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World refugee day
2023

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World refugee day 2023

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Editorial: World refugee day 2023

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Editorial on the Research Topic
World refugee day 2023

Forced displacement continues to be a major global issue, affecting 117.3 million people by the end of 2023. Of these, 31.6 million are refugees, driven from their homes by conflict, natural disasters, persecution, and environmental crises (1). Refugees are disproportionately affected by conflicts and crises, facing a decline in quality of life, heightened exposure to violence, and increased health risks (2, 3). They often lack access to essential needs such as healthcare, food, water, and support, which significantly impact their wellbeing. This highlights the need for shared responsibility to ensure their protection and dignity (4). Rebuilding healthcare systems after conflicts and disasters can take years, leading to poor health outcomes, food insecurity, and intergenerational trauma.

Earlier in 2023, a Research Topic of articles was published on the health of displaced people (5). A dedicated edition of Frontiers in Public Health focusing on the factors that improve the health of refugee populations is essential. The Research Topic "*World Refugee Day 2023*" centers on factors that improve refugee health. The published articles identify indicators of health, healthcare, mental health, and wellbeing to enhance global refugee healthcare outcomes. Key contributions are summarized below.

Phung explored the challenges and recommendations for caring for resettled refugee children in the United States, emphasizing the need for culturally sensitive, trauma-informed care. The discussion underscores the importance of addressing language barriers and mental health concerns. Additionally, the paper highlighted the role of public health in preventing infectious diseases, promoting mental wellbeing, and delivering health education.

Choudhary et al. examined the prevalence of stunting among refugee and internally displaced children under the age of 5 years, revealing significantly higher rates than the global average. The study also highlighted geographical disparities, with stunting rates notably higher in regions such as Africa and Southeast Asia.

Six articles were published in the European context, specifically addressing the need to improve health and mental health literacy, and healthcare services, for refugee populations. Kordel et al. investigated the prevalence of acute stress disorder (ASD) among Ukrainian refugees displaced by the 2022 war, revealing a high rate of ASD and underscoring the severe psychological toll of the conflict. The study identified key risk factors for ASD, including witnessing violence, separation from loved ones, and preexisting mental health conditions. Gerber et al. examined the relationship between overweight, cardiovascular risk markers, and mental health in forcibly displaced individuals in a Greek refugee camp,

finding that higher cardiorespiratory fitness levels help to mitigate the negative effects of overweight and cardiovascular risks on mental health.

Portela et al. analyzed refugees' access to healthcare services in Lisbon, Portugal, during the COVID-19 pandemic, highlighting barriers such as language difficulties, limited healthcare system knowledge, and financial constraints. The study emphasized the importance of culturally sensitive, linguistically appropriate healthcare services for refugee populations. Ekblad et al. conducted a group intervention with separated Ukrainian refugee families in Sweden aimed at improving perceived health and mental health literacy. The intervention successfully enhanced participants' understanding of health issues and boosted their confidence in accessing healthcare services.

Cimino et al. assessed the knowledge and skills of general practitioner trainees in Sicily regarding global competency standards for health workers dealing with refugee and migrant health. The findings highlighted the need for improved training and education to equip healthcare professionals with the necessary skills to support vulnerable populations. El Arab et al. explored the health and social needs of asylum seekers and undocumented migrants crossing from Belarus to Lithuania. Through qualitative interviews, the study revealed urgent needs for healthcare, shelter, and social support services, with participants expressing frustration over bureaucratic processes and restricted mobility. The research highlighted the critical need for comprehensive, culturally appropriate support for these vulnerable groups.

Four articles focused on the mental health of refugee populations. Ermansons et al. explored the mental health of Somali refugees in urban neighborhoods using an eco-social approach to examine how trauma, social isolation, and economic hardship affect their wellbeing. The study emphasized the importance of social support networks and community-based interventions. Cherepanov stressed the need for a politically informed approach to refugee healthcare, arguing that political experiences, such as trauma and discrimination, profoundly impact mental health. The study advocated for incorporating political competencies alongside cultural sensitivity and trauma-informed care to address ethical challenges in refugee healthcare. Manafe et al. examined the prevalence and factors contributing to common mental disorders, such as depression and anxiety, among internally displaced people (IDPs) in Cabo Delgado, Mozambique. The study found high rates of these disorders linked to violence, loss, and displacement stressors. Assaf et al. presented a framework to understand the mental health challenges of Syrian refugees, focusing on prewar, displacement, and post-displacement stressors. The framework emphasized the cumulative impact of these experiences and the need for tailored mental health interventions.

Hossain stressed the urgent need to provide healthcare services to displaced individuals worldwide, as more people are forced to flee due to conflict, persecution, and natural disasters. Access to healthcare is crucial for preventing disease, treating injuries, and ensuring wellbeing in displaced populations. Liu et al. explored the impact of social integration on older migrants' access to health services in China, using national data. The study found that greater social integration is linked to the increased use of community-based healthcare facilities, highlighting the importance of integration in improving healthcare access for older migrants.

Kvasnevska et al. explored the link between war-related factors and the spread of sexually transmitted infections (STIs), conducting a systematic review of the literature to identify key contributors to rising STI rates in conflict zones. The study highlighted how displacement, sexual violence, economic hardship, and healthcare disruptions increase STI transmission among vulnerable groups. It underscored the importance of targeted interventions to address these factors and curb the spread of STIs in war-affected areas.

Across the various studies, common key points emerged regarding the healthcare challenges faced by refugees and displaced populations. These included the critical need for culturally sensitive and trauma-informed healthcare, the importance of addressing mental health through both community-based and policy approaches, and the significant barriers that refugees face in accessing healthcare services, such as language difficulties, financial constraints, and lack of knowledge about healthcare systems. Social integration and fitness were also highlighted as important factors that can enhance health outcomes for displaced individuals.

Several key recommendations were proposed to enhance refugee health and foster resilient communities. These include implementing mandatory cultural competence and trauma-informed care training for healthcare providers and ensuring access to qualified interpreters and translation services for effective communication. Developing multilingual, culturally tailored health education materials is essential. Additional recommendations include integrating mental health screenings into routine care, expanding culturally competent mental health services, and streamlining enrollment processes for timely access. Mental health services must be prioritized, with an emphasis on community support and integration programs to mitigate the effects of trauma and social isolation. Establishing navigation programs will assist refugees in navigating complex healthcare systems. Partnerships with community organizations, robust immunization programs, and nutrition education will further support refugee needs. Advocacy for policies that ensure equitable access to healthcare, housing, employment, and education is vital for strengthening refugee health and community resilience. Additionally, targeted interventions are essential for addressing specific health issues, such as sexually transmitted infections and chronic diseases that are exacerbated by displacement.

While some studies have addressed mental health, further investigation into how it transmits across generations and affects refugee children is needed. The impact of chronic stress on physical health, such as cardiovascular issues and autoimmune disorders among refugees, also requires further study. Developing culturally appropriate mental health interventions, especially for women's health, gender-based violence, and maternal care, is crucial. Research should examine the health challenges faced by older refugees, including chronic diseases and social isolation, as well as healthcare access for disabled refugees. Telehealth and mobile health apps could improve healthcare for refugees, especially in remote areas. Additionally, understanding climate change impacts, policy gaps, and healthcare system limitations will aid in addressing refugees' complex health needs.

Author contributions

AH: Conceptualization, Investigation, Writing – original draft, Writing – review & editing. SH: Investigation, Writing – review & editing. SC: Investigation, Writing – review & editing. MS: Investigation, Writing – review & editing. SO: Conceptualization, Investigation, Writing – review & editing.

Conflict of interest

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Caring for resettled refugee children in the United States: guidelines, challenges and public health perspectives

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The global refugee crisis has become an urgent, pressing humanitarian issue, with an estimated 37 million children forcibly displaced from their homes due to conflict, persecution, violence and other human rights violations by mid-2022. Of these children, only a small percentage are eligible for resettlement in a new country. This narrative review examines the physical health needs of resettled refugee children (RRC) in the United States. By analyzing nutrition and growth, infectious diseases, and general health care/screening measures, a set of comprehensive, evidence-based guidelines and public health perspectives are formulated to facilitate ongoing discussion to ensure that RRC receive equitable health care access. An urgent call to action emphasizes cross-border collaboration between governments, public health experts, refugee populations, and disease preparedness authorities in order to prioritize the physical health of RRC. This review will provide primary care providers, public health professionals, social service workers, and community advocates with up-to-date recommendations to meet the health needs of RRC in the U.S.

KEYWORDS

resettled refugee children, refugee children, forcibly displaced children, refugee health screening, public health refugee

Introduction

The global refugee crisis has reached unprecedented levels, with the United Nations High Commissioner for Refugees (UNHCR) estimating that *37 million children*[1] have been *forcibly displaced*[2] from their homes by mid-2022 due to political conflict, persecution, violence, and other human rights violations (1, 2). Of those who had resettled in a different country, one-third are comprised of children under the age of 18, while adults accounted

1 This number includes some 12.5 million child refugees [i.e., 10.8 million under 'UNHCR mandate' and children from Venezuela displaced broad, and 1.8 million Palestine children registered with UNRWA, 1.2 million asylum-seeking children], and 22.8 million children internally displaced within their own countries (UNRWA is United Nations Relief and Works Agency for Palestine refugees registered in Jordan, Lebanon, Syria, Gaza, and the West Bank). More information available at: https://www.unrefugees.org.uk/wp-content/uploads/Global-Trends-2021.pdf.

2 The terms forcibly displaced, externally displaced, refugees, migrants, asylum seekers describe individuals who: i) are on the move, ii) have left their countries, and iii) have crossed country borders.

TABLE 1 Eligibility criteria.

Inclusion criteria	Exclusion criteria
Child refugee data & statistics [birth – 18 years], direct observations, and insights from overseas expert panel clinicians	Publications that did not clearly define age [birth – 18 years old]
Physical health, health examinations, guidelines/recommendations for RRC after their resettlement in the U.S.	Mental health, psychosocial issues, developmental health, and cognitive health of RRC
Multi-state (or multi-regional reports) that provided longitudinal assessments, and/or health profiles of RRC *after* their resettlement in the U.S.	Screening and/or guidelines for international adopted children
Published in English language	Non-English language
Free article access	Articles with restricted and/or paid access

only a fifth of displaced individuals (2). Despite this large disproportionate representation, only a small percentage of the forcibly displaced children (less than 4%) are eligible for resettlement in a new country (1). Thus, it is imperative to focus on the physical health needs of resettled refugee children (RRC) in order to ensure that they have equitable access to resources and support.

When discussing the refugee crisis, it is essential to distinguish amongst *refugees*, *migrants*, and *immigrants*, as each holds different legal statuses. Refugees are fleeing their homelands due to conflict, persecution, or violation of human rights, and are entitled to international protection. Most refugees are considered "*externally displaced*," meaning they have been forced to abandon their home country but may not necessarily have asylum in a new country. Migrants, conversely, are choosing to move for reasons such as career, education, or family reunification, and may also be fleeing poverty, political instability, or gang violence.

This narrative review focuses on three physical health domains including nutrition and growth, infectious diseases, and general health care/screening measures of RRC living in the United States. By analyzing these domains, a summary of evidence-based guidelines and public health perspectives are formulated to ensure that RRC receive equitable health care access and support. Among the 15 countries hosting the majority of the world refugee children, the U.S. is home to an estimated 3.3 million of them (2). Thus, U.S. primary care providers, public health professionals, social service workers, and community advocates should be knowledgeable about how to properly assess and provide care for refugee children upon their arrival.

Methods

Search strategy

The narrative review followed systematic search methods to identify original studies, meta-analytic reviews, longitudinal assessments, and population health profiles of refugee children who had resettled in the United States from 2010 to 2021. A search of the PubMed, EMBASE, MEDLINE, and Web of Science databases was conducted on March 28, 2022, with an updated search performed on February 22, 2023. Keywords used in the searches included "*resettled refugee children*," "*refugee children*," "*health considerations for refugee children*," "*initial domestic medical examination*," "*refugee health screening*," *and* "*public health implications*."

Eligibility criteria

Initially, 3,750 titles/abstracts were identified, which were then uploaded to the Covidence database, an online systematic review software. Here, two independent reviewers used an automated selection instrument to review the keywords, titles, abstracts, and full-text reports. Automated tools removed the majority of records due to lack of context for the United States.

Through the screening process, the selection was narrowed to 105 records. Subsequently, 71 records including 1 meta-analysis, 4 systematic reviews, and 58 original studies were identified as meeting the eligibility criteria (Table 1). Further evidence collection involved manual searches of websites and organizations, yielding 26 additional reports for the final analysis (e.g., refugee health profiles, global trend statistics, overseas health screenings/assessments, pre-departure vaccination programs, guidelines/recommendations, and policy-specific topics). This review was conducted in accordance with the 2020 PRISMA statement (3) for reporting new systematic reviews, as portrayed in the PRISMA Flow Diagram for New Systematic Reviews Searches (Figure 1).

Results

Thematic synthesis of meta-analyzes, systematic review findings, up-to-date guidelines, and qualitative research data were summarized pertaining to the three physical health domains associated with caring for RRC in the U.S.

Nutrition and growth

In the Appendix section (Supplementary Table S1), anthropometric definitions, measurements, and classifications of nutritional statuses (e.g., wasting, stunting, overweight, and obesity) are included.

Undernutrition v. overnutrition

To assess the prevalence of *undernutrition* (i.e., wasting and stunting) and *overnutrition* (i.e., overweight and obesity) among RRC from birth to 10 years of age, a 2012–2014 U.S. study utilized anthropometric measurements such as BMI, weight, length and/or height from *overseas medical examination* (OME) of newly RRC, and compared the data to that of low-income children of the same age in Washington state (4). As per World Health

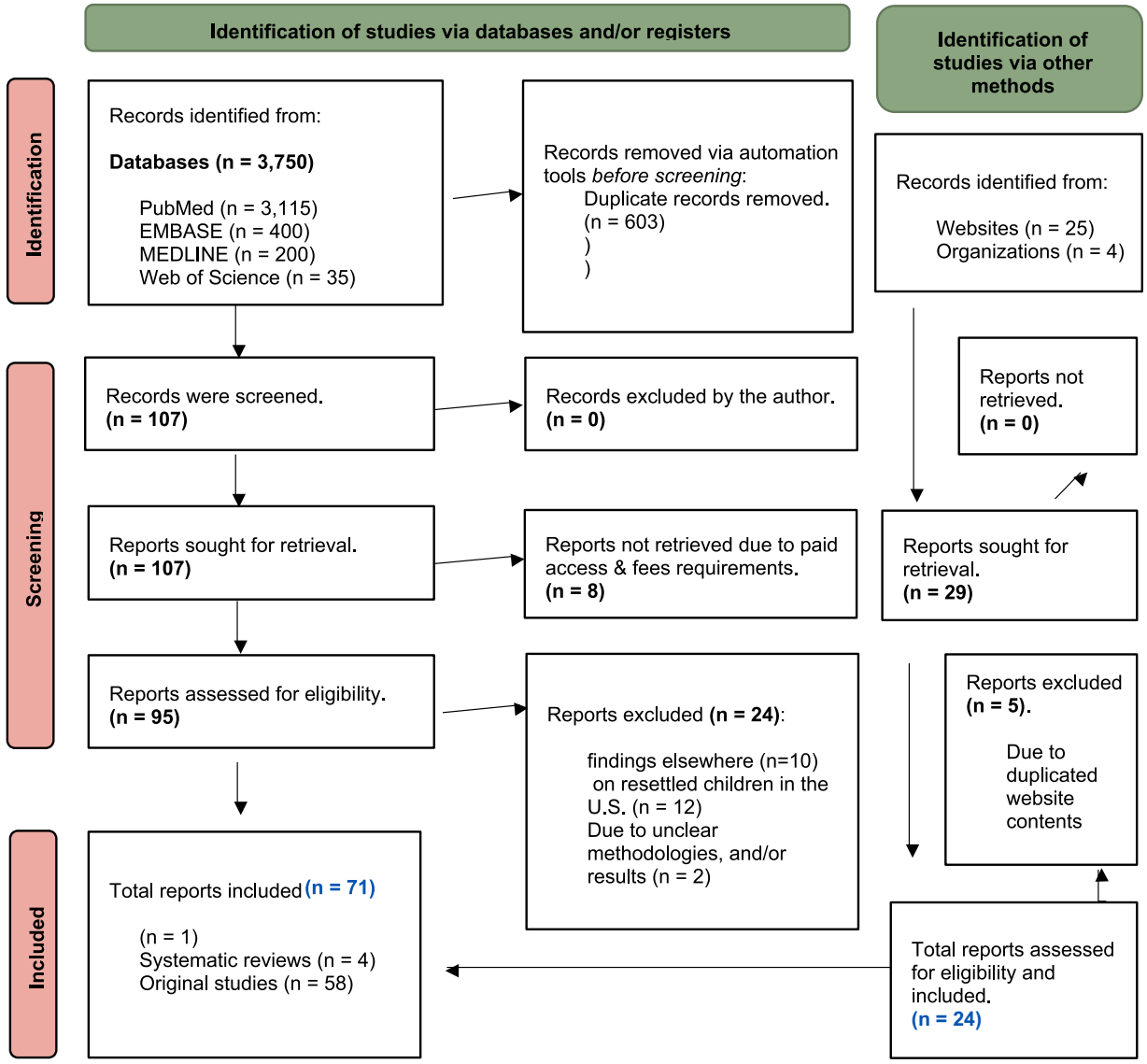

FIGURE 1
PRISMA flow diagram for new systematic reviews searches.

Organization (WHO)[3] standards for *children 0–2 years old* and Centers for Disease Control and Prevention (CDC)[4] standards for *children > 2 years old* (5, 6), about 45% of these RRC met criteria for at least one form of malnutrition (ranging from *wasting* to *stunting*) (4). When grouping the RRC by their country of origin, Somali and Iraqi children ages 5 to 10 years had the highest prevalence of wasting (low 'weight-for-height'), while Burmese children of the same age had the highest prevalence of stunting (low 'height-for-age') (4).

Refugee children arriving from certain areas of the world are also at risk of overnutrition (7). Pre-departure data of RRC from Syria in 2015–2016 showed that 11% of these children aged 6–59 months were overweight or obese (8). Iraqi children who had resettled in Washington state were found to be more likely to be obese than their conationals (children of the same country of origin) who were 5 years old or younger (4). By comparison, there was no statistically significant difference in obesity between younger and older children from Somalia and Burma. There are numerous factors which likely contributed to weight gain amongst RRC in high income countries (HICs), such as the adoption of a Western diet (7), decreased physical activity, parental perceptions of food safety (or lack thereof), cultural beliefs and values (9), level of acculturation to U.S. lifestyles (10), poor quality of housing (11), and increased food availability (12). Despite these general trends, differences observed across different countries of origin suggest that the nutritional needs of RCC vary.

3 Anthropometric definitions based on the World Health Organization (WHO) multicenter growth reference study for children ages 0 to 2 (5).

4 Anthropometric definitions based on Centers for Disease Control and Prevention (CDC) guidelines for children over age 2 (6).

Micronutrient deficiencies

Studies on RRC have shown that they may be at risk for developing deficiencies in certain micronutrients such as iron, vitamins A, B12, and D. In a systematic review conducted by Baauw et al. (13), it was discovered that RRC in HICs (e.g., United States, United Kingdom, Australia, Canada, and Germany) were at an increased risk for these micronutrient deficiencies. In 2011, a study specifically identified deficient absorption of vitamin B12 among Bhutanese refugee children resettled in three separate states (Texas, Utah, and Minnesota). This could be due to the lack of dietary options such as meat, eggs and dairy products, which were more commonplace their country of origin (Nepal) (14). Vitamin B12 deficiency is especially important as it can lead to neurological regression and megaloblastic anemia if left untreated (15). Supplementary Table S3 gives a list of common micronutrient deficiencies, associated signs/symptoms, and recommended labs.

Infectious diseases

Refugee children who originate from low-income countries (LICs) have an increased risk of developing infectious diseases (IDs) due to endemic diseases within their native countries, barriers in accessing healthcare, unaffordability of public health services, as well as lack of vaccinations and inadequate nutrition. Additionally, violence and trauma can further exacerbate these issues. To ensure that these RRC receive a timely diagnosis and appropriate treatment for IDs, U.S. healthcare professionals should be informed of the prevalent IDs among refugee groups. This section highlights some of the more common IDs, although the list is not exhaustive. Supplementary Table S4 provides detailed information on pre-departure screening, post-arrival assessment requirements, and recommended post-arrival lab testing for tuberculosis, hepatitis B virus, intestinal and tissue invasive parasitic infections.

Tuberculosis (TB) – Tuberculosis (TB) has been designated as a *Class A*[5] disease, with refugees not being allowed to enter the U.S. until properly treated (16). Studies have found that the *country of birth* is a significant risk factor for new active TB infections (17). In the U.S., *latent TB infection* (LTBI) is much more common than active TB, with 80% of TB cases stemming from longstanding, untreated latent infections (18). A 2010 report found that 12% of RRC arriving in the U.S. were diagnosed with LTBI during their OME (19). Therefore, the CDC recommends that RRC aged 2–14 from *endemic* or *high-burden disease* countries (i.e., countries with TB incidence rate of ≥20 cases per 100,000 population) should be screened with an *interferon-gamma release assay* (IGRA) blood test (20), while adolescents over 15 years old should be screened with chest radiographs (17). Some unique issues associated with IGRA[6] are discussed in the footnote.

Hepatitis B virus (HBV) – Hepatitis B virus (HBV) infection is preventable in the U.S. through childhood vaccination programs yet still poses a public health problem for RRC. Exposed children are more likely than adults to become chronically infected with HBV, which may lead to severe liver disease (22). A comprehensive literature review on the international spread of HBV showed that there was a lack of robust epidemiological and surveillance data in LICs (23). Mitruka et al. (23) conducted a study in the U.S. that suggested certain at-risk communities were not routinely being screened for HBV in four states (California, Massachusetts, Minnesota, and Washington). Fortunately, it appears that HBV vaccine coverage has generally improved the prevalence of HBV infections among US-bound refugees. Yun et al. (22) reported improvements in the prevalence of HBV among RRC living in Minnesota, Pennsylvania, and Washington state from 2006 to 2012 and attributed these positive findings to higher rates of HBV vaccination in these states. The CDC recommends vigilance in screening all RRC under 18 years old born in (or have lived in) countries with *intermediate* (2 to 7%) or *high* (≥ 8%) prevalence of chronic HBV infection, should they not have a documented negative blood test (24).

Intestinal and tissue invasive parasitic infections

Intestinal parasitic infections, such as *Ascaris lumbricoides*, *Trichuris trichiura*, and hookworm species, and *Strongyloides stercoralis*, are widely reported among refugees and are typically associated with eosinophilia (25). According to the cross-sectional study conducted by Webster et al. (26) on 1,335 refugees coming to the U.S. from Thailand, the prevalence of these infections was strongly linked to *age* (beginning in infancy to 2 years of age, and peaking in adolescents 12–17 years of age). Even though infections caused by nematodes (e.g., *Ascaris lumbricoides*, *Trichuris trichiura*, hookworm species) as well as *Strongyloides stercoralis*, are commonly associated with eosinophilia, this study suggested that eosinophilia was not always a strong predictor of infection (26).

A retrospective cohort study (2012) involving 26,956 refugees from Africa and Southeast Asia who resettled in Minnesota showed that a single-dose of albendazole (antiparasitic), given overseas as *presumptive pre-departure therapy* (PPDT),[7] significantly decreased the prevalence of parasitic infections (e.g., helminths, schistosomiasis, and malaria) (27, 28). It was found, however, that certain infections, such as *Giardia intestinalis* (giardiasis) and specific strains of *Plasmodium ovale*/*Plasmodium vivax* (malaria), were not susceptible to this standard single-dose albendazole PPDT (27). Interestingly, malaria outbreaks in endemic parts of Southeast Asia were often clustered along international borders with complex ecological interactions between the landscape, humans, mosquito vectors, and particular *Plasmodium* species. This created additional challenges for local health officials administering PPDT for refugees departing from these border regions (e.g., Thailand-Myanmar border) (29).

