorders: findings from a population-based study. *Depress Anxiety.* (2011) 28:145–52. doi: 10.1002/da.20764
37. Fracalanza K, Koerner N, Deschênes SS, Dugas MJ. Intolerance of uncertainty mediates the relation between generalized anxiety disorder symptoms and anger. *Cogn Behav Ther.* (2014) 43:122–32. doi: 10.1080/16506073.2014.888754
38. Beesdo K, Knappe S, Pine DS. Anxiety and anxiety disorders in children and adolescents: developmental issues and implications for DSM-V. *Psychiatr Clin North Am.* (2009) 32:483–524. doi: 10.1016/j.psc.2009.06.002
39. Kessler RC, Wang PS. The descriptive epidemiology of commonly occurring mental disorders in the United States. *Annu Rev Public Health.* (2008) 29:115–29. doi: 10.1146/annurev.publhealth.29.020907.090847
40. Ohayon MM, Schatzberg AF. Social phobia and depression: prevalence and comorbidity. *J Psychosom Res.* (2010) 68:235–43. doi: 10.1016/j.jpsychores.2009.07.018
41. Geiger AW, Leslie D. *A Growing Number of American Teenagers – Particularly Girls – Are Facing Depression*. (2019). Available online at: https://www.pewresearch.org/fact-tank/2019/07/12/a-growing-number-of-american-teenagers-particularly-girls-are-facing-depression/ (accessed July 8, 2020).
42. Wang C, Pan R, Wan X, Tan Y, Xu L, Ho CS, et al. Immediate psychological responses and associated factors during the initial stage of the 2019 coronavirus disease (COVID-19) epidemic among the general population in China. *Int J Environ Res Public Health.* (2020) 17:E1729. doi: 10.3390/ijerph17051729
43. Li Q, Guan X, Wu P, Wang X, Zhou L, Tong Y, et al. Early transmission dynamics in Wuhan, China, of novel coronavirus-infected pneumonia. *N Engl J Med.* (2020) 382:1199–207. doi: 10.1056/NEJMoa2001316
44. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders*. 5th ed. Washington, DC: American Psychiatric Association (2013). doi: 10.1176/appi.books.9780890425596

45. Substance Abuse and Mental Health Services Administration. *Key substance use and mental health indicators in the United States: results from the 2017 National Survey on Drug Use and Health (HHS Publication No. SMA 18-5068, NSDUH Series H-53)*. Rockville, MD: Center for Behavioral Health Statistics and Quality, SAMHSA (2018). Available online at: https://www.samhsa.gov/data/sites/default/files/cbhsq-reports/NSDUHFFR2017/NSDUHFFR2017.htm
46. Deschênes SS, Dugas MJ, Fracalanza K, Koerner N. The role of anger in generalized anxiety disorder. *Cogn Behav Ther*. (2012) 41:261–71. doi: 10.1080/16506073.2012.666564
47. Walsh LM, Wolk CB, Becker Haimes EM, Jensen-Doss A, Beidas RS. The relationship between anger and anxiety symptoms in youth with anxiety disorder. *J Child AdolescCouns*. (2018) 4:117–33. doi: 10.1080/23727810.2017.1381930
48. Papaioannou A, Gerozissis K, Prokopiou A, Solaris S, Stylianopoulou F. Sex differences in the effects of neonatal handling on the animal's response to stress and the vulnerability for depressive behaviour. *Behav Brain Res*. (2002) 129:131–9. doi: 10.1016/S0166-4328(01)00334-5
49. Simon-Morton B, Chen R, Abram SK, Haynie DC. Latent growth curve analysis of peers and parents influence on smoking progression among early adolescent healthy. *Psychology*. (2014) 23:612–21. doi: 10.1037/0278-6133.23.6.612
50. Timothy J, Rachell N. *What Is the Link Between Depression and Anger?* (2020). Available online at: https://www.medicalnewstoday.com/articles/327408 (accessed July 7, 2020).

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's Note: All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

frontiers in Psychiatry

COMMUNITY CASE STUDY
published: 27 January 2022
doi: 10.3389/fpsyt.2021.589526

Rwanda's Resiliency During the Coronavirus Disease Pandemic

Elizabeth Farrah Louis[1,2]*, *Dominique Eugene*[1,3], *Willy Chrysostome Ingabire*[4], *Sandra Isano*[4] *and Judite Blanc*[5]

[1] Fogarty International Center, Harvard University, Boston, MA, United States, [2] Department of Psychiatry, Boston Medical Center, Boston University School of Medicine, Boston, MA, United States, [3] Institute for Social Innovation Fellow, Fielding Graduate University, Santa Barbara, CA, United States, [4] University of Global Health Equity, Kigali, Rwanda, [5] Department of Psychiatry & Behavioral Sciences, Center of Translational Sleep and Circadian Sciences (TSCS), University of Miami Miller School of Medicine, Miami, FL, United States

The coronavirus disease (COVID-19) pandemic has illustrated the wide range of preventative measures and responsive strategies of low- and middle-income countries (LMICs). LMICs have implemented lessons learned from previous periods of epidemics and uncertainties. Rwanda's pre-existing decentralized healthcare and mental health system which are in response to the mental health distress from the 1994 genocide, continues to be a formidable system that collaborate and combine efforts to address people's mental health needs. COVID-19 has heightened or exacerbated people's mental health within the country. Rwandans have been exposed to and endured adversities, yet their cultural forms of resilience serve as a mental health protective factor to also overcome COVID-19. Nonetheless, Rwanda has engaged in interventions targeting public safety, social and economic protection that specifically address vulnerable communitie's mental health needs. Lessons from preparedness for the Ebola virus disease (EVD) epidemic has contributed to Rwanda's organization and approach to combating COVID-19. Policies and best practices that were enacted during the EVD outbreak have guided Rwanda's response within the healthcare and mental health system. Coincidentally, this outbreak emerged during the 26th commemoration of the 1994 genocide against the Tutsi. Although for the first-time post genocide, Rwanda was not able to engage in public traditional forms of collective mourning and community healing, evidence of Rwandan's resilient spirit is demonstrated. Community resilience has been defined by Magis [401] as the "existence, development and engagement of community resources by community members to thrive in an environment characterized by change, uncertainty, unpredictability and surprise.". Referring to this definition, community resilience has been an interwoven into the cultural framework that guided Rwandans in past challenges and continues to be evident now. Rwanda's resilience throughout this pandemic remains through ongoing psychoeducation, community awareness of mental health concerns, collective messages of highlighting mental health support, and solidarity. The global community can gain knowledge from Rwanda's learned lessons of their past which has positioned itself to stand on its resilient values in times of uncertainty such as COVID-19 and endeavor to overcome through national cohesion.