5 Class A include diseases and health conditions that render a refugee *ineligible* to enter the U.S. until that individual has been treated. Class A includes active TB, syphilis, gonorrhea, Hansen's disease (leprosy), and mental disorders *with* harmful behaviors (15).

6 In the U.S. (and other high-income countries), there are some issues pertaining to the use of *interferon-gamma release assay* (IGRA): 1) performance and reporting of results in a lab setting fall under the auspices of regulatory certification, 2) inconsistent reproducibility of test results (23), and 3) lack of consensus on "normal" threshold values (19).

7 Presumptive pre-departure therapy for intestinal parasites includes: albendazole, ivermectin, praziquantel (27,28).

Vaccine-preventable diseases

Vaccine-preventable diseases (VPDs), such as measles, polio, meningococcal meningitis, yellow fever, hepatitis A, and cholera, have been a major health concern in refugee resettlement processes in the past (30, 31). In 2009, a child died and an infant was born with congenital rubella syndrome due to successive outbreaks of measles, rubella, and varicella among US-bound Liberian refugees from *Cote d'Ivoire*, and travel suspension of refugees from those transit camps was enforced for 6 months (32). In light of the resurgence of more than 18,000 measles cases in 2022, leading to 142 deaths of newly resettled Afghan children over the course of 3 months, the World Health Organization (WHO) reported heightened safety concerns for resettling communities across the globe (33). The infection rate of COVID-19 among RRC in the U.S. is not available for analysis, but is being monitored on the Migration Data Portal which includes surveillance data for refugees and migrants from over 20 countries with the highest number of COVID-19 cases.

The U.S. Refugee Admissions Program (USRAP) Vaccination Program, launched in 2012 in partnership with the International Organization for Migration (IOM), has been a breakthrough in limiting overseas VPD outbreaks (e.g., tuberculosis and measles) in the places hosting US-bound refugees (30). The USRAP Vaccination Program is offered voluntarily to refugees at the time of their OME in more than 80 participating countries (30). The program's vaccination schedule currently consists of 11 vaccines that protect against 14 VPDs (e.g., measles, mumps, rubella, diphtheria, tetanus, pertussis, hepatitis B, polio, varicella, and others). During the COVID-19 pandemic, when some global immunization services for children were reduced and/or suspended (34), including here in the U.S., the USRAP Vaccination Program was still serving a critical role in safeguarding migrating refugee populations (30).

General health care/screening measures

Lead screening

In October 2021, the Centers for Disease Control and Prevention (CDC) revised the standard acceptable *blood lead reference value* (BLRV) from 5.0 µg/dL to 3.5 µg/dL (35), leading to more individuals being identified with potential "lead exposure." Data from domestic refugee children collected under the previous BLRV of 5.0 µg/dL revealed higher concentrations of *blood lead levels*[8] (BLLs) than US-born children (36, 37). Of the 27,000 refugee children aged 6 months to 16 years residing in 11 states (Colorado, Idaho, Illinois, Indiana, Kentucky, Massachusetts, Minnesota, North Carolina, New York, Texas, Utah, and Washington), a cross-sectional study demonstrated 19% had BLLs >5.0 µg/dL (36). Further analysis highlighted that males RRC from India, Afghanistan, Burma, and Nepal had an increased prevalence of BLLs ≥5 µg/dL (36). Seifu et al. (37) reported that *microcytosis*, *male sex*, and *young age* were the strongest predictors of having elevated BLLs ≥5 µg/dL among newly arrived refugee children. The CDC advises initial screening *via* a blood lead level test for all those under 16 years of age, plus all pregnant/lactating people within 90 days of their arrival in the U.S. Follow-up testing is recommended (i.e., a blood lead level should be repeated for all RRC ≤ 6 years old) around 3–6 months after resettlement regardless of the initial screening result (35).

Anemia

Anemia is another common diagnosis among refugee communities in the U.S. (38, 39). This condition is usually the outcome of inadequate nutrition and iron deficiency, but other causes may include vitamin B12 deficiencies (40), undiagnosed metabolic disorders (6), chronic gastrointestinal infections (hookworms), and hematologic disorders [βeta-thalassemia (41)].[9] Refugees from LICs, where anemia and other blood dyscrasias are prevalent, could experience additional health disparities in the host country (or country of first asylum) due to lack of resources, capacity and/or policy restrictions. A list of common micronutrient deficiencies, their associated signs and symptoms, and recommended lab tests can be found in Supplementary Table S3.

Dental health

Refugees and immigrants coming to the U.S. are particularly vulnerable to developing dental caries (42). A 2020 systematic review identified affordability, awareness and access as the three main barriers to dental care for refugees and their families living in HICs (e.g., the United Kingdom, United States, Canada, and Australia) (43).

Discussion

Perspectives on nutrition and growth

Issues: global nutritional challenges and growth patterns of refugee children

RRC originating from the Middle East (e.g., Syria, Afghanistan), and North Africa (e.g., Egypt, Libya, Lebanon, Yemen) living in surrounding LICs face a variety of nutritional challenges and suboptimal growth patterns. Undernutrition,[10] coupled with the COVID-19 pandemic and Russia's ongoing war in Ukraine (44), further complicates the situation. Their lack of nutrition compromises RRC's ability to adjust to different dietary needs and access existing nutritional programs. Over time, this may lead to long-term consequences on their physical, developmental, and mental health issues. Although a lot of research is dedicated to undernutrition in RRC under 5 years old, there is a lack of studies exploring nutrition and micronutrient deficiencies among older children and adolescents (5). Thus, it is important that U.S. healthcare providers be aware of the potential nutrition-related risks that RRC may face and take appropriate steps to monitor and address malnutrition (6, 45).

8 Blood lead levels (BLLs) ≤10µg/dL ➔ adverse cognitive and behavioral development (35). Above 40µg/dL ➔ headaches, abdominal pain, anorexia, constipation, clumsiness, agitation, lethargy. At 70µg/dL ➔ seizures, ataxia, mental status changes, coma, death (35).

9 βeta-thalassemia (41) which is thought to carry a prevalence of 1 to 1.5 million Afghanistan, could have ongoing public health considerations given the unprecedented evacuation of Afghanistan refugees in August 2021.

10 There are 4 types of undernutrition: 1) acute malnutrition, AKA "wasting" (i.e., low *weight-for-height*); 2) chronic malnutrition, AKA "stunting" (i.e., low *height-for-age*); 3) micronutrient deficiencies, and 4) underweight (i.e., low weight-for-age, a child who is underweight may be stunted, wasted, or both) (3).

The research conducted on RRC living in HICs has found that their risk for undernutrition and overnutrition (overweight/obesity) is elevated (46–48). For instance, a comparison of RRC aged 0–16 years old from Washington and Pennsylvania and non-refugee, low-income control sample showed a higher prevalence of obesity in the refugee group (46). Similarly, refugees aged 2–18 years from Africa and Southeast Asia in Rhode Island experienced a doubling in overweight/obesity from 17 to 35% after 3 years of resettlement (47). Olson et al.'s 2017 longitudinal study at the New York SUNY medical clinic found that whilst both groups, refugees and non-refugee control, increased in overweight/obesity after 9 years, refugees were disproportionately more likely to develop these health conditions (48). It is unclear whether this perceptible rise in overweight/obesity is a reflection of the global increase in obesity, or caused by a shift in the economic status of newly arriving refugees. Nevertheless, it is clear that refuges are increasingly susceptible to both undernutrition, which may lead to cognitive and physical developmental delays in childhood, and overnutrition (overweight/obesity), a risk factor associated with numerous chronic health conditions in adulthood (49).

Remedies: cross border collaboration and food security interventions

In order to alleviate the adverse impacts of displacement, armed conflicts, and natural disasters, it is prudent for governments, organizations, and public health authorities to take proactive steps to provide refugees with secure access to safe and nutritious foods. Lutfy et al. (42) stressed that the public health community prioritize a patient-centered approach along with enhanced nutritional monitoring and screening measures. Additionally, correlating nutritional data with domestic resettling agencies could enable the development of nutritional monitoring interventions tailored to the age, demographics, and growth parameters of different groups of refugee children (45). Cross-border collaboration between stakeholders and host communities is key to achieving improved food security among refugees, and initiatives such as the Global Food Security Cluster (50) can help facilitate this. Evidence-based food security interventions, tailored to the needs of refugees, should be implemented in order to prevent and address under- and overnutrition. The scoping review conducted by Nisbet (51) found that while food security interventions are effective in assisting refugees, they are often constrained by scope and length of program implementation. Other public health programs, media campaigns, and public education measures—such as those launched by the United Nations World Food Program (52) (WFP)—are essential in creating awareness of domestic food insecurity among refugees. If cross-border collaboration is successful in providing evidence-based solutions, raising awareness, and deepening understanding of the domestic food security context, then the nutritional health and well-being of refugees can improve significantly. Therefore, continued and research and investigation into these matters is necessary.

Perspectives on infectious diseases

Issues: the global risk of tuberculosis in refugee populations

Tuberculosis

The global TB crisis is one that continues to worsen, with an estimated 10 million new cases being reported in 2020 (53). In the U.S., the proportion of foreign-born TB cases has been steadily increasing for two decades, and now makes up 65–70% of all reported cases according to data compiled in 2018 (54, 55). Young children are vulnerable to TB and are more prone to developing severe TB disease as compared to adults (56). Cases of *multi-drug resistant TB* (MDR-TB) have also been reported in various regions including India, South Africa, Somalia, Kenya, and Syria (57). The rise in MDR-TB in Syria was attributable to high pre-civil war MDR-TB rates, war-damaged healthcare infrastructure, and poor hygiene conditions (58). Latent TB infection (LTBI) is another mounting public health issue due to lack of resources and/or inadequate infrastructure in many low- and middle-income countries. From 2019 to 2020, Bangladesh, Guatemala, India, Zimbabwe, Afghanistan, Ethiopia, South Sudan, and other countries reported inadequate resources and lack of infrastructure as the two most common barriers to proper treatment of LTBI (and active TB) (59–65). To address this modern challenge, we must continue to invest in detection, control, and prevention measures to mitigate the spread of TB worldwide.

Remedies: public health strategies to combat the global TB crisis

The magnitude of tuberculosis (TB) as a global risk is now widely recognized and considerable efforts are being taken to curtail it. In the U.S., one of the more cost-effective, high-yield strategies to prevent importation of TB cases and contribute to the elimination of disease is utilizing the overseas medical examination (OME) to provide voluntary testing and to initiate treatment of LTBI, particularly for individuals departing from a high-disease burden country (66). Since 2007, clinicians and staff from 159 countries have provided invaluable support in the implementation of the U.S. Tuberculosis Technical Instructions (TBTI). This includes requirements for chest radiographs in US-bound refugees aged 15 years and above, prior to entrance to the U.S., as well as sputum smear and culture, drug susceptibility testing for those with abnormal radiograph findings, and tests for HIV plus other concurrent symptoms that might indicate TB (30). Evidence suggest that investment in TB control program in source countries with a high-disease burden has been more beneficial than enhancing TB screening algorithms alone (67). Demonstrably, the implementation of TBTI has fostered the growth of laboratories which have the capacity to perform TB cultures and tests for second-line TB drug resistance and multidrug-resistant TB (MDR-TB) (68).

The global collective public health strategies – The Tuberculosis Action Plan (69) (WHO European Region 2016–2020), Wolfheze Consensus Statement (69), and the European Respiratory Society–WHO TB Consilium (70, 71) – have been effective in mitigating the spread of TB. The Tuberculosis Action Plan seeks to strengthen coordination between European countries to reduce the burden of TB. The Wolfheze Consensus Statement (2016) advocates for improved access to diagnosis/treatment, better surveillance systems, improved care delivery, and international collaboration. Similarly, the European Respiratory Society-WHO TB Consilium (2017) focuses on prevention and control of TB. To ensure further progress is made on this issue, more public health research is needed to evaluate

the impact of these strategies in countries with high TB prevalence. Such research should also seek to build collaborative partnerships between high- and low-income countries.

Issues: the global risk of hepatitis B virus in refugee populations

Hepatitis B virus

Refugees and those forcibly displaced bear an especially high burden of HBV-related infections. In children, the risk of disease progression from acute to chronic HBV infection is *inversely* linked to the *age* at the time of infection (72). For example, greater than 90% of infected infants (birth to 1 year), 25–50% of infected children (aged 1–5 years), and less than 5% of infected older children and adults can progress to chronic HBV infection (which can lead to cirrhosis, liver failure, and hepatocellular carcinoma) (73). HBV transmission during the perinatal and early childhood period is a major contributor to the global HBV burden in *intermediate* and *high* prevalence countries (73). As a result, ensuring a high screening rate for HBV infections in countries receiving refugees could have a transformative public health impact. Taking into account the general underdiagnosis of HBV infection by medical professionals in the U.S. (73), the initial domestic medical examination (DME) is an opportune time to identify/diagnose and prevent HBV infection.

Remedies: unified global public health responses to VPDs

The increasing emergence of vaccine-preventable diseases (VPDs) among refugee populations requires a unified public health response at the global level that takes into consideration the current migratory patterns and shifts in the geopolitical landscape. Such a response necessitates a comprehensive assessment of both acute and chronic VPDs, coupled with the implementation of robust surveillance programs and awareness campaigns to promote proactive vaccination strategies. By investing in domestic and international public health partnerships, potential costly reactive measures that are often taken in response to VPD outbreaks can be minimized. An example of this is the 16 outbreaks and 107 confirmed cases of imported measles in California in 2011, which were estimated to have cost local and state public health departments between $2.7 to $5.3 million USD (74).

In-depth epidemiological research is urgently needed to inform a better understanding of VPDs and related vaccination and treatment adherence amongst diverse, conflict-affected, forcibly displaced populations (22). RRC can be especially vulnerable to the risks posed by VPDs, given their exposure to – and potential intensification of – environmental factors such as mass migration, overcrowding, and lack of clean water/sanitation facilities (31). Refugee populations often have limited access to vaccinations and medical services in both their home and host asylum countries. To ensure a successful unified public health response to VPDs, there must be a cohesive effort to improve the overall health and well-being of forcibly displaced children, supported by public health initiatives and enabled by ongoing collaborations and contributions of reliable epidemiological data between public health planners, refugee populations, and organizations focused on disease emergence preparedness (75).

Perspectives on general health care & medical screening

Issues & remedies: effectively promoting health and well-being of refugees

The Division of Global Migration and Quarantine[11] (DGMQ), part of the Centers for Disease Control and Prevention (CDC), provides instructions for the *overseas medical examination* (OME) of refugees prior to their departure to the U.S. (75). The primary purpose of the OME is twofold – to ensure that refugees entering the U.S. pose no public health threats, and to identify any existing health conditions requiring ongoing medical attention post-resettlement (76). To assist state public health partners, the CDC has also created a set of guidelines (not mandates) to assist healthcare professionals perform the initial *domestic medical examination* (DME) within 90 days of entry in the U.S. (75). Supplementary Table S4 details the pre-departure screening process, post-arrival assessment requirements, and suggested disease-specific lab testing provided by the DGMQ/CDC.

These guidelines developed by the DGMQ/CDC comprise evidence-based clinical recommendations and checklists to support receiving states with the initial DME. Aspects covered include the history and physical examination, screening for hepatitis and HIV infection, domestic immunization guidelines, guidance for evaluating nutritional status, and testing for blood lead levels, sexually transmitted diseases, tuberculosis, malaria, and intestinal parasites (75). These recommendations for the DME are not meant for ongoing continuity of care, but rather to emphasize the health conditions that need be immediately assessed and taken care of during the first 90 days of entry. For the purposes of recognizing prevalent health conditions among US-bound refugees, the DGMQ/CDC has created "Refugee Health Profiles." These profiles include pertinent details and information on different refugee groups such as population background, demographics, health conditions, routes of movement and asylum, healthcare status prior to entry, and post-arrival medical screening (77).

The public health program in Denmark serves as a successful example of the impact of providing early General Health Assessments (GHAs) to refugees living in a HIC. This program provides free GHAs to all newly arrived refugees in Aarhus and Copenhagen (76, 78). Medical and public health professionals agree that early GHAs (similar to the DMEs in the U.S.) are beneficial for promoting the health of refugees and their integration into their new communities (78). In light of this, it is important for U.S. state/local health departments and medical clinics to consider fundamental requirements and best clinical practices when carrying out the initial DME. These include implementing a patient-centered approach, reducing health disparities and cultural barriers, improving access to primary healthcare services, explaining consent and confidentiality, and providing support for refugee advocacy/community resources to promote health and well-being (79).

11 These instructions are developed in accordance with Section 212(a)(1)(A) of the Immigration and Nationality Act (INA) (16).

Limitations

Selection bias

This narrative review was limited to English language publications, likely leading to a bias towards clinical guidelines and epidemiological descriptive analyzes from English-speaking HICs. The data extraction, categorization and data quality assessment were completed solely by the author, further contributing to selection biases in the narrative commentaries. While this review concentrated on three physical health domains, the ongoing consequences of COVID-19 on food insecurity, poverty (80), and other social determinants of health were not covered despite their potential impact on the overall health of refugee children. Acculturation was overlooked as it is difficult to define and measure within the scope of this narrative.

Omission of mental and developmental health

Mental and developmental health are critical issues, particularly for refugee children, and yet this review omitted titles and abstracts containing relevant words and phrases such as 'mental health', 'psychosocial issues', "developmental health," "cognitive health," which may have resulted in a shallow representation of the mental and psychological traumas experienced by these children. Throughout the process of forced migration (*pre-*, *peri-*, *post-*), refugee children are subjected to a variety of physical, mental, and psychosocial stressors, and are often accompanied by post-traumatic stress disorder (PTSD), anxiety, depression, emotional, and behavioral issues (81–83). Research by Fazel et al. (81) highlighted the influence of violence exposure on the mental health and developmental capacity of RRC depending on their migration period. Yet, these points are not comprehensive enough to draw broad conclusions about all RRC living in the U.S. More thorough examination of mental health literature and translation of qualitative data into descriptive themes should be conducted to provide a nuanced understanding of the mental health and developmental outcomes of RRC living in the U.S.

This review also did not evaluate the adverse risks, harms, and emotional burdens that refugee children could have encountered during their hazardous migration. Reports from the Yale Humanitarian Research Lab (HRL) have revealed that Russia is operating a large-scale, organized network of at least 43 camps and facilities, which has since the onset of Russia's War in Ukraine in February 2022, detained around 6,000 children in Russia-occupied Crimea and mainland (84). Prolonged exposure to such adverse childhood experiences is likely to inflict long-term health effects on the mental and developmental capabilities of children. The author did not find any clear baseline estimation of the prevalence of PTSD and depression among RRC living in the U.S. for comparative analysis, which was supported by Montgomery (83), who suggested that traumatic-related responses varied significantly depending on prior and/or current exposure to adverse childhood events. Thus, it is prudent to ascertain the prevalence of PTSD and depression among RRC and delve further into the consequences of adverse childhood experiences such as organized camps and facilities in order to gain insight and provide appropriate evidence-based practice recommendations.

Conclusion

The global refugee crisis disproportionately affects children, yet only 4% of these refugee children have resettlement opportunities. Nutrition is an area of significant concern, with both under- and overnutrition becoming common issues in the U.S. Likewise, the additional threat of micronutrient deficiencies adds to the importance of providing tailored public health initiatives and food security intervention programs to different age groups, population demographics, and growth-specific parameters. The increased risk of illness due to tuberculosis, hepatitis B virus, and vaccine-preventable diseases also requires more research into the epidemiological data of refugee populations to inform effective, systematic interventions. To facilitate this, cross-border collaboration between local/global governments, public health experts, refugee populations, and various organizations focused on disease emergence preparedness must occur. Finally, healthcare professionals are vital to managing refugee health both domestically and abroad. The role of primary care providers, public health officials, social service workers, and community advocates is indispensable in bridging refugee children with the U.S. healthcare system.

Author contributions

BP: conceptualization of mini systematic review, methodology, formal analysis, writing – original draft preparation, and writing – review and editing.

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Conflict of interest

The author declares 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

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2023.1046319/full#supplementary-material

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Prevalence of stunting among under-five children in refugee and internally displaced communities: a systematic review and meta-analysis

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Background: A pooled estimate of stunting prevalence in refugee and internally displaced under-five children can help quantify the problem and focus on the nutritional needs of these marginalized groups. We aimed to assess the pooled prevalence of stunting in refugees and internally displaced under-five children from different parts of the globe.

Methods: In this systematic review and meta-analysis, seven databases (Cochrane, EBSCOHost, EMBASE, ProQuest, PubMed, Scopus, and Web of Science) along with "preprint servers" were searched systematically from the earliest available date to 14 February 2023. Refugee and internally displaced (IDP) under-five children were included, and study quality was assessed using "National Heart, Lung, and Blood Institute (NHLBI)" tools.

Results: A total of 776 abstracts (PubMed = 208, Scopus = 192, Cochrane = 1, Web of Science = 27, Embase = 8, EBSCOHost = 123, ProQuest = 5, Google Scholar = 209, and Preprints = 3) were retrieved, duplicates removed, and screened, among which 30 studies were found eligible for qualitative and quantitative synthesis. The pooled prevalence of stunting was 26% [95% confidence interval (CI): 21–31]. Heterogeneity was high (I^2 = 99%, p < 0.01). A subgroup analysis of the type of study subjects revealed a pooled stunting

prevalence of 37% (95% CI: 23–53) in internally displaced populations and 22% (95% CI: 18–28) among refugee children. Based on geographical distribution, the stunting was 32% (95% CI: 24–40) in the African region, 34% (95% CI: 24–46) in the South-East Asian region, and 14% (95% CI: 11–19) in Eastern Mediterranean region.

Conclusion: The stunting rate is more in the internally displaced population than the refugee population and more in the South-East Asian and African regions. Our recommendation is to conduct further research to evaluate the determinants of undernutrition among under-five children of refugees and internally displaced populations from different regions so that international organizations and responsible stakeholders of that region can take effective remedial actions.

Systematic review registration: https://www.crd.york.ac.uk/prospero/display_record.php?RecordID=387156, PROSPERO [CRD42023387156].

KEYWORDS

under five children, refugee, internally displaced person, sustainable developmental goals, stunting

Introduction

Stunting has been defined as the "height-for-age *z*-score of more than two standard deviations below the World Health Organization (WHO) Child Growth Standards median," (1) which depicts the restriction of a child's potential growth (2). Globally, in 2019, 21.3% or 144 million under-five children were stunted, i.e., low height-for-age (3). In 2019, Asia represented more than half of all under-five stunted children (54%, 78.2 million) and two out of five under-five stunted children lived in Africa (40%, 57.5 million), and 4.7 million lived in Latin American and Caribbean regions (1). Stunting among children has been reported to exceed 30% in eastern Africa (34.5%), middle Africa (31.5%), southern Asia (31.7%), and Oceania (38.4%), excluding Australia and New Zealand. The long-term consequences of stunted children are shorter adult height, more susceptibility to chronic diseases in adulthood, reduced attained schooling rate, and less adult income (4).