Keywords: Rwanda, resilience, COVID-19, mental health, public health system

OPEN ACCESS

Edited by:
Manasi Kumar,
University of Nairobi, Kenya

Reviewed by:
Jose Gallucci-Neto,
University of São Paulo, Brazil
Nina Thomas,
New York University, United States

***Correspondence:**
Elizabeth Farrah Louis
eflouis2011@gmail.com

Specialty section:
This article was submitted to Public Mental Health, a section of the journal Frontiers in Psychiatry

Received: *30 July 2020*
Accepted: *21 December 2021*
Published: *27 January 2022*

Citation:
Louis EF, Eugene D, Ingabire WC, Isano S and Blanc J (2022) Rwanda's Resiliency During the Coronavirus Disease Pandemic. Front. Psychiatry 12:589526. doi: 10.3389/fpsyt.2021.589526

BACKGROUND OF RWANDA

Known as the "land of a thousand hills," Rwanda is a low-income mountainous country located in East Central Africa. It is surrounded by the Democratic Republic of Congo, Tanzania, Burundi, and Uganda. Rwanda's population is estimated at approximately 12,374,397 people (1). Thomson (2) notes that tourists find modern Rwanda to be an attractive, peaceful travel destination. Nevertheless, modern day Rwanda was not always the ideal place to visit. Prior to 1994, nearly half a million Rwandans (particularly the Tutsi group and some Hutus) were decimated. In the late 1980's, Rwanda's health quality and longevity had the lowest life expectancy amongst all countries (3). By mid-1990's, the genocide contributed to the increase of infectious disease and unsafe births (3). As the country attempted to rebuild its health infrastructure in the 2000's, the country became plagued with human immunodeficiency virus (HIV) and acquired immunodeficiency syndrome (AIDS) (3). Thus, in this article, we attempt to dissect the historical and psychosocial manufacture behind Rwanda's spectacular transformation in 25 years, and how lessons learned from past disasters and health crises are leveraged during this current coronavirus disease 2019 (COVID-19) pandemic period. We posit that there are some cultural values specific to the Rwandan people that serve as anchors for such transformation, that we perceive as the Rwandan resilience.

PUBLIC HEALTH SYSTEM AND MENTAL HEALTH INTEGRATION

The history of Rwanda's psychiatric system can be divided in four major periods: 1.) The pre-colonial period, when the only mental healthcare available was based on traditional practices. 2) The colonial period, marked by the inputs of Western medicine 3) The post-independence period, that started from 1962, characterized by the construction of the first psychiatric hospital of the country; Neuro-Psychiatric Hospital Caraes Ndera, and the fourth stage which is the post-genocide period, which begun following the 1994 events (4).

During the pre-colonial period, traditional practices were the earliest forms of treatment for mental health. Traditional practices were a form of healing that originated from early Rwandan culture to address the "ancestral spirit of a deceased family member who was unhappy or angry" (5). Mental health treatment involved a diviner or traditional healer who intervened to address the unhappy or angry spirit which could be an ancestor from family lineage (5). Within the Rwandan context, there are different treatment options such as the "ritual of Kubandwa and Guterekera, which paid homage to certain spirits" (p.4). For example, one of these rituals paid their respects to Ryangombe, a divinity, representing the source of love, peace, and fertility (6). These indigenous healing practices were widespread throughout Africa and efforts were made to realign broken ancestral harmony that caused mental illness (5). Moreover, protection was a common belief that centered around God and ancestral spirits to protect individuals and their families. This protection extended to physical and mental health, which Rwandans believed if compliance with the "ritual obligations to honor the perceived protector, or from the ill will of an enemy who is jealous or who wants revenge" then reconciliation between God/ancestral spirits (the protector) and the person experiencing mental health issues was necessary [(5), p. 4].

Unfortunately, during colonial rule, traditional practices to treat mental health were considered pagan and denounced by Western religions. Under Belgian colonization, starting in 1922, Western approaches of medical care entered Rwanda through missionaries. Since there were no mental health facilities available to treat Rwandans, they were sent to Bujumbura, Burundi for care (5). When Rwanda gained its independence in 1963, these psychiatric patients were sent back to Rwanda and were either welcomed by family or sent to the Central Prison of Kigali. Before the 1994 genocide, there was only one hospital for mental health disorders, Caraes Ndera Neuropsychiatric Hospital. The hospital was founded in 1968 by the "Brothers of Charity," which is a pontifical religious organization, in response to the government's request to receive mental health patients held in prisons across the country (7). As written by Brother Dr. Rene Stockman (8), the patients who were once chained like animals received proper care and treatment upon admission to Caraes Ndera, which improved their conditions (8).

The healthcare system was one of the sectors most affected by the 1994 genocide in Rwanda (9). Some health care providers were killed while others fled the country (9). During this period, infectious diseases such HIV and tuberculosis were on the rise; the life expectancy was the lowest in the world, and the country had no budget to respond immediately (9). The rate of post-traumatic stress disorder (PTSD) in the general population was 28, and 54% of those with PTSD suffered from major depression as a comorbidity (10).

Currently, the Ministry of Health (MOH) recognizes traditional medicine and is aware of the continuous practices of traditional forms of health alone or combined with modern medicine. MOH engages in ongoing efforts to involve indigenous practices in concert with the public health system (5). One of the government goals is to increase mental healthcare at the community level by the year 2024 (11).

The World Health Organization (WHO) defines integrated health services as "the management and delivery of health services so that clients receive a continuum of preventive and curative services, according to their needs over time and across different levels of the health system" (12). Dr. Brock Chisholm, who was the first Director-General of the WHO, said that "without mental health there could be no true physical health" (13). Today, evidence shows that patients with non-communicable diseases experience mental health problems and that having mental health problems increase the risks of developing non-communicable diseases such as heart disease as compared to normal population (13). The clear link between health and mental health is a fundamental concept when it comes to the integration of public health services to address overall wellness.

The Government of Rwanda's (GoR) 2018-2024 strategic plan for its health sector encompasses its decentralized healthcare

(14). At the national level, there is the MOH, Rwanda Biomedical Center (RBC), and the National referral and University teaching hospitals (NRH/UTH). The MOH sets policies that mobilize resources, and ensure capacity of the healthcare personnel while RBC ensures the implementation of the health policies in an innovative way (14). There are provincial and referral hospitals that provide treatment of complex cases such as advanced life and trauma support, emergencies, intensive care, and psychiatric services. The lower levels are district hospitals, health centers, health posts, and community health workers as the entry point. The health centers provide promotional, preventive, and curative care and supervise health posts. Health centers provide services including psychosocial support, normal deliveries, minor surgeries, lab testing, and outreach activities such as vaccinations. Health centers refer to the district hospitals (14). Health posts at the cell level provide services including health education, child immunization, antenatal care, family planning, outpatient services and refer to the health centers (14). Both health centers and health posts constitute the primary healthcare which is usually the first contact patients have to address their mental health needs.

Despite the constraints of resources in terms of trained staff, proper equipment, and infrastructure, the GoR's decision to integrate mental healthcare in the decentralized public healthcare system is evidence across all levels from health posts to hospital settings (11). For example, each district hospital has a mental health department with psychiatric nurses and a clinical psychologist who provide outpatient and inpatient care including diagnosis, treatment, and counseling services. The mental health departments refer complicated cases to Ndera, the only national referral hospital for neuropsychiatric services in the country. Some documented examples of the utility of this integrated model depict an interdisciplinary approach. According to MOH, in 2009, there were 83,633 people who consulted mental health facilities including hospitals and psychosocial consultation services while 5,518 people were hospitalized for mental health disorders (11).

RWANDA'S CULTURAL RESILIENCE

According to the former Rwandan Prime Minister, Dr. Pierre-Damien Habumuremyi (15), Rwandans are unique in the way they think, feel and act. It was these characteristics that were salient among Rwandans after the 1994 genocide. These Rwandan cultural values generate a community capable of adapting to disasters and finding common local solutions before resorting to outside support. Habumuremyi (15) describes four local cultural values that have contributed to Rwanda's achievements over the past two decades, namely: 1) a high level of patriotism and attachment to the homeland; 2) a permanent quest for success and self-sacrifice; 3) a high level of discipline and integrity and; 4) a sense of cooperation and mutual aid.

Habumuremyi (15) indicated that these four Rwandan cultural values have been leveraged by post-genocide leaders such as President Paul Kagame to involve the population in the process of socio-political and economic transformation of the country. These cultural values are representative during COVID-19 through the efforts of the government and the local people to support one another; it is evident in the promotion of resilient mental health and reliance on pre-existing mental health and healthcare resources while adapting to unprecedented circumstances (16). These virtues that originate from the Rwandan culture can be seen through concerted efforts of mobilization of the people to engage in their community development (e.g., umuganda), maintain solidarity, and embrace the spirit of volunteerism (e.g., CHWs) (15, 16). For example, umuganda is a dedicated monthly Saturday where Rwandans from all over the country come together to serve their communities by working on a project to resolve a community issue or bolster efforts to increase environmental sustainability. The maintenance of solidarity is depicted through ongoing community led initiatives to make collective decisions about ways to govern local and national entities and using their nationality to rally around coming together to play a role in combatting national concerns such as COVID-19. In terms of the spirit of volunteerism, community health workers have contributed as the voice of the people to connect Rwandans to health and mental health services all within a volunteer model.

The Rwandan spirit encompasses one in which they believe that their country "belongs to all Rwandans irrespective of their differences in identity and ideology" (15). This form of national unity and social equity is displayed during the pandemic and illustrates how this way of living manifests throughout government and community levels with critical consciousness and modifications of practices to serve vulnerable populations while accompanying others during this difficult time. Through learned lessons of the past, Rwanda has positioned itself to stand on its resilient values in times of uncertainty such as COVID-19 and overcome through national cohesion.

LESSONS LEARNED FROM EBOLA WHILE MANAGING COVID-19

Rwanda is no stranger to devastating events that have occurred in the country. Rwanda lived through an important period of uncertainty between 2012 and 2014 and from 2018 to present when the Ebola virus disease (EVD) threatened to spill over from the neighboring Democratic Republic of the Congo and Uganda. EVD is a rare but severe, often fatal disease that has human-to-human transmission, with an average fatality rate of 50% (17–20). The Ebola epidemic exposed the level of inadequacies that existed amongst institutions that were set up to protect the public such as human resource shortages and inadequate financing (18).

In the United States, Rwandans became the target of rampant discrimination which consisted of school officials banning students from attending classes; suspension of travels to and from the country; travel visas being denied; and imposing 21 days of quarantine despite the long distance of 1,700 miles between Rwanda and the affected regions (21). The EVD epidemic raised questions about the fragility of the global system's ability to respond to those types of outbreaks and how confidence needed to be rebuilt in order to prevent future crises (18, 21).