The United Nations High Commissioner for Refugees (UNHCR) has defined a refugee as "someone who has been forced to flee his or her country because of persecution, war, or violence. A refugee has a well-founded fear of persecution for various reasons of race, religion, nationality, political opinion, or membership in a particular social group" (5). Just five countries contribute to 69% of the displaced population across borders, i.e., Syria, Venezuela, Afghanistan, South Sudan, and Myanmar. According to UNHCR's Global Report 2021, 89.3 million people worldwide were refugees (6). Internally displaced persons (IDP) are "those who has[sic] been forced to flee their home due to internal strife and natural disasters but has never crossed an international border. These persons seek safety anywhere in nearby towns, schools, settlements, internal camps, even forests, and fields." These people are the largest group that UNHCR assists (5). Countries such as Yemen, Colombia, Syria, and the Democratic Republic of the Congo contribute to the largest internally displaced populations globally. In the year 2021, 53.2 million people were internally displaced around the world (6). In the country of origin of refugees, children are vulnerable to vaccine-preventable diseases, dental problems, nutritional deficiencies, chronic infections, and non-communicable diseases due to lack of accessibility to health care in conflict areas for a prolonged period (7–9). During their journey to another country, children are at risk of communicable diseases such as diarrhea, respiratory infections, skin infections, and others due to inadequate hygiene and sanitation facilities (10). In the country of destination, the refugee groups are most vulnerable to acute food insecurity and malnutrition (11, 12). Chronic undernutrition is very common in refugees and internally displaced populations, with a prevalence of 9–54% (13–16). Pooled estimates of stunting prevalence in refugee and internally displaced communities can assist in quantifying the problem and global resource mobilization toward that problem. Previous systematic reviews on the undernutrition among the under-five children of refugees and migrant populations reported a prevalence ranging up to 23.8% (17, 18). A similar review on chronic undernutrition status among the under-five children of IDP could not be found although the circumstances leading to refugee and IDP conditions overlap. Due to the paucity of pooled data on stunting in this population group, the objective of this study was to estimate the pooled prevalence of stunting in refugees as well as internally displaced children aged <5 years from different parts of the globe.

Methods

The present systematic review and meta-analysis (SRMA) was conducted adhering to the PRISMA guidelines (19) (Supplementary Table 1).

TABLE 1 Inclusion and exclusion criteria.

Research question: What is the prevalence of stunting among under five children in refugee and internally displaced communities?		
	Inclusion	Exclusion
Participants	Refugee/internally displaced person Under-five children • All genders are included	Non-pediatric cases Migrant children
Disease	Stunting	Wasting, underweight, overweight, obesity, and micronutrient deficiency Non-communicable diseases due to overnutrition and undernutrition
Outcome	Prevalence of stunting	Risk factors/determinants of malnutrition, i.e., overweight, obesity, stunting, wasting, underweight, and micronutrient deficiency. Hospitalization Mortality due to malnutrition
Study designs	Prevalence studies, cross-sectional studies, case–control studies, cohort studies	Qualitative, policy, opinions, case studies, case series, case reports, and randomized control trial
	Geography: Global level Date of search: Publish till February 2023 English language Human studies Published and unpublished data	

Participants

The study participants were refugees and internally displaced children who were ≤5 years. The participation of children in this study was not limited to gender, social status, or ethnicity. A refugee is "a person who is outside his habitual residence or country of nationality due to fear of persecution because of his race, religion, nationality, membership and is unable or unwilling to avail himself of the protection of that country, or to return there, for fear of persecution" (20). An internally displaced person (IPD) is one who has been forced to flee their home due to internal strife and natural disasters but has never crossed an international border (21).

Eligibility criteria

Population Intervention Comparator and Outcome (PICO) criteria were used to search the research question, "What is the prevalence of stunting among under-five children in refugee and internally displaced communities?" All studies that reported stunting in under five refugees or IDPs were eligible, irrespective of publication year. The full-text articles written other than English language were not considered for this review as the research team could not search for, retrieve, and translate literature published in other languages due to lack of logistics and financial support (Table 1).

Search strategy and selection criteria

Suitable search terms and Boolean operators ("AND," "OR," and "NOT") were used to conduct the comprehensive search from the seven electronic bibliographic databases: Cochrane, EBSCOHost-Academic Search Complete, EMBASE, ProQuest, PubMed, Scopus, and Web of science. Preprint servers such as medRxiv, arXiv, bioRxiv, BioRN, ChiRxiv, ChiRN, and SSRN were incorporated as search databases (Supplementary Table 2). The following combination of search terms and keywords was used in the search:

Refugee* OR expat* OR asylum seeker* OR displaced person*
AND
Malnutrition OR undernutrition OR undernourish OR stunting OR stunt*
AND
Under five child* OR preschool child* OR less than 2 year* OR preschool child.

The retrieved studies from various databases were imported into Mendeley Desktop V1.19.5 software to coordinate the review process, remove duplicates, and manage citations. The title/abstract of the retrieved studies was screened for eligibility, and further full text of the eligible studies was appraised. The articles that met the inclusion criteria were kept for data extraction. The first search strategy was implemented in December 2022. Prior to the final analysis, the strategy was re-run in February 2023. The study was registered in PROSPERO with registration number CRD42023387156.

Data extraction and management

Two independent authors (PC and SM) independently conducted the entire review screening process; any disagreement about including a study for full-text review was resolved through discussion and consensus. Further consultation was done with the third co-author (AGP) to assess the title abstracts if there was still disagreement between the two co-authors about the inclusion of any study in this analysis. The third co-author would decide whether to include the study in a full-text review. Data extraction from the eligible full-text articles was done by two authors (PC and SM) independently. At the end of the independent extraction, a meeting was conducted to remove the discrepancies in data extraction between the authors. The third author (AGP) settled conclusively the irresolvable contradictions. Microsoft Excel spreadsheet was utilized, and a data extraction

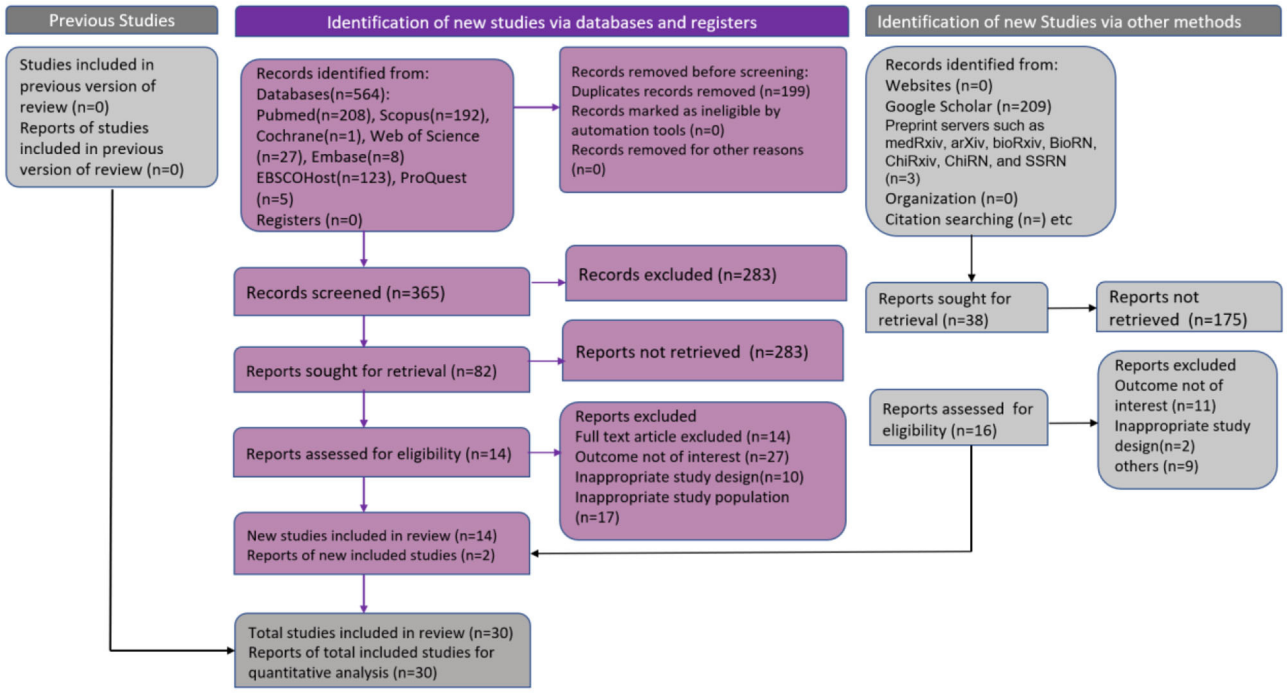

FIGURE 1
PRISMA flow chart. Flow chart showing included studies in systematic review and meta-analysis of stunting in refugee/internally displaced children.

table was formulated. From each of the final eligible studies, the following information was gathered: the author's name, the year of publication, the place of study, the origin country of refugee/IPDs, the study design, the number of participated children, prevalence of stunting in under-five children, age of included children, and gender-wise distribution of children. The Preferred Reporting Standard of Systematic Reviews and Meta-Analysis (PRISMA) flow-chart and PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) checklist were used to ensure the scientific precision of the searched articles (Figure 1; Supplementary Table 1).

Quality assessment

In order to assess the quality of the eligible observational cohort and cross-sectional studies, study assessment tools with fourteen criteria checklists from the National Heart, Lung, and Blood Institute (NHLBI) were used (22). Studies that met ten to fourteen criteria were considered good quality studies, with five to nine criteria considered fair and four or less criteria considered poor. A high rating implies a low risk of bias, and a low rating implies a high risk of bias (22).

Data analysis

The extracted data were imported into R Studio Software. A descriptive statistic of the selected studies is depicted in tables and figures. The pooled estimate of stunting was determined using a random-effects model (Dersimonian–Laird method). The studies retrieved are expected to be heterogeneous because of different geographical study areas, sample sizes, study designs, age of study participants, study periods, and methodology (23–25). The statistical heterogeneity was checked by forest plot and I^2 statistics (24). The outliers in the study were identified by a Baujat plot and diagnostic plot followed by a leave-one-out meta-analysis. Contour-enhanced funnel plot, Doi plot, LFK index (26), and Egger statistics were used to evaluate the publication bias (small study effect). Sensitivity analysis was performed by removing low-quality studies, and then the pooled estimate was determined. Graphical display of study heterogeneity (GOSH) plot analysis [*K*-means, Density-Based Spatial Clustering of Applications with Noise (DBSCAN), Gaussian] was also undertaken to identify the outliers, and a pooled estimate was arrived at after removing all the outliers, simultaneously. Heterogeneity was explored by means of subgroup analysis (27) according to the type of population (refugee & IDPs) and geographical origin of the refugees. The mixed effect model has been used for subgroup analysis. The studies within a subgroup are pooled using a common-effects model, and the subgroups themselves are pooled using a random-effect model as these subgroups might differ from each other. Here, the dependent variable is the stunting rate, and the variables based on which subgroups are made are the variables that might impact the effect size of the dependent variable. All analyses were conducted in R Studio following the standard codes (28).

Ethics

Since systematic review and meta-analysis were conducted with published literature data, ethical permission was not required.

TABLE 2 Quality assessment of included cross-sectional studies with the use of NIH quality assessment tool.

References	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Quality rating
Abdeen et al. (29)	Y	Y	Y	Y	Y	NA	NA	NA	NA	NA	Y	N	NA	NA	Good
Abou-Rizk et al. (30)	Y	Y	Y	Y	Y	NA	NA	NA	NA	NA	Y	N	NA	NA	Good
Abukishk et al. (31)	Y	Y	Y	Y	NI	NA	NA	NA	NA	NA	Y	N	NA	NA	Fair
Akeh et al. (32)	Y	Y	Y	Y	Y	NA	NA	NA	NA	NA	Y	N	NA	NA	Good
Ali et al. (14)	Y	Y	Y	Y	Y	NA	NA	NA	NA	NA	Y	N	NA	NA	Good
Bilukha et al. (33)	Y	Y	Y	Y	NI	NA	NA	NA	NA	NA	Y	N	NA	NA	Fair
Bougma et al. (34)	Y	Y	Y	Y	CD	NA	NA	NA	NA	NA	Y	N	NA	NA	Fair
Brhane et al. (35)	Y	Y	Y	Y	Y	NA	NA	NA	NA	NA	N	N	NA	NA	Fair
Ejigu et al. (36)	Y	Y	Y	Y	Y	NA	NA	NA	NA	NA	Y	N	NA	NA	Good
El Kishawi et al. (16)	Y	Y	Y	Y	CD	NA	NA	NA	NA	NA	Y	N	NA	NA	Fair
Faine et al. (37)	Y	Y	Y	Y	Y	NA	NA	NA	NA	NA	Y	N	NA	NA	Good
Faraj (38)	Y	Y	Y	Y	Y	NA	NA	NA	NA	NA	Y	N	NA	NA	Good
Grijalva et al. (39)	Y	Y	Y	Y	Y	NA	NA	NA	NA	NA	Y	N	NA	NA	Good
Haque et al. (40)	Y	Y	Y	Y	NI	NA	NA	NA	NA	NA	Y	N	NA	NA	Fair
Hasib et al. (41)	Y	Y	Y	Y	NI	NA	NA	NA	NA	NA	Y	N	NA	NA	Fair
Hein et al. (42)	Y	Y	Y	Y	Y	NA	NA	NA	NA	NA	Y	N	NA	NA	Good
Hoddinott et al. (43)	Y	Y	Y	Y	NI	NA	NA	NA	NA	NA	Y	N	NA	NA	Fair
Idowu et al. (15)	**Y**	**Y**	**Y**	**Y**	**Y**	**NA**	**NA**	**NA**	**NA**	**NA**	**Y**	**N**	**NA**	**NA**	**Good**
Jayatissa et al. (44)	Y	Y	Y	Y	Y	NA	NA	NA	NA	NA	Y	N	NA	NA	Good
Jemal et al. (45)	Y	Y	Y	Y	Y	NA	NA	NA	NA	NA	Y	N	NA	NA	Good
Komasi (46)	Y	Y	Y	Y	NI	NA	NA	NA	NA	NA	Y	N	NA	NA	Fair
Mandre et al. (47)	Y	Y	Y	Y	Y	NA	NA	NA	NA	NA	N	N	NA	NA	Fair
Centers for Disease Control (CDC) (48)	Y	Y	Y	Y	NI	NA	NA	NA	NA	NA	Y	N	NA	NA	Fair
Nwagboso (49)	Y	Y	Y	Y	Y	NA	NA	NA	NA	NA	Y	N	NA	NA	Good
Olwedo et al. (50)	Y	Y	Y	Y	CD	NA	NA	NA	NA	NA	Y	N	NA	NA	Fair
Praditsorn et al. (51)	Y	Y	Y	Y	Y	NA	NA	NA	NA	NA	Y	N	NA	NA	Good
Pernitez-Agan et al. (52)	Y	Y	Y	Y	NI	NA	NA	NA	NA	NA	Y	N	NA	NA	Fair

(Continued)

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TABLE 2 (Continued)

References	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Quality rating
Smock et al. (13)	Y	Y	Y	Y	NI	NA	NA	NA	NA	NA	Y	N	NA	NA	Fair
Vakos et al. (53)	Y	Y	Y	Y	NI	NA	NA	NA	NA	NA	Y	N	NA	NA	Fair
Walpole et al. (54)	Y	Y	Y	Y	NI	NA	NA	NA	NA	NA	Y	N	NA	NA	Fair

Y, yes; N, No; NA, not applicable; CD, cannot determine; NI, no information.
Q1: Was the research question or objective in this paper clearly stated?
Q2: Was the study population clearly specified and defined?
Q3: Was the participation rate of eligible persons at least 50%?
Q4: Were all the subjects selected or recruited from the same or similar populations (including the same time period)? Were inclusion and exclusion criteria for being in the study prespecified and applied uniformly to all participants?
Q5: Was a sample size justification, power description, or variance and effect estimates provided?
Q6: For the analyses in this paper, were the exposure(s) of interest measured prior to the outcome(s) being measured?
Q7: Was the timeframe sufficient so that one could reasonably expect to see an association between exposure and outcome if it existed?
Q8: For exposures that can vary in amount or level, did the study examine different levels of the exposure as related to the outcome (e.g., categories of exposure, or exposure measured as continuous variable)?
Q9: Were the exposure measures (independent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?
Q10: Was the exposure(s) assessed more than once over time?
Q11: Were the outcome measures (dependent variables) clearly defined, valid, reliable, and implemented consistently across all study participants?
Q12: Were the outcome assessors blinded to the exposure status of participants?
Q13: Was loss to follow-up after baseline 20% or less?
Q14: Were key potential confounding variables measured and adjusted statistically for their impact on the relationship between exposure(s) and outcome(s)?

Results

Search and screening results

A total of 776 articles were yielded in the systematic search from different databases such as Cochrane (1), EBSCOHost-Academic Search Complete (123), EMBASE (8), ProQuest (5), PubMed (208), Scopus (192), Web of science (27), preprint servers such as medRxiv, arXiv, bioRxiv, BioRN, ChiRxiv, ChiRN and SSRN (3), and Google Scholar (209). Among them, 199 duplicate studies were excluded. The title/abstract screening of 577 articles was done, and 458 articles were removed due to ineligibility. Full-text screening was performed on 120 eligible articles. Among them, 90 articles were eliminated as they did not satisfy the inclusion criteria. In total, 30 studies were eligible and included in the systematic review and meta-analysis. The process has been demonstrated in the PRISMA flow (Figure 1).

Quality assessment

The quality assessment of the included study findings is demonstrated in Table 2. Of the 30 studies, 14 (46.7%) were found to be of good quality and 16 (53.3%) of fair quality.

Baseline features of the included studies

The baseline characteristics of each article were analyzed and summarized (participants, study design, country of origin of refugees, and outcome) in Table 3. Of the 30 studies, 29 were cross-sectional (14–16, 29–54), while one record-based study was found (13). The study period ranged from 2005 to 2022, with 22 studies conducted among the refugee population and eight studies conducted among internally displaced population. In terms of geographical distribution, the majority (12 out of 30) of the refugees originated from the African region (15, 32, 34–37, 39, 45, 47, 49, 50), followed by the Eastern Mediterranean Region (eight out of 30) (16, 29–31, 33, 52–54) and South-East Asian region of WHO member states (nine out of 30) (14, 38, 40–44, 48, 51). One study was multicountry research (13), where the refugee population included were from Africa, South, East and Central Asia, and the Pacific African countries. In eight studies, participants were internally displaced, out of which four studies had population groups from the African region (Nigeria, Uganda, Burkina Faso, and Cameroon) (15, 32, 34, 50), and four studies had population groups from South-East Asian (Srilanka, Pakistan, Bangladesh, and Myanmar) (14, 40, 42, 44). Overall, 30 studies, including 31,565 under-five refugee and internally displaced children, were found eligible for the meta-analysis. The range of sample size was 100 (41) to 14,552 (52). Overall, 50.4% of study participants were men and 49.6% were women. The children in the review ranged from newborn to 5 years of age. There was a varying proportion of under-five refugee children with stunting ranging from 9% in Syrian refugees residing in Lebanon (Western Asia) (30) to 59.4% in the internally displaced population residing in Myanmar (42) (Table 3).

TABLE 3 Baseline characteristics of refugee/IPD children with stunting ($N = 30$ studies).

References	Residing country of refugee/IDPs	Origin country of refugee	Study design	Sample	Stunting prevalence	Age	Men (%)	Women (%)
Praditsorn et al. (51)	Thailand Myanmar Border	Mynmar	Cross-sectional study	2,702	28.8%	6–59 months (mean: 30 ± 15 month)	52.1%	47.9%
Grijalva-Eternod et al. (39)	Algeria	Western Saharan region	Cross-Sectional study	1,608	29.1%	6–59 months	51.4%	48.6%
El Kishawi et al. (16)	Palestine	Palestine territory	Cross-Sectional study	357	19.60%	2–5 years (mean: (39.58 ± 10.74 month)	52.7%	47.3%
Ali et al. (14)	Pakistan	Internally displaced	Cross-Sectional study	446	12.5%	6–59 months	45.1%	54.9%
Idowu et al. (15)	Nigeria	Internally displaced	Cross-sectional study	317	53.9%	0–59 months (median: 24 months)	50.8%	49.2%
Walpole et al. (54)	Greece	Syria	Cross-Sectional study	114	16.7%	<5 years	50.8%	49.2%
Abou-Rizk et al. (30)	Lebanon	Syria	Cross-Sectional study	432	9%	<5 years (mean: 16.7 ± 14.3 months)	52.5%	47.5%
Smock et al. (13)	Massachusetts	Multicountry	Record based study	1,561	10%	Under 5 years	51.1%	48.8%
Abukishk et al. (31)	Jordan	Palestine	Cross-Sectional study	367	22.9%	Under 5 years	49.6%	50.4%
Abdeen et al. (29)	Palestine	Palestine territory	Cross-Sectional study	1,331	12.4%	6–59 months	51.4%	48.6%
Olwedo et al. (50)	Uganda	Internally displaced	Cross-Sectional study	672	52.4%	3–59 months	1.2%	98.8%
Centers for Disease Control (CDC) (48)	Nepal	Bhutan	Cross-Sectional study	497	26.9%	6–59 months	–	–
Hoddinott et al. (43)	Bangladesh	Mynmar	Cross-Sectional study	523	33.4%	6–23 months (mean: 15.5 ± 4.7 months)	47.8%	52.2%
Jayatissa et al. (44)	Sri Lanka	Internally displaced	Cross-Sectional study	878	20.2%	Under 5 years	49.1%	50.9%
Bougma et al. (34)	Burkina Faso	Internally displaced	Cross-Sectional study	205	45.9%	Under 5 years	52.2%	47.8%
Haque et al. (40)	Bangladesh	Internally displaced	Cross-Sectional study	387	45%	3–5 years (mean: 4.10 ± 0.84)	–	–
Hein et al. (42)	Myanmar	Internally displaced	Cross-Sectional study	320	59.4%	6–59 months	56.9%	43.1%
Pernitez-Agan et al. (52)	Turkey, Lebanon, Jordan, Iraq, Egypt	Syria	Cross-Sectional study	14,552	9.1%	6–59 months	51.6%	48.4%
Hasib et al. (41)	Bangladesh	Myanmar	Cross-Sectional study	100	41%	0–5 years	–	–
Komasi (46)	Ghanna	La Cote D'Ivoire	Cross-Sectional study	150	18%	6–59 months	54%	46%
Faraj (38)	Thailand	Burma	Cross-Sectional study	540	46.5%	6–59 months	51.1%	48.9%
Mandre et al. (47)	Uganda	Sudan	Cross-Sectional study	340	24.7%	6–59 months	–	–
Vakos et al. (53)	Jordan	Syria	Cross-Sectional study	165	13.9%	0–59 months	–	–
Bilukha et al. (33)	Jordan	Syria	Cross-Sectional study	327	17%	6–59 months	–	–
Faine et al. (37)	Cameroon	Nigeria	Cross-Sectional study	366	22.4%	6–59 months	53%	47%

(Continued)

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TABLE 3 (Continued)

References	Residing country of refugee/IDPs	Origin country of refugee	Study design	Sample	Stunting prevalence	Age	Men (%)	Women (%)
Jemal and Haidar (45)	Ethiopia	Somalia	Cross-Sectional study	671	27.6%	6–59 months	51.7%	48.3%
Brhane (35)	Ethiopia	Eritrea	Cross-Sectional study	471	37%	6–59 months	50.74%	49.25%
Nwagboso (49)	Namibia	Angola	Cross-Sectional study	574	41.46%	6–59 months	44.94%	55.06%
Ejigu et al. (36)	Ethiopia	Somalia, Sudan, Eritrea	Cross-Sectional study	367	18.8%	6–59 months	51.5%	48.5%
Akeh et al. (32)	Cameroon	Internally displaced	Cross-Sectional study	395	22.1%	6–59 months 38.4 ± 17.7 months	59%	41%

Pooled estimate of stunting

A meta-analysis was performed to evaluate the prevalence of stunting among 31,565 under-five refugee and internally displaced children, among whom 5,930 had stunting. The effect size (pooled prevalence) of stunting in under-five refugee and internally displaced children was 26% [95% confidence interval (CI), 21–31]. The prediction interval was found to be between 7 and 62%. The mean effect size of comparable studies would fall anywhere in this prediction interval (Figure 2). High heterogeneity was found in the current meta-analysis (I^2 = 99%; p = <0.001), reflecting variance in true effects rather than sampling error. Hence, a random-effects model was applied. The contour-enhanced funnel plot showed an asymmetrical funnel with Egger's statistics p-value of 0.0254. The LFK index was 1.36 in the Doi plot, which revealed a small study effect or publication bias (Figure 3). The Baujat and diagnostic plots were made to identify studies contributing to heterogeneity (Supplementary Figures 1, 2). Leave-one-out analysis revealed no significant change in the pooled estimate or the heterogeneity (Supplementary Figure 3). GOSH plot analysis (K-means, DBSCAN, and Gaussian) revealed that the studies by Abou-Risk et al., Hein et al., Pernitez-Agan et al., and Olwedo et al. were the potential outliers, and the pooled analysis was conducted after removing the outlier studies (Figures 4, 5; Supplementary Figures S4–S9). The forest plot was made after the removal of potential outliers through GOSH plot analysis, where it was found that the pooled estimate of stunting was the same-26% (CI- 21 to 31) but the heterogeneity had decreased to 97% (Figure 6).