The Ebola crisis drew attention to the importance of reducing infectious diseases that pose threats across national borders, especially individual health security (17). Rwanda had to implement precautionary measures to prevent the emergence of this virus. They equipped EVD prone border areas with emergency holding rooms, installed hand washing stations, and utilized EVD camera detections (22) to bolster safety. The Rwandan government trained doctors to handle EVD cases, provided vaccinations in communities as well as ensured that healthcare workers were safe by having designated specialized ambulances for transporting patients (22). With these strategies in place, Rwanda demonstrated its readiness to respond to any type of outbreaks, including COVID-19.

Experts working for the WHO in Rwanda witnessed how the country was able to use its skills and expertise from tackling EVD to manage the COVID-19 outbreak (23). Techniques used in preventing EVD in 2018 have been found to be useful now with this pandemic (23). Designated COVID-19 centers and screening mechanisms have been set up around borders to limit the spread of COVID-19. Measures that were implemented from the Ebola epidemic resurfaced to raise COVID-19 awareness (e.g., communication through radio, television, community leaders, community health workers (CHWs), health facilities, and social media) (23). The Rwandan government expanded its COVID-19 surveillance and testing facilities, a testament of the country's success with reducing community transmission; while healthcare personnel have been active in tracing potential sources of transmission (23). Rwanda also utilized rapid screening and isolation of people who tested positive for COVID-19 with the "RT-PCR (reverse transcription polymerase chain reaction) tests which are accurate" [26, p. 1]. Mutesa et al. (24) developed "an algorithm for pooling subsamples based on geometry that, at low prevalence, uniquely identifies infected individuals in a small number of tests." By using their methods, the costs of mass testing are reduced while being able to quickly identify and quarantine individuals which in turn decrease the prevalence of COVID-19.

The MOH utilized pre-emptive measures during the Ebola crisis to respond to the coronavirus by quickly implementing contact tracing protocols (23). Rwandans and donors (e.g., C & D Pink Mange and the Jack Ma Foundation) from various companies mobilized to provide donations of over 25,000 test kits, 100,000 masks, 1,000 medical protective suits and face shields during the early stage of the pandemic (22). Rwanda has the capacity to test over 200 cases in approximately 4 hours for suspected cases to know their results (25). To date, Rwanda has the capacity to conduct a little over 5,534 tests a day and have tested over 255,959 people as of July 30, 2020 (16). Rwanda turned to digitized contact tracing by "using mobile phone data profiles to trace people who had contact with COVID-19 patients," which has been effective (22). There are designated facilities where COVID-19 cases go to receive services with follow-up by emergency workers, often through home visits (16). Additionally, the Butaro Cancer Center for Excellence, provides additional support for patients who need cancer treatment by providing transportation to areas around the country (23). Healthcare providers work with CHWs to identify community members with health and mental health needs and share messages of COVID-19 (16).

In 2013, Rwanda pioneered the deployment of disease-specific funding to build its primary health care system, and it has maximized synergies between U.S. President's Emergency Plan for AIDS Relief (PEPFAR) and other bilateral, multilateral, and country health initiatives (3). Since then, Rwanda has improved the country's health services. Rwanda has come a long way in its ability to effectively care for its citizens.

THE IMPACT OF COVID-19 AND RWANDA'S RESPONSE

The novel coronavirus outbreak was first declared a pandemic on March 11, 2020, by the World Health Organization. In Rwanda, the first case of COVID-19 was declared by the MOH on March 14, 2020. Similarly, to many other countries, the GoR took robust mitigation strategies that initially included the country-wide lockdown, which was later substituted by wearing of masks outside and a 9 pm to 5 am curfew (26). From the Gelfand et al. (27), the strict measures that Rwanda took can be characterized as a country of "cultural tightness," a theory which refers to the level of "strict norms and punishments for deviance" (p. 2). Rwanda's efforts in combating COVID-19 included police patrol of neighborhoods after curfew and giving fines, reprimanding people who did not follow COVID-19 rules such as wearing a mask and having them stay in a stadium for further questioning and punishment. From Gelfand et al. (27), study, nations with higher levels of cultural tightness had lesser COVID-19 cases and deaths due to these nations prompt and proactive response to this pandemic and contributed to collective cooperation as an advantage to higher survival rates during a "collective threat" (p. 2). Globally, the COVID-19 pandemic has been far more than a health crisis: it has negatively impacted societies and economies in many spheres. In Rwanda, COVID-19 has caused many disruptions related to socio-economic factors including but not limited to unemployment, limited physical contact with family members, isolation of contacts and cases of COVID-19, social distancing, non-participation in care of sick loved ones, non-participation in the burial of loved ones who die, loss of productive livelihood, and stigma and discrimination of survivors (12).

There were many social aspects that were affected by the pandemic as people tried to adhere to policies to remain safe. Yet, people found it difficult, especially those from low-income settings who had limited access to personal protective gear and faced compounded challenges. For example, people lost their jobs and had reduced work hours. Due to the demand for goods and services, prices increased, there was a scarcity of familiar items, and people had to contend with the restrictions of movement (16). For others, the elimination of public transportation further created a strain on vulnerable populations. To address some of these challenges, the GoR, applied alternatives such as providing medical officials the ability to transfer patients to health facilities in different provinces (16). Also, a social support plan was developed to alleviate food insecurity in which food

was delivered to some poor households in cities and rural areas (19). The Rwandan government's reliance on emergency food shortage reserves and loans from the World Bank and local Rwandan's collaboration in donating food while farmers continued to prepare for the agricultural season demonstrated the commitment to serve those in need and the country.

COVID-19 imposed a lockdown, which in turn imposed new ways of living. Most people shared a feeling of uncertainty about the future, as a result some people responded with fear and anxiety (26). Through different technological means of communication such as cell phones, radio and television, and social media platforms, people have adopted the coping strategies most applicable to them including talking to their relatives and friends, praying or attending their online church services (26). During the COVID-19 pandemic, through its national health implementation agency, RBC, and in collaboration with mental health patients, community health workers, healthcare providers, and partner organizations put in place guidelines to ensure continuous provision of mental healthcare at all levels including at the community and health facility levels (26). There are guidelines for specific groups including education for the general public; debriefing meetings for healthcare providers; recommendations on how to validate and support children and adolescents; support, inform, and prepare for elderly people; and engage, prevent, and address the barriers for people with disabilities; psychoeducation and mental health resources (26). Rwanda's response to the needs of its people intersected across existing multilateral systems with the involvement of stakeholders to alleviate the impact of this pandemic.

COVID-19 COINCIDE WITH THE 26TH COMMEMORATION

Rwanda's integrated mental and healthcare system was tested not only by COVID-19 but also by the 26th commemoration of the 1994 genocide against the Tutsi group. Historically, three ethnic groups: Twa, Tutsi, and Hutu comprised Rwanda's culture with a shared language. The Twa, who are the minorities, had no political voice in creating the country's infrastructure. During April 1994, Rwanda experienced genocide in which approximately one million people from the Tutsi ethnic and moderate Hutu were killed; 250,000 women were raped; and millions of Rwandans were displaced, or fled to other East African countries including Uganda, Congo, Kenya, and Tanzania (28). Studies conducted in the years following the genocide demonstrated that genocide survivors suffered from high rates of PTSD from witnessing violence and the killings of people with a machete (11, 29). In a study in 2012, it found that more than 26.1% Rwandan adults were diagnosed with PTSD and the majority of them had comorbid psychiatric disorders such as major depression (68.4%), substance dependence (7.6%), or somatic symptoms such as back pain (74.1%), and headache (71.2%)" (10). It is also important to note that epilepsy has been reported to increase as a consequence of the genocide, representing about 4.9% of the Rwandan population which further creates stigma (30).

The prevalence of PTSD, depression, trauma, and anxiety remains for both genocide survivors and perpetrators, with recurrent flare ups during the yearly genocide commemoration period. The commemoration is usually a seven-day period in April during which Rwandans gather to mourn the victims of the genocide. During this commemoration period, people living with chronic PTSD experience acute PTSD exacerbations characterized by flashbacks, agitation, self-mutilation, and anger, among other symptoms (29). Addiiotnally, substance abuse has increased in the aftermath of the genocide, widows and orphans are left to endure poverty and have limited access to education, while women were also victims of sexual violence (5). However, the country's choice to stay together, to be one Rwanda, was a difficult choice that was felt by Rwandans and its leadership. Through pain and sacrifice, the government asked its people to be resilient in their collective journey of living beyond survival (31). From this tragedy, many initiatives spearheaded by the government and the people garnered spaces for Rwandans to heal, share their stories of survival, and imprint the spirit of resiliency and hope (32). Post genocide research have "characterized three culturally specific Rwandan concepts that related to resilience: kwihangana, an intrapsychic creative process of drawing strength from within the self in order to withstand suffering; kwongera kubaho, affirmation of the reestablishment of the existential conditions for being; and gukomeza ubuzima, the moving forward in life by accepting ongoing struggles and fighting for survival" [33, p. 413; 34]. These cultural forms of resilience are embedded in Rwandans and have fostered reconciliation and restorative justice (33). Kwihangana stands for someone to be patient and strong while her or she endure challenges and know that his or her suffering will not last forever. This was a salient resilient process that post-genocide survivors held onto and continue to use to guide them with current and future challenges. Kwongera kubaho refers to the individual and community process that embedded in cultural affirmation and reestablishing community and relational conditions of healing, forgiveness and trust post-genocide to recenter and value the Rwandans as individuals and as a people. As or gukomeza ubuzima, this particular attitude provides a framing of life that guides Rwandans to continue to move forward despite the ongoing circumstances and hardships that one may face in order to survive.

In Rwanda, as the outbreak of COVID-19 coincided with the annual commemoration, Rwandans were forced to pay their respects in their homes and cope with their trauma and reminders of the genocide. There were no night vigils, village level discussions, and the annual Walk to Remember that have traditionally marked Rwanda's genocide commemorations (32). Genocide commemoration related talks were streamed on local media channels and social media. There were also special messages related to commemoration by some key personalities on TV, radios, and other media outlets. Special government notices were shared throughout healthcare systems and with mental health professionals to be vigilant of the mental health needs of the population during this sensitive and challenging period. During this period, kwihangana, kwongera kubaho, and gukomeza ubuzima will continue to be cultural

anchors of resilience as Rwandans come together to overcome another adversity.

MENTAL HEALTH DISTRESS AND RESPONSE

Consequently, the lockdown has tested people's mental health coping strategies with being alone or with family members who also have their own forms of distress (34). Whether through social media platforms, to conversations with family and friends, and the concerns of healthcare workers, people are anxious, stressed, fearful, and uncertain about their future (26). Concerns related to financial support, maintaining social connections, the risk of turning to substance use to cope remains salient risk factors have also been present during this time (26). Some have turned to religion/spirituality to cope either through prayer or listening to sermons (35). With being restricted to the confines of one's home, there has been a rise of domestic violence and family conflict during this pandemic. For example, in some cases child support has ceased because jobs have been halted or men are no longer helping teen mothers and children financially (36). Couples who were on the verge of finalizing their divorce have had to stay with each other while teen mothers have had to stay in the same home of men who abused them or impregnated them (36). This creates conflict and further puts these women and children at risk for additional physical, emotional, and verbal abuse. The Rwanda Investigation Bureau and local authorities have received hundreds of calls a day around concerns of gender-based violence and interpersonal conflict during the lockdown period of this pandemic (36). Women and children in abusive situations are further at risk when the context of poverty and substance abuse is present in the home which can increase perpetrator's aggressive behaviors (26). Efforts to use local authorities to monitor cases and use digital services have been implemented along with raising awareness through media outlets (19).