Subgroup analysis

Subgroup analysis conducted on the basis of type of children revealed that internally displaced children (IDP group) had a higher prevalence of stunting (37%) when compared to the refugee children (22%) (Table 4). According to the WHO regions, refugees from the South-East Asian region (SEAR) had the highest prevalence of stunting (34%) when compared with African countries (32%) and Eastern Mediterranean Region (EMR) (14%) (Table 4). However, heterogeneity remained high between the studies within the subgroups (95–99%).

Discussion

The pooled prevalence of stunting has been estimated to be 26% among the under-five children of the refugees and internally displaced population in the index analysis. This is marginally higher than the global stunting rates reported among the under-five children (22%) (55). However, while subgrouping, children belonging to IDPs had a significantly higher prevalence of stunting (37%) than the refugees (22%), indicating higher vulnerability among the IDPs. This might be due to the impact of the socioeconomic capability of the host country in providing aid and provisions for the refugees. In contrast, since the IDPs have moved to a different place within the same country, the country's capacity remains the same, while on the other hand, the environment milieu has been changed for such people. The IDPs included

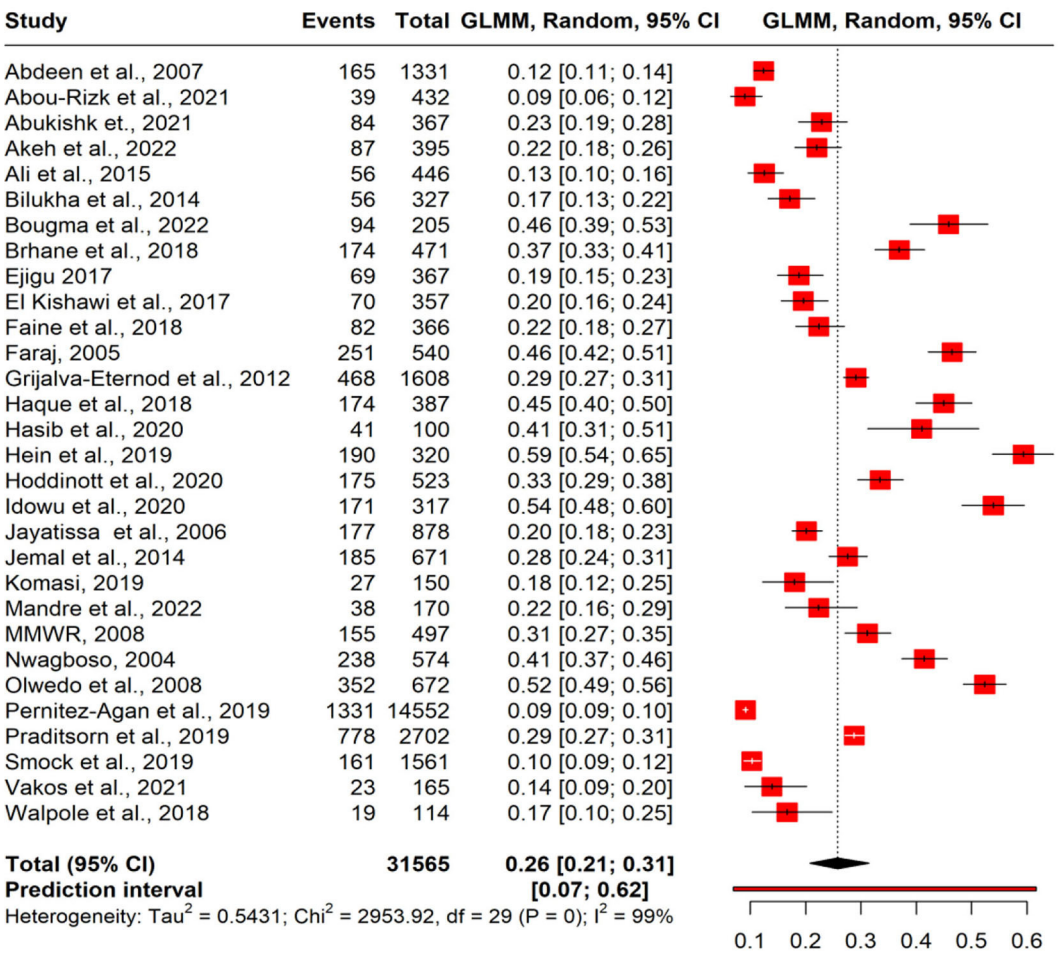

FIGURE 2
Forest plot of pooled magnitude of stunting in refugee children. GLMM, generalized linear mixed effects model.

in the present analysis were from either low-income or low-middle-income countries in Asia and Africa, thus restricting the economic capability of the country to respond adequately to the IDPs. The stunting rate was less in countries with high human development index (HDI) and vice versa, which means there is a linear relationship between HDI and stunting rate (56).

Across the world, 59.1 million people are internally displaced (21). The vulnerability of the IDPs has tended to remain high compared to the refugees owing to the IDP camps located close to the conflicts or, at times, trapped within the conflict zones (57). Research among this vulnerable section-IDPs, to bring out the potential factors has also been lacking (58). One of the potential reasons for the high vulnerability among IDPs might be due to non-compliance of the respective country/nation states to the international norms on the IDPs (59), and it is seen as an internal issue by the country, with limited role or part allowed for the international community to play. Analytical and qualitative studies assessing the determinants of nutrition between the refugees and IDPs may shed further clarity on the variations.

Regarding the regional variation, children from refugees and IDPs from the SEAR had the highest stunting rate (34%), followed by the African region (32%), which was higher than the global rate. Refugee children had a 50% higher stunting rate than their counterparts among the general population of the African region (31%) (59). The intersection of the African region and the attribute of internal displacement has revealed high stunting ranging upto 54% (15). This adverse intersection needs to be further evaluated for the underlying causes and addressed adequately. South-East Asian countries reported a stunting rate of 34%, which was slightly higher than the rates prevailing among the general population (27%) (60). IDPs from Myanmar reported the highest prevalence of stunting among the included children (59%) (42). Lack of dietary diversity has been attributed as a potential factor for this high rate of stunting (42). Children of the Rohingyas from Myanmar, currently in Bangladesh, had a stunting rate of 33.4% (43), which was also the highest among the Asian countries included in the analysis. Rohingyas are labeled the "most persecuted minority in the world" by the United Nations and, consequently, the most vulnerable population for poor health outcomes (61). None of the Rohingyas who moved into Bangladesh in or after 2017 were given refugee status (43), but are called "Forcibly Displaced Myanmar Nationals" (62).

This is the first study to estimate the pooled prevalence of stunting among under-five refugee and internally displaced

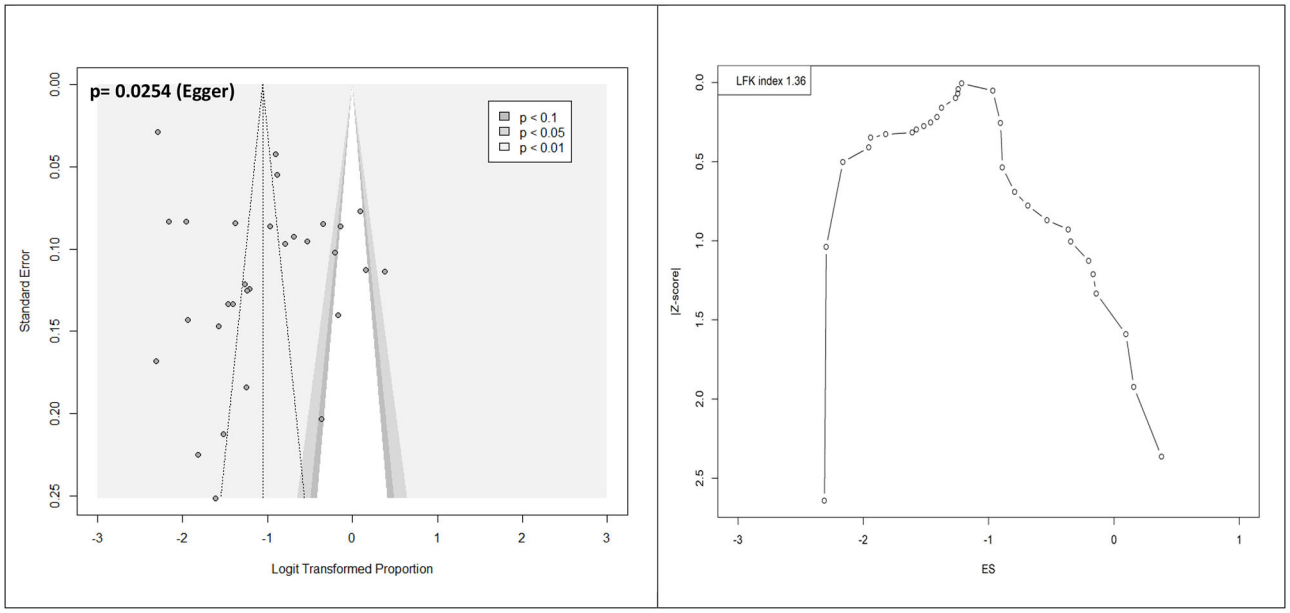

FIGURE 3
Publication bias assessed by contour-enhanced funnel plot and Doi plot.

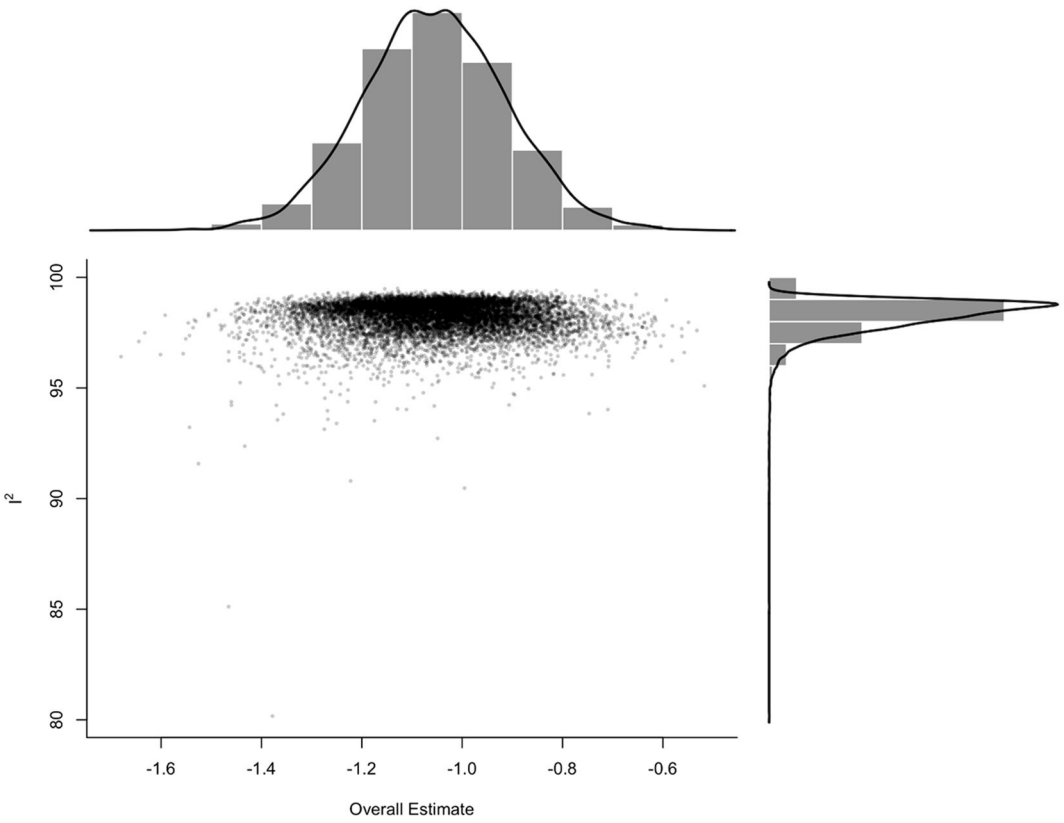

FIGURE 4
Graphic display of heterogeneity (GOSH) plot analysis.

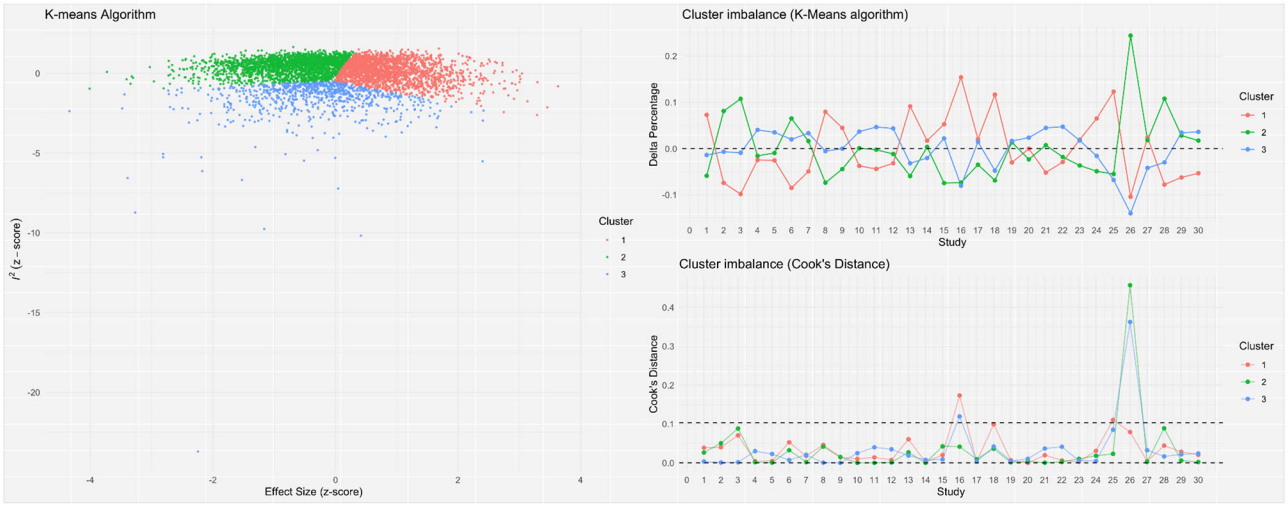

FIGURE 5
K-means GOSH plot analysis.

Study	Events	Total	GLMM, Random, 95% CI
Abdeen et al., 2007	165	1331	0.12 [0.11; 0.14]
Abou-Rizk et al., 2021	39	432	0.09 [0.06; 0.12]
Abukishk et., 2021	84	367	0.23 [0.19; 0.28]
Akeh et al., 2022	87	395	0.22 [0.18; 0.26]
Ali et al., 2015	56	446	0.13 [0.10; 0.16]
Bilukha et al., 2014	56	327	0.17 [0.13; 0.22]
Bougma et al., 2022	94	205	0.46 [0.39; 0.53]
Brhane et al., 2018	174	471	0.37 [0.33; 0.41]
Ejigu 2017	69	367	0.19 [0.15; 0.23]
El Kishawi et al., 2017	70	357	0.20 [0.16; 0.24]
Faine et al., 2018	82	366	0.22 [0.18; 0.27]
Faraj, 2005	251	540	0.46 [0.42; 0.51]
Grijalva-Eternod et al., 2012	468	1608	0.29 [0.27; 0.31]
Haque et al., 2018	174	387	0.45 [0.40; 0.50]
Hasib et al., 2020	41	100	0.41 [0.31; 0.51]
Hein et al., 2019	190	320	0.59 [0.54; 0.65]
Hoddinott et al., 2020	175	523	0.33 [0.29; 0.38]
Idowu et al., 2020	171	317	0.54 [0.48; 0.60]
Jayatissa et al., 2006	177	878	0.20 [0.18; 0.23]
Jemal et al., 2014	185	671	0.28 [0.24; 0.31]
Komasi, 2019	27	150	0.18 [0.12; 0.25]
Mandre et al., 2022	38	170	0.22 [0.16; 0.29]
MMWR, 2008	155	497	0.31 [0.27; 0.35]
Nwagboso, 2004	238	574	0.41 [0.37; 0.46]
Olwedo et al., 2008	352	672	0.52 [0.49; 0.56]
Pernitez-Agan et al., 2019	1331	14552	0.09 [0.09; 0.10]
Praditsorn et al., 2019	778	2702	0.29 [0.27; 0.31]
Smock et al., 2019	161	1561	0.10 [0.09; 0.12]
Vakos et al., 2021	23	165	0.14 [0.09; 0.20]
Walpole et al., 2018	19	114	0.17 [0.10; 0.25]
Total (95% CI)		**31565**	**0.26 [0.21; 0.31]**
Prediction interval			**[0.09; 0.56]**

Heterogeneity: $Tau^2 = 0.3745$; $Chi^2 = 883.98$, df = 25 ($P < 0.01$); $I^2 = 97\%$

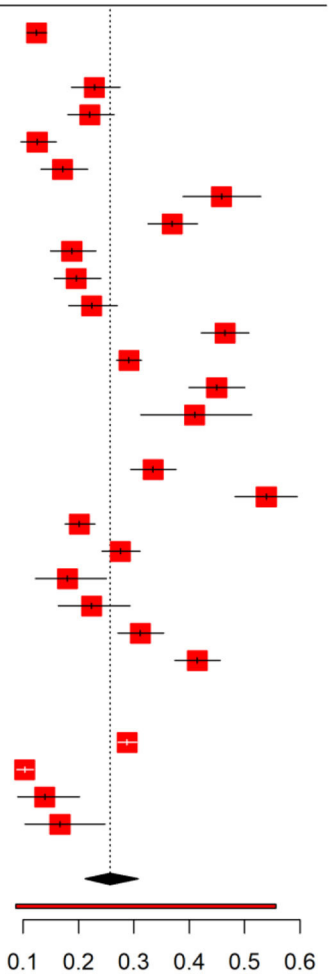

FIGURE 6
Forest plot after removal of potential outlier through GOSH plot analysis.

TABLE 4 Subgroup analysis of the studies reporting the stunting based on refugee population and internally displaced person.

Factors	No. of studies	Estimate (95% CI)	*p*	I^2	P subgroup
WHO Regions*					<0.01
Africa	12	32 (24–40)	<0.01	97%	
South-East Asian region	5	34 (24–46)	<0.01	97%	
Eastern Mediterranean region	8	14 (11–19)	<0.01	95%	
Multi Region	1	10 (9–12)	<0.01		
IDP/Refugee					0.02
Internally displaced person	8	37 (23–53)	<0.01	98%	
Refugee	22	22 (18–28)	<0.01	99%	

A mixed-effects model was applied to the subgroup meta-analysis.
*One multi-region study (13).

children worldwide. Objective tools were used to assess and report the quality of the studies included in the meta-analysis. A better measure of publication bias, the Doi plot, was used to assess the publication bias between the studies. High heterogeneity and the potential publication bias are the major limitations. Variation in the field application of the tools to measure anthropometry is also a limitation, contributing to the high heterogeneity. The authors have explored the heterogeneity by means of subgroup analysis and sensitivity analysis. GHOSH plots and diagnostic tests were applied to identify outliers, and sensitivity analysis was conducted. Although heterogeneity could not be reduced, it revealed a differential pattern of stunting prevalence between the type of refugee/IDP and the geographical origin. The persistence of high heterogeneity indicates that racial, ethnic, and socio-cultural factors might have more impact on the nutritional status.

Conclusion

The stunting rate among the under-five children of refugees and IDPs is 24%, with a higher prevalence among the IDPs (32%). Geographically, refugees and IDP children from the African region, and ethnically, the Rohingya children are the most vulnerable and stunted. Further research on the determinants of the nutrition status of the African IDPs and Rohingyas needs to be conducted. Implementation of interventions to address the disproportionately higher stunting among the children of IDPs, Rohingyas, and the African region might improve the nutritional status of these marginalized groups.

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 authors.

Author contributions

PC: Conceptualization, Data curation, Investigation, Methodology, Visualization, Writing—original draft. BP: Conceptualization, Data curation, Formal analysis, Methodology, Resources, Validation, Visualization, Writing—original draft. AM: Conceptualization, Data curation, Investigation, Methodology, Writing—original draft. AG: Conceptualization, Formal analysis, Methodology, Project administration, Writing—original draft, Writing—review & editing. SM: Conceptualization, Formal analysis, Methodology, Writing—original draft. NS: Conceptualization, Data curation, Methodology, Writing—original draft. SB: Conceptualization, Data curation, Methodology, Writing—original draft. PS: Conceptualization, Data curation, Methodology, Writing—original draft. MS: Conceptualization, Data curation, Formal analysis, Software, Writing—original draft. LT: Data curation, Formal analysis, Methodology, Writing—original draft. SR: Conceptualization, Formal analysis, Project administration, Supervision, Writing—original draft. RS: Conceptualization, Formal analysis, Project administration, Supervision, Writing—original draft. MK: Data curation, Methodology, Resources, Writing—review & editing. SG: Conceptualization, Methodology, Resources, Writing—review & editing. QZ: Data curation, Methodology, Resources, Writing—review & editing. AA-A: Data curation, Methodology, Software, Writing—review & editing. HA: Conceptualization, Data curation, Funding acquisition, Methodology, Project administration, Writing—original draft.

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Conflict of interest

HA was employed by Hamad Medical Corporation.

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.

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Supplementary material

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2023.1278343/full#supplementary-material

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How does social integration work when older migrants obtain health services from community? Evidence from national database in China

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Background: The roles of community are often overlooked when studying the older migrants' health issues, and more importantly, the mediating effect of social integration on the health of older migrants were rarely investigated empirically.

Methods: This study developed comprehensive index to explore this relationship. With data from the 2017 China Migrants Dynamic Survey, the study first examined the potential linkage between community-based health services and the health of older migrants. Ordered logit regressions was carried to investigate whether the self-rated health of older migrants is related to health education and health records provided by community, then the Causal Stepwise Regression and bootstrap method was used to looked into the potential mediation effect.

Results: The findings showed that older migrants with more community-based health education had higher self-rated health ($\beta = 0.038$, SE $= 0.009$, $p < 0.001$). However, the community-based health records were not associated with older migrants' health. Moreover, higher levels of social integration were associated with community health education ($\beta = 0.142$, SE $= 0.014$, $p < 0.001$), and social integration was positively associated with older migrants' health ($\beta = 0.039$, SE $=$ 0.002, $p = 0.024$), indicating the mediation role of social integration.

Conclusion: The vital role of community-based health education in improving the health of older migrants was found, and social integration plays a mediating role.

KEYWORDS

community-based, health services, Chinese older migrants, health status, social integration

1 Introduction

The emergence of the migrant older adults in China is accompanied with urbanization and the large-scale rural-to-urban migration (1). Migrant older adults denote those over 60 years old who have departed from their household registration residence for a period exceeding 6 months, due to reasons such as working or providing care for grandchildren (2). Different from the western countries, in China, with extended family value, the older people also move alone with their children' migration.

And it has been common for those older migrants to look after grandchildren (3). As migrant patterns become increasingly centered around family, the number of older migrant individuals has grown rapidly, becoming a crucial group for driving China's society and economy development (4). According to a survey conducted for the China Migrant Development Report 2018, the number of these people was approximately about 20 million, accounting for 8% of all migrant population (5). The scale would further increase in the future, along with the ongoing urbanization and population aging (6). The older migrants consequently become what should be focused.