During this pandemic, as mental health professionals, we have been working with various colleagues to create a hotline dedicated to mental health concerns (34). From our perspectives, patients with mental health disorders, healthcare providers, organizations, and CHWs have been working together diligently to make sure there are limited interruptions in psychiatric support for patients. The national healthcare insurance, Mutelle remains operable and its continuation during this challenging time ensured Rwandans had access to mental health services. Dr. Louis contributed to the mental health guidelines of MOH to demonstrate the importance of validating people's emotions and experiences while offering strategies to cope with COVID-19 (26, 34). Through our experiences in this setting, we have witnessed our family members, friends, and colleagues engage in regular check-ins by phone as a means of bolstering morale.

According to Zraly et al. (33) "human resilience, the capacity to function or adapt during or following exposure to adversity, can function to protect mental health among violence-affected populations (p. 411). Rwandans have been exposed to and endured adversities, their cultural forms of resilience serve as a mental health protective factor to also overcome COVID-19. Additional forms of mental health support include patient access to discounted psychotropic medications, general and psychiatric nurses are trained to administer psychiatric medications, at each healthcare facility there is at least one mental health professional, and patients can engage in individual and group therapy. Contextual factors such as socio-economic status are taken into consideration (community-based health insurance known as "Mitiweri" Mutuelle de sante, whereby people pay for enrollment according to their social category; most poor being covered by the government); for more severe patient cases psychiatric inpatient care is available, and mental health professionals and CHWs collaborate to assist community members manage their mental distress (16).

While these are great initiatives, some challenges that still remain include stock out of psychiatric medications such as valproic acid for seizures and haloperidol for schizophrenia, reliance on CHWs to identify community members who need support, limited resources to address socio-economic issues, stigma of having a mental illness, limited mental health providers to address patient's needs in rural areas, high turnover of general and mental health nurses who make up a large portion of the health system, and limited resources to provide mental healthcare to children and persons with disabilities (16).

Recommendations of mental health strategies such as exercise, relaxation techniques, limiting intake of news on COVID-19, and speaking to a mental health provider appears to be helpful for some Rwandans (26). The reality for other Rwandans is that this unfortunate time causes additional stress, making it difficult for them to implement the aforementioned. In order to address these various levels of distress and reduce maladaptive coping, continued affirmation and validation of people's feelings, self-compassion, empathy, reinforcing resilient values, and normalizing experiences during this unprecedented time is vital to overcome this pandemic (34). The incorporation of cultural and community oriented mechanisms such as religion and spirituality and attending services, community meetings led by elders, youth led involvement in healing practices and conflict resolution, and umuganda (day of service) that already exist to address positive mental health is also needed especially since during the period of the pandemic, there can be some anxiety and fears of accessing care within a medical system. Rwandans are currently using their past experiences of coping with adversities to deal with the changes of normality due to COVID-19. The resilient principles of the Rwandan people can and will continue to provide them with guidance on how to overcome and rely on each other.

COMMUNITY RESILIENCE WITHIN THE RWANDAN CONTEXT

When it comes to the definition of community resilience, experts in disaster preparedness and response argued that a required paradigm shift and a new national culture of disaster resilience needs to occur. However, Patel et al. (37)'s review on the community resilience definition found no consensus on what such a culture would look like within our communities. Rather

they noted that there is a wide range of components that have been proposed within the general notion of community resilience that are worthwhile to explore in the Rwandan context, namely they are: Local knowledge: factual knowledge acquired by the community as it relates to a disaster; community networks and relationships: community connectedness and cohesion; health: The pre-existing physical and mental health of a community and "delivery of health services after a disaster;" resources: tangible and intangible resources that are available and fairly distributed in the community; economic investment: post-disaster direct and indirect economic costs, assessment of community needs and potential for economic growth; preparedness: the active involvement at the individual, family, community and government levels to engage in planning, risk management and preparedness initiatives; mental outlook: meaning making, attitudes, feelings, and points of views after a disaster that affect a community's outlook through "hope, adaptability, "and "acceptance of uncertainty and change" (p. 15).

For instance, through government and community-based approaches, factual knowledge, collective efficacy was emphasized to ensure that Rwandans had access to correct information and fostered the importance of discipline and integrity to combat COVID-19. Additionally, appropriate hand washing and other preventative mechanisms were provided through different outlets to promote education, empower Rwandans to care for their health and others, and the government in collaboration with national and international organizations collaborated with staff to train them on appropriate procedures during this pandemic. The use of many languages such as Kinyarwanda, French and English is useful in combination with the component of local knowledge and culture are also examples of community resilience in order to reduce negative outcomes and help the community understand its risks. While effective communication, including risk or crisis communication, have been found to be crucial tools for a community in addressing disaster outcomes.

Similarly, the positive impact of connectedness and cohesion within the element of community networks and relationships which aligns with Rwanda's patriotism and attachment to the homeland are believed to help people cope with uncertainty after a disaster. The decentralized health system that encompasses mental health services is undoubtedly important for communities to recover from disasters such as COVID-19. Understanding and addressing health and mental health vulnerabilities can build resilience before a disaster and mitigate long-term issues after a disaster which is evidenced throughout Rwanda's precolonial, colonial, post-independence and post-genocide periods. Moreover, within the framework of governance and leadership, ensuring the engagement of front-line leadership during crises such as Ebola and COVID-19 are clear at the local level and also represents community resilience.

An equitable distribution of resources is essential in the short term. From tangible supplies, such as food, psychosocial support, distribution of masks, the use of drones to deliver medicine to underserved communities, and providing free ongoing COVID-19 testing to the population are valuable resources that are associated with stronger resilience factors. Assessing a community's current economy and developing its ability to sustain economic growth were also noted as important areas of concentration after a disaster. The importance of preparedness across a number of levels, including the individual, family and government have often been acknowledged.

Last but not least, mental outlook which is different from mental health refers to attitudes, feelings and views when facing the uncertainty that usually occurs in the aftermath of a disaster. Thus, mental outlook is considered as the greatest resilience-promoting factor within a community through a focus on sub-components such as hope and adaptability. The mental outlook of a community is consequently determinant in the preparedness of affected individuals to continue on in the face of uncertainty (37). The mental health outlook for Rwandans as with previous periods of trauma, uncertainty and disasters have been to engage in collective cooperation and mutual aid, knowing that the journey for better days and success is achieved through unity and self-sacrifice with the hope of a better tomorrow for all Rwandans.

CONCLUSION

Rwanda has continuously demonstrated its cultural forms of resilience to address periods of uncertainty that are interwoven by values that guide its beliefs and actions. COVID-19 is not an exception to this country's management of its preventative and responsive measures that have been applied in previous health emergencies such as Ebola. The decentralized healthcare system with the incorporation of a community based mental health approach provides essential services that further support Rwandans during a pandemic and through another commemoration that elicited mental health distress. Community resilience thrives in Rwanda and its principles are embedded at all levels and enrich the lives of its citizens to overcome challenges that are present and will arise in the future. This LMIC can teach the world about its evolving journey for progress, sustained collective unity, mental health priority, culturally informed resources, and community-oriented mechanisms that all contribute to Rwandan resilience.

DATA AVAILABILITY STATEMENT

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author/s.

AUTHOR CONTRIBUTIONS

EL, DE, WI, SI, and JB provided their contributions throughout this article and are in agreement to be accountable for the content of the work. All authors contributed to the article and approved the submitted version.

FUNDING

EL and DE are supported by the Fogarty International Center and National Institute of Mental Health (No. D43TW010543). JB's work is funded by a grant from the National Heart, Lung, and Blood Institute and National Institutes of Health (Nos. T32HL129953 and 7R01HL142066-04). The content is solely the responsibility of the authors and does not necessarily represent the official views of the National Institutes of Health.