The older migrants' health is a significant concern of the aging society and influences the function of family, however, these people usually face more vulnerability than other migrant people due to aging (7, 8). Firstly, their ability to adapt to the new environment in the host city is decreasing with aging (9). As the duration of residence in new environment increases, long-term exposure to the accumulation of chronic stress significantly reduces the health status of older migrants (10, 11). They actually need more health recourses than the younger and urban counterpart. However, since the distribution of urban health resources in China is based on household registration status, most of them are excluding from urban public healthcare services and other social welfare benefits (12, 13). Previous research has suggested a high percentage of chronic illnesses and a low ratio of hospitalization among them (14, 15). Secondly, the social capital of these migrant people has been limited when the leave their original place to an unfamiliar city (16). In the host city, the majority of them has no fixed workplace and other social organizations who could act as supporters, nor do they have diverse social activities. Thus, their social circle and interaction is limited to the community they live, showing a high dependency on the community (17). This increases the importance of community in providing health productions and services. However, to date, the health issues has been regarded as a family responsibility for a long term (18, 19), resulting in an ineffective health maintenance and improvement for these people.

Looking into community health services could provide a practical perspective on the wellbeing of migrants. Previous research on immigrants in Europe and America has confirmed that the enhancement of community-based healthcare services improved international migrants' health (20, 21). However, we could not know to what extent the same could be a case for China. To date, the health issues of older migrants in China mainly analyzed from individual characteristics and family characteristics of older migrants (22, 23). Among the very limited studies that took the community as an analysis unit, they have addressed the informal community services, supports and interactions, all of which roles have been proved as positive and significant in influencing older migrants' overall health (24, 25), the community-based formal service support was neglected. In addition, the deeper underlying mechanisms behind in the relationship between the community support and the older migrants' health are unclear (26). It is necessary to pay attention to especially the formal public health services provided by the community and explore their role in health. Not only in academics, but also in practice, the narrowed scope of health issues on individual and family prescriptive results in an ineffective health maintenance and improvement for these people. Actually, the Chinese central authorities have emphasized the importance of community development. 2019 National Medium and Long-term Plan for Actively Coping with Population Aging has encouraged communities to facilitate service provision for senior citizens, improve community-based public health education, enhance citizens' quality of life, and make substantial contributes toward optimal aging. However, as there are in effect almost no formal provision public health services for older migrants in communities, Chinese older migrants often lack a comprehensive understanding of community-based public services.

One potential associated mechanism in community-based services affecting the older migrant's health may be social integration. According to the social capital theory, community is an important platform for promoting and accumulating social capital for older immigrants, the formation of community social capital requires the community to transform the residents' interaction needs into actual interaction behaviors (27, 28). Previous studies have already demonstrated that the interactive activities in the community are a process of community social capital accumulation (29, 30), community can create such opportunities to interact with others as various health services includes offline health promotion and health education lecture, and the positive relationships formed can enhance the recognition of the older migrants by local residents, which can enhance the social integration of the migrant population (31). In addition, research has also found association social integration and the health outcomes of migrants (32, 33). Based on the Transform program, which is a poverty alleviation program in the Philippines, explored the mechanisms by which social capital at the community level affects self-rated health, and revealed that access to connections with others in the community through the program significantly enhanced self-rated health by 17% (34). Besides, the community support also can be viewed as a sociocultural and spiritual resource that ultimately contributes to improved overall health by strengthening their sense of community identity and alleviating personal stress and sense of loneliness, ultimately improve their overall health (35, 36).

Focusing on the understudied community context, this study aims to investigate the association between community-based health services and the health of older migrants in China, and further to explore the underlying mechanisms behind in the relationship. As the older migrant population is increasing rapidly in China, such analyses and findings provide insights for improving the health of this population and promoting specific behaviors related to community public health service provision.

2 Materials and methods

2.1 Study sample

This paper uses the 2017 China Migrants Dynamic Survey (CMDS), which was obtained from a survey conducted by the National Health and Family Planning Commission. The survey covers 31 provinces, autonomous regions and municipalities, the Xinjiang Production and Construction Corps in China, using the probability proportional scale sampling (PPS) method to survey

the migrant population aged 15 years and older (37). All sample individuals are surveyed through face-to-face interviews and questionnaires. Besides, the CMDS data covers the questionnaires on public health services, migrant and residence intention and social integration, with broader range of variables and good reliability and validity, which can provide a data source for this study. Additionally, although the CMDS data from 2017 is survey data collected before the pandemic, it remains highly representative and consistent with the current trend of China's migrant population, making it applicable to the context of 2023. The 2017 CMDS data contained a total of 169,989 samples. Out of the total sample, a total of 5,986 older people over the aged 60 were extracted. Additionally, there were 646 samples with missing values in each variable and those who answered "don't know," "not sure," and "can't answer" options were eliminated, and finally 5,340 valid samples were obtained.

2.2 Measures

2.2.1 Dependent variable

Self-rated health does not only reflect the subjective experiences of older migrants, composed of their daily health behaviors, psychological status and major illnesses, but also include their general feelings about socialization, which can comprehensively evaluate both subjective and objective aspects of individual health (38). In this paper, the questionnaire "How do you feel about your own health now" was selected to measure the health of older migrant people. The question includes four options: 1. healthy; 2. generally healthy; 3. unhealthy but able to take care of themselves; and 4. unable to take care of themselves. To facilitate the analysis and maintain consistency with the independent variables, the options were recoded as "very poor," "poor," "better," and "very good," respectively from 1 to 4. In addition, the four categorical variables of self-rated health in the original questionnaire were directly retained in order to ensure the accuracy of data (39).

2.2.2 Independent variables

Community-based health services were measured through health education and health records, because these were the only two public health service programs that were available to the entire population in China, which implied that older migrant individuals have access to these services (40). Community health education was selected from the question "In the past year, did you receive health education in your current village/community", with nine options including "occupational disease prevention and control," "AIDS prevention," "reproductive health," "tuberculosis prevention and control," "smoking prevention and control," "mental health," "chronic disease prevention and control," "self-help in public emergencies," and "eugenics and excellent pregnancy knowledge." The nine questions were treated as dummy variables, with "yes" coded as "1" and "no" coded as "0". On this basis, the total value of these nine variables was calculated to measure the overall level of community-based health education.

To determine the availability of community health records, we selected the question "Have you established a local health record?" with answer options of 1. "yes, established"; 2. "no, never heard of it"; 3. "no, but heard of it"; and 4. "not sure". In order to reflect the availability of community health records directly, the variable was treated as a dichotomous variable after excluding those who answered "not sure". Those who responded "yes, already established" were considered to be "providing community health records" and were coded as "1". Those who responded "no, never heard of it" and "no, but heard of it" were considered as "providing community health records". The responses "no, never heard of it" and "no, but heard of it" were considered as "not established" and were coded as "0".

2.2.3 Mediator variable

The mediator variable was social integration. Measured by the agreement with the statements: "I like the city/place where I live now," "I am concerned about the changes in the city/place where I live now," "I would love to integrate among the locals and become one of them," "I feel that the locals are willing to accept me as one of them," "I feel that I am already a local," "I feel that locals look down on outsiders," "It is more important for me to do things according to the customs of my hometown," and "My hygiene habits are quite different from those of local citizens." Each question includes four options: 1. fully disagree; 2. disagree; 3. basically agree; 4. fully agree. Drawing on relevant studies (41, 42), the scores of eight variables were combined into a total score using factor analysis. The score ranged from 8 to 32, with the higher the value taken, the higher the social integration level of the respondent.

2.2.4 Control variables

According to existing studies, three categories of factors should be taken into account when studying older migrant populations including demographic, socioeconomic, and migrant characteristics. Individual characteristics variables include sex (0 = female; 1 = male), household registration (0 = urban; 1 = rural), marital status (0 = without spouse; 1 = with spouse), and education level (1 = primary school or less; 2 = junior high school; 3 = high school or more). Socioeconomic characteristics variables include personal income, measured by log of family income, work status (0 = without work; 1 = with work), and insured status (0 = no; 1 = yes). Migrant characteristics variables include migrant range (1 = interprovincial migrant; 2 = intercity migrant within the province; 3 = intercounty migrant within the city), migrant reason (1 = doing business and working; 2 = caring for children; 3 = migrant for aged-care; 4 = others), and the time of migrant.

2.3 Data analysis

The statistical analyses were conducted by STATA SE Version 15.1. Descriptive analysis was performed to investigate the initial differences in the sample, including the mean, standard deviation, minimum, and maximum values of all variables in the sample. Ordered logit regression was conducted to investigate

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the association between community-based health services and the health of older migrants. Model 1 examined the association between all control variables and self-rated health. Model 2 included community health education and examined their effect on self-rated health. Model 3 included community health records and examined their effect on self-rated health. Model 4 incorporated all variables to fully examine the association of community-based health services and other variables on health, as well as the resulting coefficient changes. The Causal Stepwise Regression (CSR) method was used to analyze the mediating effects of social integration by decomposing the total effect of community health services on the self-rated health of older migrants into direct and indirect effects. CSR is a commonly used method for identifying causality. By gradually adding independent and control variables (43), it can determine which variables have the significant impact on the health of older migrants. In addition, to test the robustness of the study results, a sensitivity analysis was performed by selecting the substitute variables of dependent variable. Substitute variables include disease status and general health index, in which general health index was an operational treatment of self-rated health, chronic disease and common disease indicators by means of average sum (44).

3 Results

3.1 Descriptive statistical analysis

Table 1 presents a comprehensive overview of the key characteristics of the sample of older migrant individuals. The mean value of self-rated health of older migrants was 3.220 (SD = 0.773; range = 1–4). In community-based health services, the mean value of community health education was 2.702 (SD = 3.197; range = 0–9), and only 33.4% of older migrants had community health records. The mean value of social integration was 25.88 (SD = 3.424; range = 8–32). Among the 5,340 older migrant respondents, more than half were male (58.09%). The majority of the older migrants had rural household registration (56.62%), and 84.19% of the older migrants married. On the education level of older migrants, 47.79% had the education level of primary school and below, 30.05% had education level of junior high school, and 22.16% had education level of high school or above. The mean score of the logarithm of family income was 8.332 CNY (SD = 0.914; range = 4.094–11.408). A minority of the sample had a job (29.15%), and most of the sample enrolled in health insurance (65.85%). The migrant range was mainly interprovincial migrant (44.86%), intercity migrant within the province (34.28%), and the lowest percentage was intercounty migrant within the city (20.86%). The most common reason for migrant is to take care of children and grandchildren (40.54%), then followed by migrant for doing working (34.88%), and migrant for aged-care in other places (13.57%), in addition to other reasons for migrant (11.03%). Finally, the mean value of migrant times was 9.616 (SD = 8.177; range = 0–70).

TABLE 1 Sample characteristics of the older migrants ($N = 5,340$).

Variables	Mean/%	SD	Range
Dependent variables			
Self-rated health	3.220	0.773	1–4
Independent variables			
Community-based health services			
Community health education	2.702	3.197	0–9
Community health records	0.334	0.472	0–1
Mediator variable			
Social integration	25.88	3.424	8–32
Control variables			
Sex			
Male	58.09%		
Female	41.91%		
Household registration			
Rural	56.62%		
Urban	43.38%		
Marital status			
With spouse	84.19%		
Without spouse	15.81%		
Education level			
Primary school or less	47.79%		
Junior high school	30.05%		
High school or more	22.16%		
Log of family income (CNY)	8.332	0.914	4.094–11.408
Work status			
With work	29.15%		
Without work	70.85%		
Insured status			
Yes	65.85%		
No	34.15%		
Migrant range			
Interprovincial migrant	44.86%		
Intercity migrant	34.28%		
Intercounty migrant	20.86%		
Migrant reason			
Migrant for work	34.88%		
Migrant for childcare	40.54%		
Migrant for aged-care	13.57%		
Other reasons	11.03%		
Migrant times	9.616	8.177	0–70

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3.2 The associations between community-based health services and the health of older migrants

Table 2 displays the results of the regression analysis, revealing the correlation between community-based health services and the health status of the older migrant population. Notably, the results were consistent and uniform across all models, only having community-based health education were associated with higher self-rated health ($\beta = 0.038$, SE $= 0.009$, $p < 0.001$), and a negative correlation between community health records and older migrant' self-rated health ($\beta = -0.091$), but there was no statistical significance (SE $= 0.059$, $p > 0.1$). Additionally, other noteworthy factors that positively influenced their health included sex ($\beta = 0.151$, SE $= 0.057$, $p < 0.001$), completing junior high school education ($\beta = 0.274$, SE $= 0.066$, $p < 0.001$), high school education and above ($\beta = 0.327$, SE $= 0.081$, $p < 0.001$), higher family income ($\beta = 0.354$, SE $= 0.034$, $p < 0.001$), work status ($\beta = 0.812$, SE $= 0.079$, $p < 0.001$), interprovincial migrant ($\beta = 0.259$, SE $= 0.072$, $p < 0.001$), intercity migrant ($\beta = 0.162$, SE $= 0.073$, $p = 0.026$) and migrant for work ($\beta = 0.383$, SE $= 0.103$, $p < 0.001$). Other factors that had a negative effect on the health of older migrants included older having a rural household ($\beta = -0.227$, SE $= 0.074$, $p < 0.001$), and migrant times ($\beta = -0.013$, SE $= 0.003$, $p < 0.001$).

3.3 The mediating effect of social integration between community-based health services and older migrants' health

Table 3 presents the mediating role of social integration of older migrants in the relationship between community-based health education and self-rated health. The results showed a notable correlation between community health education and social integration among older migrant individuals ($\beta = 0.142$, SE $= 0.014$, $p < 0.001$), and social integration also had a significant positive effect on self-rated health of older migrants ($\beta = 0.039$, SE $= 0.002$, $p = 0.024$). Social integration played a vital mediating role in the correlation between community health education and the health status of older migrant individuals [indirect $= 0.006$, SE $= 0.000$, $p < 0.001$, 95% CI: (0.003, 0.008)], with the mediating effect accounted for 17.64% of the total effect.

3.4 Sensitivity analysis

Table 4 presents the sensitivity analysis of association between community health services and older migrants' health. In the results that the relationship between community health services and disease status of the older migrants (Model 5), the direction of the coefficient opposite between sensitivity analysis and benchmarking analysis, and the size and significance of the coefficients were almost similar. Community health education was associated with lower probability of suffering from disease ($\beta = -0.022$, SE $= 0.010$, $p = 0.028$). This was essentially consistent with the benchmarking

TABLE 2 Hierarchical regression models of community-based health services on older migrants ($N = 5,340$).

Variables	Model 1	Model 2	Model 3	Model 4
	β (SE)	β (SE)	β (SE)	β (SE)
Sex	0.136**	0.151***	0.148***	0.151***
	(0.056)	(0.057)	(0.057)	(0.057)
Household registration type	−0.221***	−0.220***	−0.234***	−0.227***
	(0.072)	(0.074)	(0.074)	(0.074)
Marital status	−0.046	−0.061	−0.055	−0.057
	(0.073)	(0.074)	(0.074)	(0.074)
Junior high school	0.286***	0.276***	0.285***	0.274***
	(0.065)	(0.066)	(0.066)	(0.066)
High school or more	0.331***	0.329***	0.342***	0.327***
	(0.079)	(0.081)	(0.081)	(0.081)
Log of family income (CNY)	0.373***	0.358***	0.364***	0.354***
	(0.033)	(0.034)	(0.034)	(0.034)
Work status	0.829***	0.815***	0.822***	0.812***
	(0.078)	(0.079)	(0.079)	(0.079)
Insured status	−0.002	−0.009	−0.006	−0.007
	(0.069)	(0.071)	(0.071)	(0.071)
Interprovincial migrant	0.254***	0.269***	0.245***	0.259***
	(0.070)	(0.072)	(0.072)	(0.072)
Intercity migrant	0.165**	0.164**	0.153**	0.162**
	(0.072)	(0.073)	(0.073)	(0.073)
Migrant for work	0.381***	0.387***	0.384***	0.383***
	(0.101)	(0.103)	(0.103)	(0.103)
Migrant for childcare	0.112	0.136	0.114	0.136
	(0.090)	(0.091)	(0.091)	(0.091)
Migrant for aged-care	0.066	0.078	0.074	0.080
	(0.105)	(0.107)	(0.107)	(0.107)
Migrant times	−0.013***	−0.013***	−0.013***	−0.013***
	(0.003)	(0.003)	(0.003)	(0.003)
Community health education		0.034***		0.038***
		(0.008)		(0.009)
Community health records			−0.013	−0.091
			(0.057)	(0.059)

β, estimated coefficient; Standard errors in parentheses; **$p < 0.05$, ***$p < 0.001$. Model 1 denotes the regression results between each control variables and self-rated health. Model 2 denotes the regression results between community health education and self-rated health when all control variables were included. Model 3 denotes the regression results between community health records and self-rated health when all control variables were included. Model 4 denotes the regression results between community-based health services and self-rated health when both community health education and community health records were included as independent variables.

TABLE 3 Mediating effect of society integration in the association between community-based health services on older migrants ($N = 5,340$).

Variables	β	SE	Bootstrap 95% lower bound	Bootstrap 95% upper bound	% of total effect
a coefficient	0.142***	0.014	—	—	—
b coefficient	0.039**	0.002	—	—	—
Indirect effect	0.006***	0.000	0.003	0.008	17.64%
Direct effect	0.028***	0.003	0.021	0.035	82.36%
Total effect	0.034***	0.008	—	—	—

β, estimated coefficient; SE, standard error. $^{**}p < 0.05$, $^{***}p < 0.001$; a coefficient denotes the regression results between community health education and social integration; b coefficient denotes social integration and self-rated health.

TABLE 4 Sensitivity analysis for benchmarking analysis ($N = 5,340$).

Variables	Model 5		Model 6	
	β	SE	β	SE
Sex	−0.075	0.064	0.072**	0.031
Household registration type	−0.183**	0.081	−0.020	0.040
Marital status	0.193**	0.084	−0.087**	0.040
Junior high school	0.008	0.074	0.111***	0.036
High school or more	−0.093	0.090	0.189***	0.044
Log of family income	−0.069*	0.037	0.131***	0.018
Work status	−0.452***	0.088	0.390***	0.042
Insured status	0.006	0.078	−0.051	0.038
Interprovincial migrant	−0.068	0.080	0.131***	0.039
Intercity migrant	−0.080	0.081	0.057	0.039
Migrant for work	−0.340***	0.113	0.176***	0.056
Migrant for childcare	−0.044	0.100	−0.030	0.050
Migrant for aged-care	0.038	0.116	0.001	0.058
Migrant times	0.016***	0.004	−0.009***	0.002
Community health education	−0.022**	0.010	0.016***	0.005
Community health records	0.055	0.065	−0.007	0.032

In model 5, the dependent variable was disease status. In model 6, the dependent variable was general health index.
β, estimated coefficient.
$^{*}p < 0.1$, $^{**}p < 0.05$, $^{***}p < 0.001$.

analysis, which community health education were conducive to older migrants' health.

In the results that the association between community health services and the general health of the older migrants (Model 6), the coefficients of sensitivity analysis and benchmarking analysis were in the same direction. Providing community health education was associated with higher overall health level ($\beta = 0.016$, SE $= 0.005$, $p < 0.001$). Similarly, the coefficient of the relationship between community health records and older migrants' general health was negative value ($\beta = -0.007$), and the significance of coefficients were the same as the baseline regression (SE $= 0.032$, $p > 0.1$).

3.5 Endogenous test

There may be an endogenous relationship between the community-based health services and the health of older migrants. The instrumental variable method was employed to address the endogenous problem. An effective instrumental variable must satisfy two conditions. The first condition is correlation, where the instrumental variable is related to the community health services received by older migrants. The second condition is independence, where the instrumental variables are not related to error terms that affect the health of older migrants. We referred to studies by Tabllini (45), and selected a policy "Whether communities

TABLE 5 Instrumental variable estimation results ($N = 5,340$).

Variables	Model 7		Model 8	
	Stage I	Stage II	Stage I	Stage II
National basic public health service project	0.451*** (0.080)		0.454*** (0.011)	
Community-based health education		0.013*** (0.003)		
Community-based health records				−0.068 (0.046)
Control variables	Controlled		Controlled	
P (Durbin-Wu-Hausman Test)	0.002		0.011	
F (weak instrumental variable test)	22.51		20.19	

***Denote the significance of 1%, standard errors are contained within parentheses. In model 7, the endogenous explanatory variable is community-based health education, the dependent variable in the first stage is the health of older migrants, the independent variable is national basic public health service project, the dependent variable in the second stage is community-based health education, and the independent variable is the health of older migrants; In model 8, the endogenous explanatory variable is community-based health records, the dependent variable in the first stage is the health of older migrants, the independent variable is national basic public health service project, the dependent variable in the second stage is community-based health records, and the independent variable is the health of older migrants.

implement basic public health service projects (Yes = 1, No = 0)" as the instrumental variable. On one hand, community health services are part of this project, and its implementation directly affects the access of health education and health records for older migrants. On the other hand, as a public health policy, this project is not related to the health status of older migrants and belong to exogenous variable.

The regression results of the instrumental variables were reported in Table 5. Firstly, the stage I regression results reported the effects of instrumental variable on community-based health services. The national basic public health service project has a significant positive impact on the community-based health education. The implementation of this project will increase the probability of getting the community health education and health records increased by 45.1 and 45.4%, respectively. Secondly, the stage II regression results reported the effect of endogenous explanatory variable on the health of older migrants. Community health education still had a positive impact on the self-rated health of the older migrants after the inclusion of instrumental variables, with a significant correlation at the level of 1%. However, the effect of community health records on the self-rated health of the older migrants was not statistically significant. After dealing with the endogenous problem of community health services, the effect of community health services on the self-rated health of the older migrants remains robust.

Besides, we examined several conditions that the instrumental variable needs to satisfy. Firstly, we examined whether the explanatory variables were endogenous variables. The *P*-values obtained through the DWH test in models 7 and 8 are 0.002 and 0.011, respectively, both of which are <0.05. Therefore, community health education and community health records can be considered as endogenous variables. Secondly, we examined whether there was a weak instrumental variable problem. The F-value of the weak instrumental variable test in models 7 and 8 are 22.51 and 20.19, respectively, both >10. Therefore, it can be considered that there was no risk of weak instrumental variables.

TABLE 6 The test results of the externality of instrumental variables ($N = 5,340$).

Variables	Model 9	Model 10	Model 11
Community-based health education	0.034*** (0.008)		0.035*** (0.009)
National basic public health service project		0.053*** (0.008)	0.028 (0.058)
Control variables	Controlled	Controlled	Controlled

***Denote the significance of 1%, standard errors are contained within parentheses. In model 9, the independent variable is community-based health education, the dependent variable in the health of older migrants; In model 10, the independent variable is national basic public health service project, the dependent variable is the health of older migrants; In model 11, the independent variable are community-based health education and national basic public health service project, the independent variable is the health of older migrants.

Finally, we examined whether the instrumental variable was an exogenous variable. The Hausman test cannot be conducted since only one instrumental variable was selected in this paper. Therefore, we followed Fang's approach to examine the externality of instrumental variables (46). The instrumental variable is considered exogenous if it influences the dependent variable through the endogenous explanatory variable, but cannot directly or indirectly influence the dependent variable through any other means (47). Table 6 reported the test results of the externality of instrumental variables. When endogenous explanatory variable was controlled, the effect of National basic public health service project on the health of older migrants was not significant. However, the National basic public health service project had a significant impact on the health of older migrants when regression was performed separately, indicating that the instrumental variables did not directly affect the dependent variables, but only affected the health of older migrants through community-based health education. Therefore, the instrumental variables selected for this paper are exogenous. The satisfaction of the aforementioned conditions indicates that choosing the National Basic Public Health Service Project as instrumental variables is reasonable, as it effectively addresses the endogenous problem of this paper.

4 Discussion

This research is the first community-based perspective to study the health of Chinese older migrants. The study has analyzed the correlation between community-based health services and the health of older migrants, through nationally representative data. This study has also comprehensively explored the impact mechanisms and transmission pathways involved in this relationship. The self-rated health status of older migrants has proved to positively associate with community-based health education, not only in a direct pathway but also occur through social integration of older migrants. However, there were no positive relationships between community-based health records

and older migrants' health. The findings of this research have indicated that community-based health services and social integration are crucial elements in improving the self-perceived health status of older migrants.

Firstly, this research revealed that community-based health education had a direct impact on the health of older migrants. The greater variety of health education provided by the community along with the establishment of community health records promoted self-related health among older migrants. This is consistent with previous research that health resource allocation and health promotion activities increased residents' utilization of community health services, which enhances their health (48, 49). A reasonable explanation is the feasible capability theory, empowering competence plays an imperative function in enhancing individual health (50). For the older migrant population, community-based health services are both a community resource and an important form of cultivating health literacy among vulnerable groups of older migrants (51). Communities utilize various forms as health education lectures, publicity brochure and internet websites, to provide health education content that covers chronic ailment prevention and physiological wellbeing. Such initiatives not only directly improve the knowledge of health of older migrants, but also enhance their capability for self-preventive care and disease prevention, thereby improving their overall health status (15).

Secondly, the community health records showed a negative correlation with the health of the older migrants, although this correlation was not statistically significant. The negative coefficient between community health records and the health of older adult immigrants is related to the supply pattern of public health services in China. For a long time, the provision of public services such as medical care and older adult care in China has been tied to household registration, resulting in exclusion of the older migrants from the coverage of basic public services (52). When older migrants find that local residents or those with rural hukou have a "comparative advantage" in accessing local public medical services, their self-rated health levels will decline. This is essentially consistent with existing research (12, 37), reflecting the negative impact caused by the reform of China's household registration system. However, the lack of statistically significant association between community health records and the health of older migrants might be attributed to the overall low establishment of health records among the respondents. This study discovered the only 33% of older migrants having community health record, and far from the target and requirement of 80% of the construction rate of the migrant population in China (53). Approximately 70% of older migrants have not established community health records, and the comparative advantages derived from accessing public services are not evident. At the same time, previous studies have also shown that the construction of health records for older migrants generally has the problem of low utilization rate and excessive form (54), which may make it difficult for health records to be transformed into practical abilities such as timely identify health risk factors, cope with chronic illnesses, or minimize the incidence of diseases, and consequently have limited influence on older immigrants' health. This indicates that there is a need for more government work on achieving the goal of equalizing public health services for the older migrants in China, and community platforms should be utilized to gain a fully understanding of their health situations, promote the establishment of health records, enhance their health awareness and provide timely healthcare services.

Thirdly, an important finding of this paper is that social integration plays a mediating role in the relationship between community-based health services and older migrants health. On the one hand, community-based health education is positively associated with social integration of older migrants. For the older migrants, constraints of household registration system make it difficult for them to develop an identity and social integration (55). Relying on older migrants' communities to create opportunities for them to participate actives in a reasonable and formal manner, which is a positive and effective approach for accelerating social integration (56). In the process of providing health education, actually the community also creates a platform for the older migrants to interact with local residents, and the establishment of local social network, which promotes them to develop a sense of self-identity that "I am a local". More importantly, the community-based health education enables the older migrants to receive the same health service resources as the locals, which can reduce the inequity caused by the urban-rural dichotomy (57), and eliminate the integration obstacle that "locals look down on foreigners", thus increasing the social integration of the older migrants.

On the other hand, social integration was positively associated with the health of older migrants. Based on the opportunities and platforms created by the community, the sense of belonging and willingness to socially integrate generated by the floating population can promote their self-rated health. This was an explanation based on social capital theory, where the degree of social integration reflects the local social network and social interaction status of the older migrants, which constitute the social capital of the older migrants in the community. The positive relationship between social capital and health has been studied and argued by numerous scholars (34, 58). Social capital can positively influence health by intervening in social networks to meet the health needs of the older migrants. The mediating effect implies the significance of providing community-based health services for the older migrants, leveraging the service and platform capabilities of the community, which can help mitigate barriers to social integration of the older migrants and assist them in establishing formal opportunities and pathways for social integration, thereby fostering toward their health and wellbeing in a comprehensive approach.

However, this study has several limitations. Firstly, due to data limitations, this study mainly used self-rated health and disease status indicators to evaluate the health of older migrants, further research should to provide a more comprehensive assessment of their overall health. Secondly, when measuring community-based health service indicators, the measurement of community health education was only examined in terms of service content, the form and frequency of community health education were not explored. Thirdly, this study only discussed the mediating mechanism of social integration in the relationship between community-based health services and the health of older migrants, and other potential mechanisms such as physiological or psychological pathways were not explored. Therefore, caution should be exercised when

interpreting the representativeness of the study findings. In order to promote active aging and healthy aging among the older migrant population, more contents and forms of community-based health services need to be explored in the future.

5 Conclusion

Relying on a national sample of Chinese older migrants, this study focused on how the community-based health services may influence the health of older migrant. This study found a significant association of community-based health education with higher self-rated health among older migrants, and social integration played a mediating role in the positive association. However, the findings failed to support the favorable function of community health records in older migrants' health. These findings underscore the critical position of the community-based health services in improving the health of older migrants. The "Healthy China" strategy is a long-term plan implemented by the Chinese government to promote national health and enhance the overall wellbeing of the population. Given the vulnerability of their health and the complexity of migration, prioritizing older migrants' health is essential for achieving the goals, such as developing policies and regulations to support the health of older migrants, establishing a community-based health management platform.

Adopting a community perspective toward older migrants not only benefits their wellbeing, but also facilitates the basic public service equalization. It is therefore crucial to explore community-based interventions that establish convenient health service points in the community. These interventions should include regular health check-ups, various health education programs, disease screening activities, chronic disease management and emergency medical services to ensure that older migrants have easy access to quality healthcare. Meanwhile, fostering social support networks can contribute to the overall wellbeing and integration of older adult individuals into their community. This can be achieved through setting up clubs and activity centers, creating platforms for older migrants to socialize, and organizing cultural events such as traditional festivals and exhibitions. The results of this study provide guidance for decision-makers to implement personalized health education programs for older migrants, covering chronic diseases and mental health. It also suggests providing social support strategies such as social activities and neighborhood assistance. In addition, future research should include exploring specific aspects of community-based health services or delving into the effectiveness of different intervention strategies.

Data availability statement

Publicly available datasets were analyzed in this study. This data can be found here: https://www.chinaldrk.org.cn/wjw/#/data/classify/population/yearList.

Ethics statement

Ethical approval was not required for the study involving humans in accordance with the local legislation and institutional requirements. Written informed consent to participate in this study was not required from the participants or the participants' legal guardians/next of kin in accordance with the national legislation and the institutional requirements.

Author contributions

SL: Conceptualization, Data curation, Formal analysis, Methodology, Project administration, Software, Validation, Writing – original draft. BQ: Investigation, Methodology, Project administration, Supervision, Writing – review & editing. DW: Conceptualization, Funding acquisition, Investigation, Methodology, Project administration, Resources, Supervision, Writing – review & editing.

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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

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Refugees from countries with complex political contexts: politically-informed approach to health and mental health services

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Introduction: time to talk politics?

The studies of the impact of refugee resettlement have demonstrated that refugees enrich the social, cultural, and economic life in host communities (1). This transition is not always easy: during the integration process, refugees must overcome cultural and language barriers and cope with trauma, losses, and adjustment issues. Refugee health and mental health (MH) care and psychosocial support providers (in the future, "Providers") stride to address the barriers to accessing resources amid the sensitive political realities of current migration trends.

Culturally responsive trauma-informed care in refugee resettlement emphasizes the importance of cultural sensitivity, contextual relevance, and situational appropriateness in service provision (2). Incorporating such practices in the health and human services supporting refugee resettlement allows addressing vulnerability while promoting resilience. Cosgrove et al. noted that in the current climate of global geopolitical instability and increased violence, political experience has become a prominent factor affecting refugees' health and MH wellbeing (3). The authors suggest that politically informed approaches broaden the perspective on Global Mental Health, away from the legacy of the over-pathologizing trend maintained by Western MH.

The serious and often intergenerational impact of tyranny, genocide, or politically-motivated violence on refugees' mental health has been noted in various populations: Holocaust survivors (4), Asian American families (5, 6), immigrants Latinos (7), or refugees from the post-Soviet countries (8). Although studies spotlight the various facets of such experience, the multitude of evidence points to the importance of recognizing its impact.

This paper draws attention to the historical-political dimension of the refugee experience and advocates for increased political competencies in refugee care. It would mean that Providers are aware of the geopolitical situation in different parts of the world and routinely consider the refugees' exposure to political adversity as a factor potentially affecting the therapeutic alliance and access to care.

This need becomes particularly apparent when serving refugees who fled countries with complex political contexts or CPCs. The paper discusses the practical implications of previous findings about the MH impact of social and political victimization in the health and MH services provision. It draws on the literature review and the author's Global Mental Health (GMH) experience in providing refugee services (8, 9).

Complex political context

Cherepanov defines *Complex Political Context (CPC)* as settings affected by complex political dynamics, social instability, political or sectarian violence, and ethnic cleansing, resulting in gross violation of human rights and massive trauma (9).

Authoritarianism, dictatorial, and nationalistic regimes unleash violence against political, religious, ethnic, or gender-identity minority groups. These groups become a target of political violence, institutional discrimination, and systematic persecution and are subjected to police brutality and torture. WHO defines political violence as using power and force to achieve political goals (10). This definition also includes deprivation, the deliberate denial of basic needs, and human rights.

Widespread human rights abuses and politically motivated violence distinguish CPCs from other settings with high criminal violence rates.

Authoritarian leaders abuse political power to exercise power and control. They employ coercion, terror, threats, torture (hard tactics), indoctrination, and brainwashing (soft tactics) to intimidate and control the citizens. In states with CPCs, the administration deliberately fosters divisiveness and inflames racial and ethnic tensions by blaming the victims (11).

The experience of politically motivated victimization and abuse carries a profound psychological impact, which can reverberate across generations (4, 5, 8, 12).

Mental health impact

When refugees flee, they not only carry with them their scarce belongings. Their baggage also includes culture, memories, experiences, and learned social cognitions and beliefs, which can be particularly pervasive when formed as a survival skill.

Political violence affects individual and collective functioning and health (13). Survivors of political persecution often report chronic fear, anxiety, depression, and unpredictability. The trauma of social and political victimization and persecution is complex and chronic: cumulated hardship and multiple and ambiguous losses (e.g., missing, imprisoned, or murdered family members or friends). Many become victims or witness violence, are tortured, or know those who were.

Coping with political adversity may carry similarities with dealing with the complex trauma of interpersonal abuse: Learned social helplessness, social and emotional withdrawal, or increased alcohol consumption and other forms of self-destructiveness are commonly reported coping strategies with societal victimization. Socially avoidant behavior helps keep a low profile, avoiding exposure or unwanted attention. In CPCs any attention from the authorities is unwanted even when this attention is positive (8, 9).

The experience of political persecution tends to create mutual distrust in the community and distrust toward governmental officials and health providers, complicating access to health care and community integration.

Social cognitions reflect social fears and powerlessness

In refugees fleeing persecution, the experience of targeted and deliberate victimization increases social vulnerability. Even when health and MH services are available, distrust can hinder their access. There is a pervasive belief that health and MH issues may be used as an excuse to thwart the immigration process and deny permanent residency.

Distrust in authorities prevents refugees from seeking help and reporting domestic violence or other crimes to law enforcement (6, 7, 9). It increases refugees' risk of re-victimization and being taken advantage of.

Survival experience solidifies in the form of so-called survival messages (SM), the condensed survival life lessons communicated in the family, and sometimes mistaken for cultural wisdom (14, 15). Analysis of SMs allows us to capture the implicit beliefs and takeaways from the deliberate victimization experience. Cherepanov identified similar life lessons in people coming from different countries affected by CPCs (9):

- No one, especially strangers or officials, can be trusted. Even close friends or family can betray.
- Exposing personal weaknesses, including fears, makes it easier to be taken advantage of. Disclosing MH issues is often perceived as disclosure of vulnerabilities.
- Reaching out and accepting help can create vulnerabilities that adversaries will exploit.

These social beliefs reflect social fears, helplessness, and powerlessness. They are not conducive to sharing trauma experiences or reaching out for help and can add to the barriers to accessing health and MH services in refugees.

Community support eroded by mutual distrust

Community support is critical in trauma recovery and creating a safe and supportive environment conducive to integration. It is not always the case for refugees affected by CPCs, where communities may lack aggregation, a striking difference from the post-disaster recovery community. The phenomenon of *aggregation* refers to the emergence of shared trauma experience or the emergence of a special mental space where survivors feel safe to disclose and can relate to and validate each other's experiences. Distrust, social fear, shame, and moral injury associated with CPCs' experiences prevent traumatic experiences from aggregating. Lack

of aggregation diminishes the community's capacity to provide mutual support (8).

Stresses of resettlement are often credited for strengthening community cohesion and support, but they also can also lead to further social exclusion of already marginalized people. In this way, the communities of refugees often reproduce the social and political division and tensions that existed in their homeland.

> For example, LGBTQ minorities who were persecuted at home often continue hiding their identity from the community in the US out of fear of re-victimization (Cherepanov, Personal communication).

Many political refugees are acutely aware that the community may share some beliefs pertinent to the country of origin, and there may be former perpetrators who can threaten their families. In the community, people with troubled histories may want to avoid recognition by any means.

When the community is unwilling or unable to support refugees or further marginalize them, Providers may need to take a more proactive position, scale up their support, and engage the support systems outside the ethnic community.

Political situation at places of resettlement

Social and political dynamics at the places of resettlement can exacerbate the refugee's traumatic experience.

> During the political campaigns of 2016 and 2020 in the US, some refugees shared with me that political rhetoric reminded them of their homeland. They did not feel safe and reported recurrences of traumatic memories and nightmares (Cherepanov, personal communication).

At the places of resettlement, refugees can also encounter anti-immigrant sentiments amid prejudices and real or perceived competition for resources. Hostile community attitudes can increase the sense of uncertainty and fear about the future. They compound the sense of not being welcomed, marginalized, and unsafe, leading to emerging ethnic enclaves with a siege mentality and internal violence where victims are reluctant to report abuse and disclose crimes.

Attitudes toward providers reflect apprehension toward the authorities

Not surprisingly, the CPC's experience affects trust and rapport with Providers who may be perceived as government officials. And it is not incidental.

In many countries with CPCs, there is a well-documented use of MH services for punishment and surveillance. For example, the government in the Soviet Union and now Russia has been employing punitive psychiatry, involuntarily confining dissidents to the psychiatric facility and forcing on them anti-psychotic medications (16). In the 1970s, Somalia openly used psychologists to report disloyalty to the government. Most recently, Kurpatov, the president of the Professional Medical Psychotherapeutic Association in Russia, proposed an amendment to the professional code of ethics for psychologists and psychiatrists, requiring that they inform officials of their patients who don't support military operations in Ukraine. They are also expected to use MH interventions to motivate young people to join the army and to report draft dodgers (17).

Recommendations for health communication and interventions

Psychoeducation, integrated primary care, and psychosocial services demonstrated the advantages of addressing the complex needs of refugees in a less stigmatizing and more effective manner (18). In addition, in many cultures, psychological distress presents and communicates in the form of somatic symptoms, while Providers sometimes struggle to explain to patients the benefits of standalone MH services. Primary care providers are well positioned to serve as a foot in the door to identify and engage those needing MH support.

When assisting and treating refugees, the politically-informed Providers:

> Curious about the history and current political situation in the refugees' homeland.

> Are aware of barriers preventing refugees from accessing services and make efforts to address these barriers. For example, using phone interpreters where a client can remain anonymous even when community or family members are available to translate.

> Are mindful of the power differential and the disproportionate weight given to providers' every word.

> Are aware that refugees often come from countries where it is not safe to trust law enforcement. Reluctance to disclose victimization makes safety and trauma assessments less reliable.

> Are aware that the community may not be able or willing to support some refugees. In these cases, seeking support outside of the community is needed, and Providers can assist with it.

> Are aware of the stigma associated with MH and certain physical conditions, and consequent internalized stigmatization. Shifting the focus to less contentious issues like problems with sleep or stress management can help engage refugees in health and MH services.

> Balance information gathering during the intake with allowing patients to guide the process: "Tell me what you believe is important to know about you." This is done to avoid the appearance of interrogation.

> Are aware that in most interventions, trust, and telling the truth are desirable but is not required. Instead, offer a person to volunteer the information that may be important for a provider to know.

> Are aware that medical procedures can retraumatize some refugees, and MH support may be required. For example, torture survivors' experiences of receiving surgical treatment may be indicative of re-traumatization (19).

Additional consideration

Perpetrators also may need MH services. In CPCs, the line between perpetrator and victim can be blurry: a perpetrator can become a victim in the next cycle of political violence and vice versa. Addressing their trauma offers the opportunity to break the cycle of violence (8).

Ethical considerations: dual representation and the Mr. Jones Dilemmas

Servicing refugees exposes MH providers to unique ethical dilemmas (20). One is *the dual representation dilemma*, which highlights the potential conflict between the norms, attitudes, or political convictions adopted by refugees and the society with which Providers identify. This dilemma common in refugee work can become a point of contention when working with refugees who may internalize the beliefs associated with CPCs.

Advocacy vs. Do No Harm Mr. Jones's Dilemma underscores the high risks of exposure due to advocacy. This dilemma is depicted in the Mr. Jones film (21) and is named after journalist Gareth Jones, who, in 1933, traveled to the Soviet Union, where he discovered evidence of the Holodomor. This artificially created famine resulted in mass starvation and death in Ukraine. Upon return, Jones had to decide whether to advocate for victims and, in this way, put them in more danger or expose the atrocities. He chose the latter, which is how we know about them now. Similarly, Providers' advocacy may come at a high price for the exposed refugees and their families remaining in the CPCs (20).

Discussion

Politically informed care is essential in addressing barriers to health and MH care in refugees from countries with CPCs. With the rising political instability and authoritarian and nationalistic tendencies around the world, political violence has become a routine part of the GMH experience. Exposure to political victimization affects many facets of the refugees' wellbeing and integration and becomes yet another barrier to accessing health and MH services.

For a long time, health and MH care professionals have been shying away from discussing the political dimensions of the refugee experience, especially when it interacts with the political developments at the places of resettlement. At this time, Providers can no longer ignore the political facet of adversity. Political competencies must become at least as important as trauma-informed care or cultural sensitivity. Such an approach will allow providers to understand better the individual needs of the people served within a broader societal and political context and develop contextually appropriate strategies for addressing them.

I see the next steps in developing the guidelines on routine screening for politically adverse and intergenerational trauma experiences, conceptualizing politically informed approaches in global mental health and refugee health care, and outlining the best practices.

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Provision of healthcare services for displaced individuals globally is a pressing concern

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The United Nations Refugee Agency (UNHCR) paints a stark picture of forced displacement: a staggering 108.4 million people were uprooted by the end of 2022, a record high representing a surge of 19.1 million from the previous year (1). This includes 35.3 million refugees, 53.2 million internally displaced, and 4.9 million asylum seekers (1). This staggering number eclipses even the mass displacement of World War II (1945), marking a tragic new chapter in global displacement. The current article shed light on the worldwide healthcare circumstances faced by displaced populations, offering significant perspectives on the hidden complexities associated with this matter.

The world faces a displacement crisis of staggering proportions, driven by armed conflict, physical aggression, persecution, and natural disasters. Recent data reveals the five main countries generating refugees: Syria, Venezuela, Afghanistan, South Sudan, and Myanmar (1). Meanwhile, Turkey, Colombia, Pakistan, Uganda, and Iran host the most (1). But the causes go beyond human conflict. Environmental factors, particularly devastating natural disasters and trigger internal displacement. In 2022, Pakistan endured the brunt of this, with 8.2 million people internally displaced due to disasters (2). This surging tide of displacement presents a critical crossroads for healthcare systems and practitioners. Bridging the gap between diverse needs, heightened vulnerabilities, and strained resources demands innovative solutions and unwavering commitment.

In Cox's Bazar, Bangladesh, housing one of the largest refugee camps globally, the Rohingya community heavily relies on humanitarian aid, especially the food rations distributed by the World Food Programme (WFP). The reduction in these rations for the nearly one million Rohingya residents drew criticism from the United Nations in Bangladesh on June 1, 2023 (3). The decrease in assistance to these refugees may be attributed to factors such as the COVID-19 pandemic, the conflict in Ukraine, and a significant rise in food costs. The World Food Programme urgently appeals for funding to support the global refugee community, where severe hunger is already prevalent (4). Similar situations are observed among Syrian refugees in Turkey, Lebanon, and Jordan (5) and among refugees from Burundi and Congo in Tanzania (6). Providing healthcare services to refugees and host populations in host countries necessitates the international community's acknowledgment of shared responsibility, which should include both financial commitment and intention (3, 6).

The COVID-19 pandemic has cast a long shadow over the lives of refugees, compounding their existing vulnerabilities and creating a triple burden on their physical, mental, and social wellbeing (7, 8). While the COVID-19 pandemic has undoubtedly exacerbated the challenges faced by refugees, it has also highlighted the need for stronger international cooperation and a renewed commitment to upholding the rights of displaced people. By addressing the triple burden on their health and wellbeing, we can build a more inclusive and resilient future for refugees worldwide.

Displacement can have a devastating impact on individuals' wellbeing, with the consequences reaching far beyond just physical health. Refugees often face numerous challenges, including economic hardship, food insecurity, restricted access to healthcare, and instances of discrimination (4–7). Past traumatic experiences may further hinder their ability to adapt to their current circumstances (9). Beyond the myriad challenges of adjusting to a new country, individuals may have endured conflict, violence, multiple losses, torture, sexual abuse, and the potential for exploitative situations. They may be vulnerable to various forms of gender-based violence, domestic violence (within families or spousal relationships), honor-based violence, trafficking or forced displacement, modern slavery, and forced marriages. In addition to immediate political and economic obstacles, addressing this humanitarian crisis necessitates health-related responses, particularly in the realm of mental health policies and interventions.

Refugees and migrant populations need comprehensive support to improve their overall health. This support should encompass access to nutrition, hydration, housing, sanitation, healthcare, education, and vocational training. It is crucial to consider patients' preferences regarding the language, gender, and cultural background of healthcare providers, as these factors can significantly impact trust and information disclosure. Making every effort to establish clear and effective patient communication is essential. For pregnant individuals, ensure access to antenatal services, provide maternal vitamins (such as folic acid, vitamins C, and D), promote breastfeeding, offer contraception, and discuss the importance of cervical cancer screening.

Many nations globally are presently grappling with a notable humanitarian crisis, necessitating aid to fulfill the exacting requirements of their complex healthcare responsibilities. Primarily, it is imperative that individuals are provided with required nutrition and medical attention in the present moment. Nonetheless, it is equally essential to contemplate their future possibilities.

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Exploring refugees' health care access in times of COVID-19: a quantitative study in the Lisbon region, Portugal

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Background: To address the health needs of refugees, health services must be culturally competent and facilitate this population's access to health care, especially in a context prone to the amplification of social inequities, such as the COVID-19 pandemic. However, few quantitative studies exist in the European Union, and to the extent of our knowledge, there are no published quantitative studies exploring refugees' access to health care during the pandemic in Portugal. The objective of this study is to describe the demographic and socioeconomic characteristics of refugees living in Lisbon and to explore their healthcare access patterns during the COVID-19 pandemic.

Methods: We conducted a cross-sectional, descriptive, and quantitative study from May to November 2022. Using Levesque' s theory on health care access, we designed and applied a 38-item questionnaire through face-to-face interviews with refugees living in Lisbon for at least 12 months, and used descriptive statistics to characterize sociodemographic and healthcare access profiles during the pandemic.