REFERENCES

1. National Institute of Statistics of Rwanda. *Population Size And Population Characteristics*. (2019). Available online at: https://www.statistics.gov.rw/statistical-publications/subject/population-size-and-population-characteristics (accessed July 7, 2020).
2. Thomson S. *Rwanda: From Genocide to Precarious Peace*. New Haven, CT: Yale University Press (2018).
3. Binagwaho A, Kyamanywa P, Farmer PE, Nuthulaganti T, Umubyeyi B, Nyemazi JP, et al. The human resources for health program in Rwanda—a new partnership. *N Eng J Med.* (2013) 369:2054–9. doi: 10.1056/NEJMsr1302176
4. Eytan A, Ngirababyeyi A, Nkubili C, Nkubamugisha P. Forensic psychiatry *in* Rwanda. *Glob Health Action.* (2018) 11:1. doi: 10.1080/16549716.2018.1509933
5. Mukamana D, Lopez Levers L, Johns K, Gishoma D, Kayiteshonga Y, Ait Mohand A. A community-based mental health intervention: promoting mental health services in rwanda. *Innov Glob Ment Health*. (2019) 1–17. doi: 10.1007/978-3-319-70134-9_36-1
6. Gatarayiha F, Baro F, Wagenfeld MO, Stockman R. The development of mental health services in sub-Saharan Africa: the case of Rwanda. *J Sociol Soc Welfare.* (1991) 18:25–40.
7. Caraes Ndera. *Neuro-Psychiatric Hospital History*. (2020). Available online at: https://caraesnderahospital.rw/ (accessed July 11, 2020).
8. Stockman R. *50 years of Caraes Ndera: A Story Of Love, Care, And Professionalism in Rwanda*. (2018). Available online at: https://brothersofcharity.org/wp-content/uploads/2018/06/Toespraak-50-jaar-Caraes-Ndera.pdf (accessed October 7, 2021).
9. Engler S, Umutoni LB. *Building a healthier Rwanda: linking social priorities to the national budget, 2011–2016. Innovations for Successful Societies; Princeton University*. (2018). p. 1–21. Available online at: https://successfulsocieties.princeton.edu/publications/building-healthier-rwanda-linking-social-priorities-national-budget-2011%E2%80%932016 (accessed July 8, 2020).
10. Munyandamutsa N, Nkubamugisha MP. Prévalence de l'État de Stress Post-Traumatique dans la population Rwandais. *Diversité des figures cliniques, Abus des drogues et autres comorbidités.* (2009) 1–90. doi: 10.13097/archive-ouverte/unige:75046
11. Ministry of Health. *National Mental Health Policy*. (2011). Available online at: http://www.moh.gov.rw/fileadmin/templates/Docs/Posted-National-Mental-health-Policy-1.pdf (accessed May 8, 2020).
12. World Health Organization. *Integrated Health Services - What And Why? Who*. (2008). Available online at: https://www.who.int/healthsystems/technical_brief_final.pdf (accessed June 30, 2020).
13. Kolappa K, Henderson DC, Kishore SP. No physical health without mental health: lessons unlearned? *Bull World Health Organ.* (2013) 91:3–3A. doi: 10.2471/BLT.12.115063
14. Ministry of Health. Fourth *Health Sector Strategic Plan - July 2018 – June 2024.* (2018). Available online at: http://moh.gov.rw/fileadmin/templates/Docs/FINALH_2-1.pdf (accessed June 30, 2020).
15. Habumuremyi PD. *The Secret Behind Rwanda's Resilience*. (2015). Available online at: https://www.newtimes.co.rw/section/read/193251 (accessed July 8, 2020).
16. Ministry of Health. *Coronavirus Disease COVID-19: Rwanda's Preparedness And Response*. (2020). Available online at: https://moh.gov.rw/index.php?id=575 (accessed June 30, 2020).
17. Heymann DL, Chen L, Takemi K, Fidler DP, Tappero JW, Thomas MJ, et al. Global health security: the wider lessons from the west African Ebola virus disease epidemic. *Lancet.* (2015) 385:1884–901. doi: 10.1016/S0140-6736(15)60858-3
18. Moon S, Leigh J, Woskie L, Checchi F, Dzau V, Fallah M, et al. Post-Ebola reforms: ample analysis, inadequate action. *BMJ.* (2017) 356:1–8. doi: 10.1136/bmj.j280
19. United Nations Development Programme. *Rwanda: Support To The National Response To Contain The Impact Of COVID-19* (2020). Available online at: https://www.undp.org/content/dam/rba/docs/COVID-19-CO-Response/undp-rba-covid-rwanda-apr2020.pdf (accessed May 8, 2020).
20. Nakiire L, Mwanja H, Pillai SK, Gasanani J, Ntungire D, Nsabiyumva S, et al. Population movement patterns among the democratic Republic of the Congo, Rwanda, and uganda during an outbreak of ebola virus disease: results from community engagement in two districts—Uganda, March 2019. *Morb Mort Weekly Rep*. (2020) 69:10. doi: 10.15585/mmwr.mm6901a3
21. Karamouzian M, Hategekimana C. Ebola treatment and prevention are not the only battles: understanding Ebola-related fear and stigma. *Int J Health Policy Manag.* (2015) 4:55. doi: 10.15171/ijhpm.2014.128
22. Buningwire W. *Rwanda Intensifies Ebola Vigilance As Death Toll Hit 2,236 in DRC*. (2020). Available online at: https://www.ktpress.rw/2020/01/rwanda-intensifies-ebola-vigilance-as-death-toll-hit-2236-in-drc/ (accessed June 30, 2020).
23. Tasamba J. *Rwanda Steps Up Efforts To Beat Coronavirus*. (2020). Available online at: https://www.aa.com.tr/en/africa/rwanda-steps-up-efforts-to-beat-coronavirus/1774728 (accessed June 30, 2020].
24. Mutesa L, Ndishimye P, Butera Y, Uwineza A, Rutayisire R, Musoni E, et al. A strategy for finding people infected with SARS-CoV-2: optimizing pooled testing at low prevalence. *medRxiv*. (2020) 1–23. doi: 10.1101/2020.05.02.20087924
25. Mwai C. *How Jack Ma's Donation Will Boost Rwanda's COVID-19 Fight*. Danbury, CT: The News Times. (2020). Available Online at: https://www.newtimes.co.rw/news/how-jack-mas-donation-will-boost-rwandas-covid-19-fight
26. Rwanda Biomedical Center. *Coronavirus Disease 2019 National Preparedness And Responsive Plan*. (2020). Available online at: https://www.rbc.gov.rw/fileadmin/user_upload/annoucement/Coronavirus%20Disease%202019,%20National%20Preparedness%20and%20Response%20Plan.pdf (accessed June 30, 2020).
27. Gelfand MJ, Jackson JC, Pan X, Nanu D, Pieper D, Denison E, et al. The relationship between cultural tightness–looseness and COVID-19 cases and deaths: a global analysis. *Lancet Planet Health.* (2021) 5:e135–44. doi: 10.1016/S2542-5196(20)30301-6
28. Ng L, Harerimana B. Mental health care in post-genocide Rwanda: evaluation of a program specializing in posttraumatic stress disorder and substance abuse. *Global Mental Health.* (2016) 3:E18. doi: 10.1017/gmh.2016.12
29. Kabakambira JD, Uwera G, Hategeka M, Kayitesi ML, Malu CKK, Celestin H. In Rwanda : a cross-sectional study. (2018) 8688:1–8.
30. Sebera F, Nyiramazaire H. *Prévalence de l'épilepsie au Rwanda: Connaissance, perception, vécu et attitudes de la population et des professionnels de la santé*. Kigali: Ministry of Health (2005).
31. Bizimungu J. *Rwanda: First Lady Recounts Rwanda's Story of Resilience*. All Africa (2019). Available Online at: https://allafrica.com/stories/201902070074.html
32. Kwibuka26. *Kwibuka Means 'To Remember' And Describes The Annual Commemoration of the 1994 Genocide Against The Tutsi in Rwanda*. (2020). Available online at: http://kwibuka.rw/ (accessed April 6, 2020).
33. Zraly M, Rubin SE, Mukamana D. American anthropological association:ETHOS. (2013) 41:411–39. doi: 10.1111/etho.12031
34. Louis EF, Inagabire W, Isano S, Eugene D, Blanc J. Rwanda's response during COVID-19. *Psychol Trauma Theory Res Pract Policy*. (2020). 12:565–6. doi: 10.1037/tra0000801

35. The News Times. *Rwanda*. Danbury, CT: The News Times(2020) Retrieved from: https://www.newtimes.co.rw/news/rwanda (accessed April 7, 2020).
36. Iliza A. *Domestic Violence Rises During COVID-19 Lockdown*. (2020). Available online at: https://www.newtimes.co.rw/news/domestic-violence-rises-during-covid-19-lockdown (accessed June 30, 2020).
37. Patel SS, Rogers MB, Amlôt R, Rubin GJ. What do we mean by 'community resilience'? a systematic literature review of how it is defined in the literature. *PLoS Curr*. (2017) 1.

Conflict of Interest: The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's Note: All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

Advantages of publishing in Frontiers

OPEN ACCESS
Articles are free to read for greatest visibility and readership

FAST PUBLICATION
Around 90 days from submission to decision

HIGH QUALITY PEER-REVIEW
Rigorous, collaborative, and constructive peer-review

TRANSPARENT PEER-REVIEW
Editors and reviewers acknowledged by name on published articles

Frontiers
Avenue du Tribunal-Fédéral 34
1005 Lausanne | Switzerland

Visit us: www.frontiersin.org
Contact us: frontiersin.org/about/contact

REPRODUCIBILITY OF RESEARCH
Support open data and methods to enhance research reproducibility

DIGITAL PUBLISHING
Articles designed for optimal readership across devices

FOLLOW US
@frontiersin

IMPACT METRICS
Advanced article metrics track visibility across digital media

EXTENSIVE PROMOTION
Marketing and promotion of impactful research

LOOP RESEARCH NETWORK
Our network increases your article's readership