Results: The mean age of the 36 recruited refugees was 35 years (SD = 10.24), the majority were male (56%), married (72%), had at least a secondary education (69%), were unemployed (77.8%), and had a median length of stay in Portugal of 17 months (IQR = 45). All were registered in a primary care center, and 94% used healthcare services during the pandemic. The majority never tested positive for the coronavirus (58%) and one out of the positive was admitted to hospital due to severe COVID-19. A total of 97% received COVID-19 vaccination, of which 69% had an incomplete schedule. A quarter of the participants did not have access to information about COVID-19 in a language they understood, and although 97% needed health care during the pandemic, more than half (63%) did not seek it because of structural and cultural barriers. Half of the respondents had difficulty getting medical advice by phone or email, and 39.4% could not afford a medical examination or treatment. Only 18.2% sought counseling services. A total of 58.8% of the participants felt like healthcare professionals did not always show respect towards their culture, and 64.7% reported that healthcare professionals did not always discuss treatment options with them.

Conclusion: This study's findings highlight the need to endow inclusive communication, cultural competency, and patient involvement in health care, alongside improving the socioeconomic condition of refugees. Identified population characteristics and barriers to health care access by refugees in this study may inform future research on the health care needs of refugees in

Portugal and ultimately assist in the devising of strategies to reduce inequalities in health care access.

KEYWORDS

refugees, migrants, health care access, COVID-19, Portugal

1 Introduction

With the increasing global migratory flows, health care access by migrant populations has been a subject of international and national research. The concept of access to health care in the literature encompasses diverse definitions. Some definitions view access as the attributes of health services, users, or both, while others focus on the relationship between the supply and demand for health care (1). Levesque's Conceptual Framework for Heath Care Access analyzes access as a product of the relationship between five dimensions of accessibility of services (Approachability, Acceptability, Availability and Accommodation, Affordability, and Appropriateness) and five abilities of persons (Ability to perceive, Ability to seek, Ability to reach, Ability to pay, and Ability to engage) (2). This multidimensional and integrative approach of the theory may provide means to characterize health care access more comprehensively and accurately. Long-standing barriers to health care access by refugees and migrants are robustly documented in the literature. Nested within cultural, social, and financial factors, lie obstacles such as language differences, discrimination, unawareness about individual rights to health or available healthcare services, economic insufficiency and out-of-pocket expenditures (3), bureaucracy and lack of refugee documentation status, and long distances to healthcare facilities (3–6).

The additional burden of the COVID-19 pandemic on refugees' social determinants of health through the loss of jobs, increased poverty, discrimination, and social isolation, along with COVID-19 prevention and control measures, led to a disproportionate impact of the pandemic on this vulnerable group (7). Constraints in services such as childcare, language classes, and provision of resettlement services (8) accounted for the weakening of social support networks. Pre-existing healthcare barriers further compromised refugees' access to health care, namely in accessing COVID-19 information (9) or testing (10). Social distancing and lockdowns enhanced the reliance on technology for the delivery of health care services. Studies with refugees show that while the use of technology provided advantages in some aspects of access (i.e., users' convenience in travelling-associated costs and time, especially for people living in remote areas) (11), it also presented several challenges. In this context, a different set of health care access barriers emerged, such as technology costs and complexity, technical and operational issues (i.e., connectivity problems), interference with quality of care (communication and development of a trustful relationship with providers) (11), lack in technology literacy, issues with communication and cultural mediation services, and privacy concerns (8).

In Portugal, there are published studies on health care access and utilization by the overall immigrant population, which show the presence of systemic barriers both before and during the pandemic. In a 2018 study involving 1,375 immigrants and 320 professionals from primary care centers in Lisbon, Dias et al. explored the perceptions of both groups on the access and utilization of healthcare services. Economic, cultural, linguistic, and discriminatory obstacles were identified (12). These constraints led to an underutilization of healthcare services by the immigrant population (13–16). A 2021 survey on health care access by immigrants in Portugal underscored the unmet needs for medical care due to financial constraints, long waiting lists, lack of time due to occupational or family responsibilities, dissatisfaction, and lack of trust in public healthcare services (17). O Martins et al. through a cross-sectional study in Lisbon's Metropolitan Area, highlighted the disproportionate socioeconomic impact of the COVID-19 pandemic on immigrants compared with natives. Findings revealed that COVID-19's effects amplified immigrants' previous hardships leading to greater job loss, lay-offs, and income losses, with a consequential impact on livelihoods. Moreover, in the early stages of the pandemic, immigrants had increased difficulties in accessing healthcare services in comparison with natives. Immigrants were more likely to face hindrances in obtaining medical appointments, in complying with children's vaccinations, and in the acquisition of pharmaceuticals (18, 19).

Although there has been a substantial increase in the number of people in need of international protection in Portugal since 2015 (20), little is known about refugees' reality, namely in what concerns their health care. Despite the aforementioned research on health care access by the overall immigrant population in Portugal, to the extent of our knowledge, there are no published quantitative studies addressing this issue in refugees, particularly during the COVID-19 pandemic. As such, this study may provide valuable initial information about the subject.

Although in Portugal asylum seekers and refugees' rights to health care are enshrined in the national Asylum Act (21), it is essential to understand if this translates into an effective and equitable access to health care, particularly in the midst of a pandemic. Furthermore, as other migrants in vulnerable situations, assurance of access to health care by refugees is imperative, as their needs differ from the host population due to the cumulative effect of risk factors to poor health, which act throughout the migration process (22). Therefore, host countries need to define evidence-based interventions that protect this vulnerable group' s health.

Within this context, we may ask: what have been the main difficulties in health care access by refugees in Lisbon during the COVID-19 pandemic? The objective of our study is to describe the demographic and socioeconomic characteristics of refugees living in Lisbon and to explore their health care access patterns during the COVID-19 pandemic.

The outcomes of this study will potentially provide preliminary information about barriers experienced by refugees, which may serve as a basis to larger studies, and assist in the devising of vertical health policies to improve their health care access.

2 Materials and methods

2.1 Study design and setting

We conducted a cross-sectional, descriptive, and quantitative study in Lisbon, between May and November 2022. We found this type of study the most suited to explore the unknown reality of health care access among refugees in Portugal and to address the multidimensional and multivariable nature of the chosen framework on health care access, while saving time and resources.

Although the reception and geographical distribution of asylum-seekers and international protection beneficiaries in Portugal is tendentially decentralized, Lisbon has been the district receiving the greatest number of refugees through all programmed entry mechanisms globally (2018–2021) (20). To recruit the participants, we collaborated with the community intervention organization CRESCER, within the scope of the organization's projects "É UMA VIDA [IT'S A LIFE]" and "NO Border." CRESCER develops assistance projects for vulnerable populations in the greater Lisbon area. Since 2016, they have also cooperated with Lisbon's Municipal Refugee Reception Program (PMAR Lx) during its second phase, facilitating the transition of refugees and asylum seekers from the Refugee Reception Center to temporary autonomous housing granted by the municipality. Additionally, CRESCER provides assistance in areas like employment search, legal and psychosocial support, medical and psychological care, housing, mediation, and translation. This comprehensive support is delivered by a technical team of social workers, interpreters, a psychiatrist, a psychologist, and a lawyer (23).

2.2 Participants and sampling

The target population was adult refugees as defined by the United Nations Convention relating to the Status of Refugees (24). Participation in the study required the fulfillment of the eligibility criteria, which consisted of being a refugee, aged 18 or more, living in Lisbon, with a length of stay in Portugal of at least 12 months, and receiving assistance from the community intervention association CRESCER. From late April to November 2022, CRESCER's professionals contacted potential participants during the social support appointments at the organization's headquarters or during the technical teams' weekly home visits. Individuals were excluded from the study if there was no interpretation available for their languages. For this exploratory study, we used a non-probabilistic convenience sample, as it was the most cost-effective method to meet the study's objectives within a short period. Interviews were conducted at the home of the "É UMA VIDA" project beneficiaries or CRESCER's headquarters in the case of the "NO Border" project recipients. In all cases, the interview place was chosen considering the participants' convenience and in alignment with CRESCER's engagement context for each project.

2.3 Measurement instrument and variables

We designed a structured 38-item questionnaire, which was translated from Portuguese into English and Arabic by the research team and interpreted into the other languages of the refugees in the sample (i.e., Kurdish and French), with the collaboration of the organization's cultural mediators. The questionnaire referred to the period between the beginning of the COVID-19 pandemic in Portugal (March 2020) and the moment of the interview and was structured in two domains for content organization and analysis facilitation purposes: (1) sociodemographic-, migration-, healthcare services-, and COVID-19-related variables and (2) dimensions of access to health care, using Levesque's theory on health care access. Levesque's theory identifies two main components: "accessibility of services" and "abilities of persons." The "accessibility of services" encompasses five dimensions: Approachability, Acceptability, Availability and Accommodation, Affordability, and Appropriateness. Correspondingly, the "abilities of persons" include the abilities to Perceive, to Seek, to Reach, to Pay, and to Engage in healthcare. The dimensions of "accessibility of services" interact with the corresponding dimensions in "abilities of persons" to generate access (2), as shown in Figure 1. This multidimensional approach and the holistic view of access illustrate the complex interactions that generate access and stand for the comprehensive nature of the theory. Drawing on Levesque's framework, we selected variables from established public health surveys, with the intent of capturing the determinants of all health care access dimensions among refugees during the COVID-19 pandemic, albeit with a focus on the abilities of persons. We classified the variables into the dimensions they best reflect, according to the categorization used in the literature and the research team's interpretation of the framework, as follows:

2.3.1 Approachability

We explored this dimension using the determinant "information." Namely, we assessed whether health services conveyed information about COVID-19, considering audiences from diverse cultural backgrounds. By making information culturally adequate and available in different languages, recipients can identify and use healthcare services according to their health needs. For example, clear information in several languages about COVID-19 testing procedures could enhance testing adherence among refugees not proficient in Portuguese or English.

2.3.2 Ability to perceive

This ability was analyzed through the determinants "health literacy" and "health beliefs," both of which influence the individual's perception of health issues and the realization of the need for care. We used the variables "source of information about COVID-19," "knowledge of symptoms of COVID-19," and "asymptomatic spread of COVID-19" to assess health literacy, the variable "prevention of COVID-19 by eating spicy food" to assess health beliefs, and the variable "need for health care during the pandemic" to explore both.

2.3.3 Acceptability

We used the variable "cultural competence in health care provided" to explore this dimension. For health care to be accepted, the provision of services must be culturally adequate to engage users in seeking care. Likewise, healthcare professionals need to be equipped with skills that stimulate cultural awareness when delivering care to people from diverse backgrounds.

2.3.4 Ability to seek

The variables "sought health care every time needed" and "reasons for not seeking health care during the pandemic" were used to assess the determinants of autonomy, personal and social values, and individual rights. Understanding why individuals in need of care do

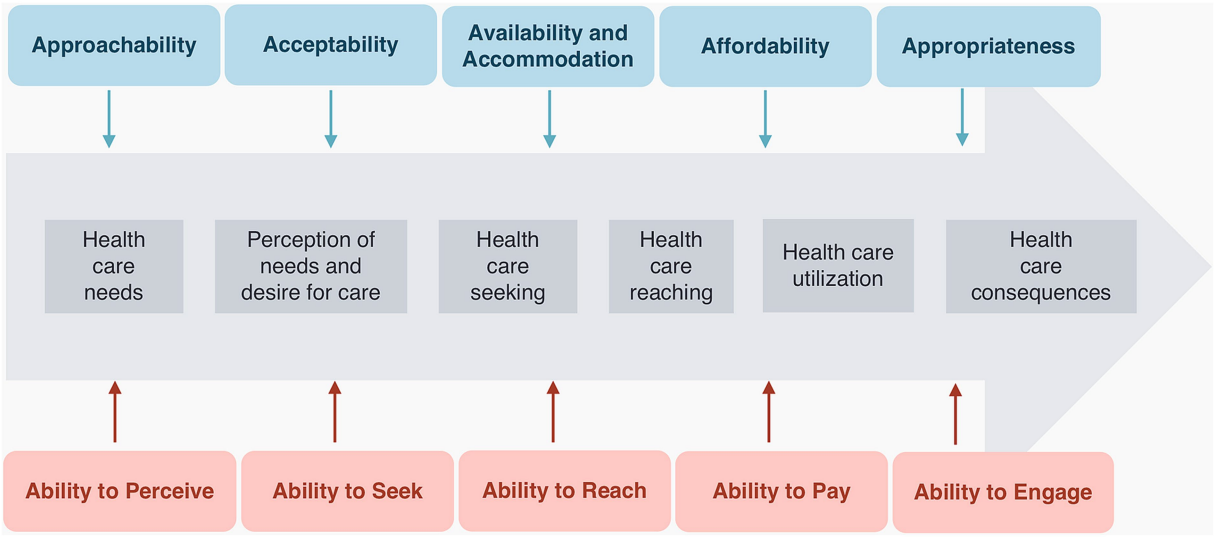

FIGURE 1
Levesque's framework of access to health care Adapted from: patient-centred access to health care: conceptualizing access at the interface of health systems and populations, Levesque et al. (2) (p.5).

not seek it helps identify barriers to their autonomous decision-making regarding seeking healthcare. To explore users' awareness of different health care modalities, we examined the variables "type of healthcare providers sought during the pandemic," "type of healthcare services sought during the pandemic," and "knowledge about line SNS 24". The awareness of "line SNS 24" (Portuguese national health system phone and online platform) was particularly important during the pandemic. This line was designated as the primary point of contact between the public and the health system, alongside providing advice and guidance on COVID-19 preventive measures, symptoms, contacts, testing, quarantine, and when necessary, referral for medical observation. Therefore, awareness of its existence was essential to access some key healthcare services.

2.3.5 Availability and accommodation

With the establishment of public health measures (such as social distancing) and with the need to avoid health system saturation during the pandemic, healthcare services were required to diversify the ways of providing care, by swiftly investing in remote or virtual modalities of contact with users. Thus, the variable "get medical advice by email/phone" was chosen to assess the availability of alternative methods to in-person healthcare service provision.

2.3.6 Ability To reach

This ability was analyzed through the variable "travel to healthcare facility" which explores the easiness with which people can get to the healthcare unit in case of need. It is determined by the concept of personal mobility and availability of transport (2). Another important determinant to reach health care is occupational flexibility, which was assessed by "medical appointment/perform exams during working hours."

2.3.7 Affordability

The variable "pay for healthcare services" was used to assess the direct costs of services, namely if refugees were required to pay for any healthcare services.

2.3.8 Ability to pay

This ability translates to the economic capability to pay for health care without incurring expenses that endanger the supply of basic needs (2). It was analyzed through the variable "could not afford medical examination/treatment."

2.3.9 Appropriateness

The determinant adequacy of care was assessed using the variable particularly if the provided healthcare addressed the specific linguistic needs of refugees. The variable "discussion of treatment options/side effects" was used to assess the technical and interpersonal quality of care, namely if healthcare professionals provided holistic information about treatment options and involved refugees in treatment decisions.

2.3.10 Ability to engage

The variables "vaccination against COVID-19" and "preventive measures SARS-CoV-2" were used to analyze the determinant adherence, namely if refugees were involved in COVID-19 precautionary actions.

2.4 Ethical considerations

The study's protocol was approved by the Ethics Committee of Institute of Hygiene and Tropical Medicine, NOVA University of Lisbon (IHMT) and guided by the ethical principles of the Declaration of Helsinki (25). A written informed consent was obtained from the individuals to participate in the study, which consisted of answering a face-to-face questionnaire applied by the research team. Participation in the study was voluntary, and data was treated confidentially and anonymously. The informed consent was translated from Portuguese into English, Arabic, and French by the research team, and into Kurdish by a cultural mediator from CRESCER, to allow a comprehensive understanding of the information. Whenever the participant was illiterate, the informed consent was read by the

cultural mediator in the participant's language in the presence of a witness (usually a family member). Participants' privacy, in the case of the "NO Border" project, was ensured by conducting the interviews in a separate room at the organization's headquarters.

2.5 Statistical methods

We summarized data using descriptive statistics: we computed frequencies and proportions for qualitative (nominal and ordinal) variables, and the mean and standard deviation (SD), or the median and interquartile range, for quantitative variables, according to their distribution. A database was created and analyzed using the IBM®SPSS® Statistics version 28.

3 Results

3.1 Participants

A total of 37 refugees were identified by CRESCER as meeting the eligibility criteria for the study and were invited to participate. One participant declined participation due to a lack of time to answer the questionnaire, resulting in a final sample size of 36.

3.2 Socioeconomic and demographic characteristics

As shown in Table 1, the mean age of the participants was 35 years (SD = 10.24 years), with over half being male ($n = 20$, 55.6%), 26 (72.2%) were married, and the majority had an Islamic religious background (n = 25, 69.4%). The participants were from seven countries across the Middle East, Asia, and Africa (mainly Afghanistan, Iraq, and Syria) and had all been integrated into the government's Refugee Reception Program. The median length of their stay in Portugal was 17 months (IQR = 45) by the time the questionnaire was applied. Most participants had at least a secondary school education ($n = 25$, 69.4%), and were not verbally proficient in Portuguese ($n = 23$, 63.9%) or in English ($n = 27$, 75%). In six interviews where the house representatives were fluent in English, they acted as an interpreter for the other family member(s) included in the study. Concerning employment, the majority of participants were unemployed ($n = 28$, 77.8%), including nine (25%) housewives. With a median of four persons living in the same household (IQR = 4), all the participants expressed some degree of difficulty making ends meet, of which 19 (52.8%) indicated great difficulty. All 36 participants were registered in a primary healthcare center and, during the pandemic, 34 (94.4%) used healthcare services. Regarding infection with SARS-CoV-2, only two participants were never tested during the study period. Of those tested, the majority never tested positive (n = 21, 58.3%), while a total of 13 (36.1%) tested positive at least once. Among the latter, only one required hospitalization due to severe COVID-19 symptoms.

3.3 Health care access profiles during the COVID-19 pandemic

3.3.1 Approachability and ability to perceive

In this study, 25% of the participants reported not accessing information about COVID-19 in a language they understood. Almost a third of the participants relied on social media and family/friends to obtain information ($n = 11$, 30.5%). Almost all participants ($n = 35$, 97.2%) needed some kind of health care during the pandemic. Most participants (over 86%) were able to identify the most common symptoms of COVID-19 (i.e., fever/chills, cough, fatigue, loss of taste and/or smell), and over 69% recognized three of the less common symptoms (i.e., muscle/body aches, sore throat, congestion/runny nose) (26). However, the identification of gastrointestinal symptoms, specifically nausea or vomiting and diarrhea, varied among participants, with only 44.4 and 38.9% recognizing them correctly (respectively). When presented with false symptoms, 22 (61.1%) correctly identified constipation as unrelated to COVID-19, while 26 (72.2%) did the same for bleeding. Most participants ($n = 21$, 58.4%) either did not know or incorrectly believed that an asymptomatic person could not spread the virus. Additionally, one-sixth ($n = 6$, 16.7%) held the misconception that COVID-19 can be prevented by eating spicy food.

3.3.2 Acceptability and ability to seek

As shown in Table 2, when receiving health care, 58.8% of the participants felt like healthcare professionals did not always show respect towards their culture, including 17.6% who rarely or never felt respected. More than half of the participants ($n = 22$, 62.9%) did not seek health care every time they needed it. Of the mentioned reasons for not seeking health care, most were related to the difficulty of getting a medical appointment, whether due to a long waiting list ($n = 16$, 72.7%) or because the appointment got canceled/postponed ($n = 6$, 27.3%). Language difficulties were pointed out by 13 (59.1%) respondents, and 12 (54.5%) considered their health problem not to be serious enough to justify seeking health care. A total of 10 (45.4%) respondents did not know what to do or where to go for health care. The main healthcare providers sought by the participants during the pandemic were family doctors ($n = 23$, 69.7%), pharmacists ($n = 19$, 57.6%), hospital specialist doctors ($n = 17$, 51.5%) and emergency rooms ($n = 17$, 51.5%). Only six (18.2%) sought counseling services. Most participants relied on the public sector, namely primary care centers ($n = 27$, 81.8%) and public hospitals ($n = 26$, 78.8%), to get health care. Half of the participants ($n = 18$, 50%) were unaware there was a national health line (linha SNS24).

3.3.3 Availability and accommodation and ability to reach

Of the 26 respondents who contacted the healthcare center by phone or email, half (n = 13, 50%) found it was very difficult to get medical advice through those channels of communication. When considering the physical mobility to the health center, most participants reported that it was very easy (n = 17, 51.5%) or somewhat easy (n = 9, 27.3%) to get to the primary care center or hospital. Out of the six employed refugees who needed care during work hours, four had the occupational flexibility to go to a medical appointment or perform an exam.

3.3.4 Affordability and ability to Pay

When it comes to the direct costs of health care, over half of the participants ($n = 19$, 54.5%) reported having paid for health care (including medication). A total of 13 (39.4%) respondents experienced times when they could not afford a medical examination or treatment.

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TABLE 1 1st domain: sociodemographic-, migration-, healthcare services-, and COVID-19-related variables.

VARIABLE	FREQUENCY *(n)*	%
Employment status		
Unemployed	19	52.8
Housekeeper	9	25.0
Employed	8	22.2
Number of people in household (Median, IQR)		
	4 (IQR = 4)	
Integration Refugee Reception Program (yes)		
	36	100
Native language		
Arabic	10	27.8
Kurdish	10	27.8
Dari	8	22.2
Pashto	5	13.9
Tigrinya	2	5.6
French	1	2.8
Portuguese verbal proficiency		
not at all	2	5.6
not well	21	58.3
well	12	33.3
very well	1	2.8
Primary Care Center registration (yes)		
	36	100
Length of stay in Portugal, months (Median, IQR)		
	17 (IQR = 45)	
Healthcare services utilization (yes)		
	34	94.4
Test positive for coronavirus		
no	21	58.3
yes	13	36.1
never been tested	2	5.6
Admission to hospital due to COVID19		
no	12	33.3
yes	1	2.8
never been tested/never tested positive	23	63.9
Vaccination against COVID-19		
no	1	2.8
yes, but not all doses required	25	69.4
yes, all doses required	10	27.8
COVID-19 Preventive measures		
wore face mask	36	100
used sanitizers	35	97.2
washed hands for 20 s	33	91.7
kept social distance	30	83.3
did not touch my face	13	36.1
changed my diet	7	19.4
took over-the-counter medicines	4	11.1
other preventive measures	1	2.8

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TABLE 2 Acceptability and ability to seek results.

Dimension/Question	Responses *N* = 36			
	Always *n* (%)	Sometimes *n* (%)	Rarely *n* (%)	Never *n* (%)
Acceptability				
When receiving health care during the pandemic, did you feel that health care professionals were understanding and respectful of your culture?	14 (41.2)	14 (41.2)	5 (14.7)	1 (2.9)
	n (%)			
Ability to Seek				
During the pandemic, did you seek health care every time you needed it?				
no	22 (62.9)			
yes	13 (37.1)			
If you did not always seek health care whenever you needed it, please indicate why				
Could not make an appointment because of long waiting list	16 (72.7)			
Language difficulties	13 (59.1)			
My health problem was not serious	12 (54.5)			
Did not know what to do	7 (31.8)			
Appointment got canceled/postponed	6 (27.3)			
Could not afford health care	6 (27.3)			
Fear of getting COVID-19	6 (27.3)			
Preferred to seek traditional/alternative medicine from my country of origin	6 (27.3)			
Do not trust healthcare professionals	4 (18.2)			
Did not know where to go	3 (13.6)			
Fear of discrimination	3 (13.6)			
Did not know if I was entitled to health care	3 (13.6)			
Did not have means of transportation	2 (9.1)			
Fear of denunciation due to my legal situation	0 (0.0)			
Other	2 (9.1)			
During the pandemic, which healthcare providers did you seek? (select all that apply)				
Family medicine doctor	23 (69.7)			
Pharmacist	19 (57.6)			
Hospital specialist doctor	17 (51.5)			
Emergency room	17 (51.5)			
Dentist	14 (42.4)			
Nurse	7 (21.2)			
Psychological & counseling services	6 (18.2)			
Traditional healer	1 (3.0)			
During the pandemic, which health services did you seek?				
Primary care center	27 (81.8)			
Public hospital	26 (78.8)			
Private clinic/hospital	7 (21.2)			
Non-governmental organization	5 (15.2)			
Other	1 (3.0)			
Do you know what is the health line SNS24 (linha SNS24)?				
No	18 (50)			
Yes	18 (50)			

3.3.5 Appropriateness and ability to engage

Table 3 reports the dimensions of appropriateness and the ability to engage. Over a third of the participants ($n = 11$, 35.5%) were not offered an interpreting service when receiving health care, and for the ones who were, interpretation was provided by the organization CRESCER or a family member proficient in English. A total of 22 (64.7%) participants reported that when receiving health care during the pandemic, healthcare professionals did not discuss with them treatment options or treatment side effects. Most participants ($n = 35$, 97.2%) had received vaccination against COVID-19, of which 25 (69.4%) had an incomplete vaccination schedule. In what concerns COVID-19 preventive measures, all the participants wore face masks, and the large majority ($n = 30$, 83.3%) used sanitizers, washed their hands for 20 s, and kept social distance. Around 30% of participants changed their diet or took over-the-counter medicines to protect themselves from SARS-CoV-2 infection.

4 Discussion

4.1 Sociodemographic characteristics

This article aimed to describe the sociodemographic, migration, and COVID-19 characteristics of refugees living in Lisbon, and to describe the dimensions of their health care access during the COVID-19 pandemic in consistent with Levesque's Patient-Centered Framework. A total of 36 refugees participated in the study, with a mean age of 35 years, and over half were male ($n = 20$). The participants were from seven countries across the Middle East, Asia, and Africa, had all been integrated into the government's Refugee Reception Program, and had a median length of stay in Portugal of 17 months. Of the 36 participants, 26 were married, with a median of four persons living in the same dwelling, and the majority had an Islamic religious background ($n = 25$). Most had at least a secondary school education ($n = 25$) and were not verbally proficient in Portuguese ($n = 23$) or English ($n = 27$). The large majority were unemployed ($n = 28$) and all expressed some degree of difficulty making ends meet. All were registered in a primary healthcare center and, during the pandemic, 34 used healthcare services. Most of them never tested positive for SARSCoV-2 ($n = 21$), and one was admitted to hospital due to severe COVID-19.

Sociodemographic data on refugees and asylum seekers resettled in Portugal is dispersed and often incomplete. According to available national data from the last 5 years (which corresponds to the longest length of stay of this study's participants), the sociodemographic distribution of refugees was overall similar to that in this study's sample. For example, most refugees - including children - were male (around 68% in 2018, around 60% in 2020 and 52% in 2021 compared to 55.6% in the sample) (20, 27). Additionally, the most representative age group among adult refugees (over 18) was 19–39 years (89% in 2018, 78% in 2019, 76% in 2020, and 66% in 2021) (20), similar to the age distribution of the study (in which n = 27, 75% aged 21–38 years). The most frequent countries of origin (Afghanistan, Iraq, Syria, and Eritrea) are also among the main five countries of origin of refugees and asylum-seekers in Portugal in the last 5 years (27). National data concerning the educational attainment of refugees is limited. In 2021, the educational level of up to 40% of refugees arriving in Portugal was unknown, including those from Afghanistan—the most prevalent group at the time. For those whose educational level was documented, most had only completed primary school. This contrasts with the findings of our study, where the majority had at least a secondary school education (20). Regarding employment, in 2020 and 2021, around 40% of the refugees were still unemployed at the end of the integration program, whilst in our study, unemployment almost reached an astounding 78%. Similarly to the findings of this research, there were high percentages of registration of newly arrived refugees in the National Health System (SNS) in 2021, namely over 80% in all official entry mechanisms (except for the Afghans, which was 69.4%) (20). Although our sample is not intended to be representative, a comparison with the limited data available at the national level shows that the age, gender, and country of origin of the refugees in our study do not differ considerably from the national picture.

4.2 Approachability and ability to perceive

When considering healthcare services' approachability, especially in public health emergencies such as the COVID-19 pandemic, services must devise strategies of communication in which information is available, clear, and adequate to the audience it serves, so that preventive and control measures can be promptly and efficiently followed. Inclusive communication in health care should take into consideration not only the diverse cultural backgrounds of the recipients (namely by making information culturally adequate and available in different languages) but also ensure that it reaches the intended public promptly, so that services can be identified by users. Although several entities such as the Directorate-General of Health, non-governmental organizations, the International Organization for Migration, and particularly the High Commission for Migration publicized multilingual information about COVID-19, 25% of the participants in this study stated not to have had access to information about COVID-19 in an understandable language. Studies in countries such as the United Kingdom and Brazil similarly showed that there was insufficient communication effectiveness with asylum seekers, due to a lack of culturally and linguistically adequate information about the pandemic (28).

The Ability to perceive the need for care is highly influenced by health literacy, knowledge, and beliefs about health (2). The main sources of information on COVID-19 chosen by the participants were informal, such as social media and friends/family, which accounted for almost a third of the responses. This finding is in line with other studies, which outline the role of social media as a source of information about COVID-19 (29–31). Factors such as age, language proficiency, education, economic resources, and length of stay in the country may all have played a part in the choice of the information source. Healthcare services that are not approachable, due to their failure to convey culturally and linguistically appropriate information, can negatively affect people's ability to access and perceive reliable health information. People may then turn to sources of information that are readily available and free of language barriers, like social media, as outlined in a systematic review on the use of social media during the pandemic by ethnic minorities and migrants (including refugees) (31). Social media channels may, in turn, become a vehicle for health misinformation, particularly during public health emergencies like the COVID-19 pandemic, with negative impacts on people's health behavior, such as increasing vaccine hesitancy and the use of unproven treatments (31–33).

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TABLE 3 Appropriateness and ability to engage results.

Dimension/Question	Responses *N* = 36			
	n (%)			
Appropriateness				
When receiving health care were you ever offered an interpreting service?				
No	11 (35.5)			
Yes	20 (64.5)			
	Always *n (%)*	*Sometimes* *n (%)*	*Rarely* *n (%)*	*Never* *n (%)*
When receiving health care during the pandemic, have healthcare professionals discussed with you your different treatment options, including possible side effects?	12 (35.3)	11 (32.4)	3 (8.8)	8 (23.5)
	n (%)			
Ability to engage				
Were you vaccinated against COVID-19?				
No	1 (2.8)			
Yes, but not all doses required	25 (69.4)			
Yes, all doses required	10 (27.8)			
COVID-19 Preventive measures				
Wore face mask	36 (100)			
Used sanitizers	35 (97.2)			
Washed hands for 20 s	33 (91.7)			
Kept social distance	30 (83.3)			
Did not touch my face	13 (36.1)			
Changed my diet	7 (19.4)			
Took over-the-counter medicines	4 (11.1)			
Other preventive measures	1 (2.8)			

In this study, most participants were knowledgeable about the most common symptoms of COVID-19, which can be partially explained by the high level of education of the participants and the study's timing (*circa* 2 years of pandemic). Nevertheless, a lack of awareness about asymptomatic transmission of the virus was also common, and up to one-sixth of respondents held the misconception that COVID-19 can be prevented by eating spicy food. The literature on the levels of knowledge about transmission and symptoms of COVID-19 among forcibly displaced people is heterogeneous but generally shows that lower levels of knowledge and health literacy are more likely in refugees with low educational attainment (30, 34–36). Other factors that probably influence knowledge levels include the different study settings (camps versus urban resettlements), timing of the studies/time elapsed since the beginning of the pandemic (and thus production of knowledge about the novel virus), and language proficiency.

4.3 Acceptability and ability to seek

When receiving health care, most participants of this study felt like healthcare professionals did not always show understanding and respect towards their culture, including almost a fifth who rarely or never felt culturally respected. This finding elicits a lack of cultural competence, which is defined as the ability of systems to provide care to patients with diverse values, beliefs, and behaviors, including tailoring delivery to meet patients' social, cultural, and linguistic needs (37). Lack of cultural competence in the provision of healthcare services compromises its acceptability by users (38). Cultural and religious differences between participants and their healthcare providers may have played a role in this dimension, as most refugees were of Islamic background, in contrast with the predominant Christian-embedded culture of Portugal. There is a paucity of data in the literature on refugees' input on cultural competence in the healthcare setting (39). Findings of the qualitative arm of a European study on the healthcare of migrants and refugees highlighted a perceived cultural competence inadequacy among healthcare providers in all ten participating countries (Portugal not included) (40). Similarly, studies with healthcare professionals in Portugal acknowledged the cultural challenges in providing care to migrants, including the lack of cultural competence training (41) and the need to incorporate cultural mediators in healthcare services (42, 43). Healthcare professionals' lack of awareness and preparedness regarding certain cultural aspects of refugees and other migrants may lead to feelings of rejection and imperil health care access through the avoidance of healthcare providers (3, 44), thus endangering acceptability. Additionally, disrespect towards the culture of migrants and refugees, in the form of discrimination or xenophobia, is also a

well-known barrier to health care (3, 38, 40, 45), further compromising access. Results from a training program on cultural and individual diversity for primary healthcare providers in Portugal during the COVID-19 pandemic showed an improvement in cultural diversity awareness, knowledge, and skills, and contributed to reducing feelings of discrimination among healthcare professionals (46).

The Ability to Seek care was also compromised in this research as most participants did not seek health care every time they needed it. Structural barriers to health care, such as long waiting times, cancellation or postponing of medical appointments, language difficulties, and unfamiliarity with the health system, were appointed by refugees as the main reasons for not seeking care, similar to other studies on migrants and refugees' health care (6, 12, 40, 44, 47). It is indisputable that the COVID-19 pandemic put overwhelming pressure upon health care systems, limiting their capacity to respond. This was particularly evident in Portugal, where unmet needs for medical care in the first year of the pandemic were the second highest among the Organization for Economic Co-operation and Development (OECD) countries, affecting more than a third of the population and especially impacting people in the lowest quintile of income (48). Nevertheless, the persistent nature of the health care barriers encountered by migrants and refugees is attested by their presence long before the pandemic, both globally (38), and in several Portuguese studies among migrants (12, 15, 47), suggesting that major interventions are necessary to reduce health systems inequalities.

Half of the participants were unaware of the existence of a national health line (*linha SNS24*). During the pandemic, and particularly during lockdown, this phone line was mandated as the primary contact with the national health system to alleviate pressure on health services. It acted as a source of information about preventive measures, provided case and contacts management, quarantine, isolation, and vaccination guidance, and, when applicable, access to the respective certifications of work absence. Also of particular importance, it allowed free testing to people registered in the national health system, provided the initial management of people with COVID-19 symptoms, and served as a referral system to healthcare providers according to the severity of symptoms (49). A non-COVID-19 line was also available to assess and direct people to medical consultation if justified. Lack of awareness of refugees about this telephone line may have impaired knowledge about health care options and modes of navigating the health system during the pandemic.

While the majority of healthcare providers sought by participants were family doctors, pharmacists, emergency doctors, and hospital specialist doctors, only a small percentage sought counseling services. These findings are in line with a systematic review of the underutilization and access to mental health services among refugees and asylum seekers in Europe (50). The distressing experiences faced by refugees act as risk factors for mental disease (51–53), doubling their risk of suffering from post-traumatic stress disorder and depression compared with economic migrants (50). The detrimental effect of the COVID-19 pandemic control measures on mental health further accentuated this vulnerability in asylum-seekers and other migrants (28). Moreover, increased perceptions of discrimination, socioeconomic difficulties, and unmet needs for medical care among refugees and migrants due to the pandemic also contributed to worsening their mental health outcomes (54). The discrepancy between refugees' mental health needs and the actual mental care they receive can be attributed to several factors, rooted in the aforementioned barriers, namely language difficulties, unavailability or lack of timely appointments, unawareness regarding providers' services, or constraints to virtual care access during the pandemic (11, 50, 52). Additionally, cultural barriers, stigma, low self-perceptions, and awareness about mental disease are also important impediments to access, probably contributing to the low rates of mental help-seeking among refugees (50, 52).

Regarding health services, most participants relied on the public sector to get health care, which is probably explained by the economic insufficiency reported in the study.

4.4 Availability and accommodation and ability to reach

During the pandemic, half of the respondents who contacted the healthcare center found it very difficult to get medical advice by phone or email. Restrictions on social contacts, especially during lockdowns, forced healthcare services into a fast transition to alternative and non-face-to-face modalities of contact with users. In this study, there was limited availability and accommodation of services for refugees during the pandemic, as the offered means of obtaining a medical consultation were ineffective.

When considering the ability to reach, namely the physical mobility to the health center, most participants reported that it was easy to get to the primary care center or hospital. This is probably partially because all respondents live in an urban setting, specifically in the country's capital, where there is a greater concentration of services and resources, including public transportation. As of November 2022, of the 1,294 primary care units of the country, approximately 68% were concentrated in Porto and Lisbon regions (514 and 362 respectively) (55). Likewise, in 2021, most of the 107 country's public hospitals were in the Lisbon Metropolitan Area (24 hospitals) (56). In a study among immigrants living in the Lisbon Metropolitan Area, the geographic proximity of the healthcare centers was found to be the main reason for their utilization (12). Another factor that may have facilitated responders' mobility was the use of public transportation for free, as refugees are attributed a gratuitous monthly travel pass during the monitoring phase of PMAR Lx. The intent to assess the ability to reach through occupational flexibility was limited in this study, as the great majority of responders were unemployed, and out of the few who were employed, not all needed health care.

4.5 Affordability and ability to pay

Over half of the participants reported paying for health care, despite refugees being exempt from user fees in the SNS. The lack of affordability in this study was mainly related to paying for medication and, to a lesser extent, dental care. These findings are consistent with a study among immigrants in Portugal that showed greater financial difficulties for immigrants to acquire pharmaceuticals compared to natives (19). The Portuguese SNS covers several but limited services, namely medical appointments in primary care and specialized outpatient care, pharmaceuticals, and other services prescribed by physicians (57). Despite refugees' entitlement to user fee exemption, which enables them to receive the aforementioned services without

costs, the SNS coverage for pharmaceuticals operates under a coinsurance scheme in which a portion is paid by the user (58). In 2020, pharmaceuticals and other medical goods constituted the main reason for out-of-pocket expenditures in OECD countries, due to a lesser extent of governments' coverage comparatively to inpatient/outpatient care. Moreover, in Portugal, coverage for pharmaceuticals was below the average of 59% of the OECD countries (59). Nevertheless, the extensive offer of generic medications should theoretically allow people with scarce economic resources to maintain their treatment at sometimes considerably lower costs. Concurrently, access to the government's cost-sharing in the acquisition of pharmaceuticals requires the presentation of a medical prescription (which is usually provided subsequently to a medical appointment). A study of the results from the 2014 National Health Survey in Portugal showed that migrants were more likely than natives to use medications without a prescription (60). Obstacles to medical appointments observed in this study, and therefore inability to obtain a prescription, may have contributed to refugees resorting to over-the-counter pharmaceuticals (which are not covered by the SNS). Dental care is mainly provided by dentists in the private sector despite its inclusion in the SNS in 2016 (58, 61). In cases of oral cancer suspicion and some situations of social vulnerability (62), within which refugees are not included, SNS offers a dental paycheck that covers treatments free of charge (58).

Assessment of ability to pay showed that up to 40% of responders experienced times when they could not afford a medical examination/treatment, which can be understood in the context of the high percentages of unemployment and difficulty in making ends meet reported by the participants. Costs associated with dental care, medical appointments, or exams in the private sector (as an attempt to cover health needs in a timely manner), and medications were some of the cited reasons for the inability to pay.

4.6 Appropriateness and ability to engage

In terms of appropriateness and adequacy of services, over a third of the participants were not offered an interpreting service when receiving health care during the pandemic, even though the large majority were not proficient in Portuguese or English. In cases where interpretation was offered, it was mainly provided by the cultural mediators of the organization CRESCER, which could partially be explained by the participants' median stay of 17 months in the country (which coincides with the monitoring phase of PMAR Lx). Lack of adequate communication between healthcare professionals and refugees leads to misunderstandings and misdiagnosis (3, 44). In addition, it generates feelings of emotional distress, distrust, and perceptions of exclusion, and propels disconnection and underutilization of services by refugees and immigrants (44, 51). Although interpretation services provided by CRESCER organization may contribute to the fulfillment of most refugees' linguistic needs when articulating with healthcare services during the monitoring phase of the PMAR Lx, devising long-term strategies to address this issue is warranted. With the intent to bridge the communication gap between migrants and institutions, the High Commission for Migration provides a toll-free interpretation telephone service (63). Nevertheless, the line is not available 24/7 and it is not specific for health care purposes, making it unsuitable for emergencies and prone to the inadequate interpretation of medical terminology. Most participants reported that when receiving health care during the pandemic, healthcare professionals did not discuss with them treatment options or treatment side effects. Poor technical and interpersonal quality of care contributes to restricting access (2). A review of primary care access among immigrants in Canada showed that the lack of patient involvement in treatment decision-making results in service dissatisfaction and, eventually, change in healthcare providers (44). Conversely, a study with refugees and immigrants in Denmark during the pandemic underscored the importance of the coproduction of health as a means to deliver quality healthcare service to this vulnerable population, sustained by trustful relationships with healthcare providers, which enhanced patient participation in decisions as well as their overall health care (64).

The large majority of participants were vaccinated against COVID-19 and adopted preventive measures against infection, denoting significant participation in public health recommendations and an ability to engage in health care. The participants' high level of education probably played a role in this engagement. Although there was a high percentage of vaccination at the time of the study, most participants had an incomplete schedule. The findings on following precautions against SARS-CoV2 infection in this study were similar to those in a World Health Organization worldwide survey of refugees and migrants on the self-reported impact of COVID-19 (29). In the latter, there was also a high adherence to measures such as increased hand washing, social distancing, and covering the nose and mouth. However, the ability to follow these precautions varied across regions, with refugees and migrants from Africa and Southeast Asia showing higher noncompliance percentages due to the lack of suitable living conditions (29).

5 Limitations

Although this research was designed to comprehensively address all dimensions of access as contemplated in Levesque's theoretical framework, it could not encompass all the underlying determinants of access, highlighting the complexity of the subject at hand. This complexity extended to the methodology of characterizing the dimensions of the framework. The process of allocating a variable and corresponding question to a specific dimension or ability within the framework proved challenging, as some questions applied to more than one dimension or ability (65). The non-probabilistic and small sample limits the generalization of the findings, and focusing on just one refugee reception organization, to save time and resources, may have resulted in a selection bias (66). Additionally, the questionnaire refers to a timeline of more than 2 years, which may have compromised the accuracy of memories regarding the studied events and have led to a recall bias (66). Finally, the cross-sectional nature of the study does not allow for causality to be established: for that purpose, it would be necessary to carry out another type of study design (i.e., cohort study).

5.1 Implications for future research

Identified population characteristics and barriers to health care access in this research may inform future studies on the health care needs of refugees in Portugal and suggest how health services could

TABLE 4 Extracted policy implications from the study.

Potential Health Care Access Areas to Improve		Possible Interventions	
Inclusive communication	*Close Collaboration with Refugees'representatives*	Work with translators/interpreters in: - developing culturally adapted communication materials on health care functioning and individual rights to health in the host country - choosing the most widely used communication channels by the communities to disseminate information - developing Standard Operating Procedures for risk communication in public health emergencies with a defined chain of command within the communities Generalize the inclusion of interpreters in health care settings	*Coproduction of Health*
Cultural competence of healthcare providers		Invest in training courses for healthcare professionals on cultural diversity awareness and cultural competence skills development Integration of cultural diversity awareness in academic curricula of health care professionals Promote cultural exchange opportunities between refugees and healthcare professionals through events or training courses Include Cultural Mediators in health care settings as permanent staff	
Utilization of counseling services		Use appropriate channels to disseminate information about counseling services Promote information sessions on mental health: increase refugees' self-perceptions about mental health and reduce stigma associated with mental disease	

be improved to meet those needs. Findings in this research also shed light on persistent challenges that require the development of strategies and policies aimed at reducing inequalities in health care access. However, a deeper understanding of the specificities of the refugee population in Portugal is essential for designing targeted interventions that facilitate access to health care. Studies with larger samples, involving more refugee hosting entities, and in different geographic locations of the country, would allow for better representativeness of the refugee population in Portugal, thus providing a more comprehensive understanding of health care access. Likewise, to better understand the complexity of health care access, it is also necessary to explore the perceptions and experiences of both refugees and healthcare providers. Qualitative studies could allow for in-depth insights into the specificities and needs of both access agents, therefore enabling effective and context-specific strategies.

6 Conclusion

To the extent of our knowledge, this is the first quantitative study exploring health care access among refugees in Portugal during the COVID-19 pandemic. It also provided a platform for refugees' input on the subject, using a comprehensive framework on health care access, exploring both supply- and demand-side determinants. Although all the participants were registered in the national health system and most had received at least one dose of vaccination against COVID-19, our study also suggests constraints in several dimensions of access:- an insufficiency of inclusive communication by healthcare services/authorities, as language-appropriate information about COVID-19 did not reach all of the participants;- a paucity of cultural competence, as more than half of the refugees felt like healthcare professionals did not always show respect towards their culture; −an underutilization of mental health services, considering the minority of refugees that sought counseling; −a lack in the coproduction of health care, as the majority of refugees felt they were not involved in their health care process decision making. Table 4 summarizes possible policy implications from the aforementioned barriers. The outcomes of this study will potentially make visible difficulties refugees experience in health care access and thus inform future studies with larger and representative samples. Vertical health policies with multilevel strategies are essential to improve access to health care by refugees. To this end, the establishment of work alliances with refugee communities' representatives would be an unvaluable asset to ensure an open channel of communication with the target population and the alignment of measures with people's specific needs.

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.

Ethics statement

The studies involving humans were approved by Ethics Committee of Institute of Hygiene and Tropical Medicine of New University of Lisbon. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

VP: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Supervision,

Visualization, Writing – original draft, Writing – review & editing. SH: Conceptualization, Methodology, Supervision, Writing – review & editing. MO: Conceptualization, Data curation, Funding acquisition, Methodology, Project administration, Resources, Supervision, Writing – review & editing.

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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.

The author(s) declared that they were an editorial board member of Frontiers, at the time of submission. This had no impact on the peer review process and the final decision.

Publisher's note

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2024.1337299/full#supplementary-material

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Somali refugees in urban neighborhoods: an eco-social study of mental health and wellbeing

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Background: Impact of pre-migration trauma and post-migration settlement on refugee mental health and wellbeing is well-documented. However, little research has focused on the specific places where refugees settle and spend their daily lives within the post-migration context. This study adopts an eco-social perspective to explore the relationship between urban neighborhoods and refugee mental health and wellbeing.

Methods: We conducted twenty-six qualitative interviews with Somali refugees in London and Bristol in the UK. The transcripts were coded using an inductive approach and analyzed through thematic analysis.

Results: Somali refugees navigate a complex urban environment comprising various neighborhood features which include important places near home, interactions with neighbors, and community spaces. While these features afford them resources to improve mental health and wellbeing, they also present challenges such as high urban density, exposure to violence or discrimination, and neighborhood disorder.

Conclusion: The societal and physical features of urban neighborhoods intersect with refugee experiences of adversity, trauma and stress over time. As eco-social niches, urban neighborhoods are both accommodating, safe and familiar, as well as alien, threatening and unwelcoming. To support mental health and wellbeing and ensure successful settlement, it is essential to recognize the agency of refugees and provide continuous support throughout the entire asylum process and after, ensuring stable and safe living conditions.

KEYWORDS

refugees, mental health, wellbeing, eco-social niches, urban neighborhoods

Introduction

Within the asylum landscape, cities have emerged as significant sites of refugee destination and settlement (1). More than 60% of the world's refugees and asylum seekers live in urban areas and this percentage is probably even higher in Global North countries (2, 3). Literature on 'urban refugees' focuses mostly on the Global South[1] where most refugees are displaced and settled (5–7). Conversely, while there has been a focus on refugee mental health in Global North countries, relatively little is known about the urban experience of refugees and how they navigate their daily lives within urban neighborhoods, particularly understanding how this affects their mental health and wellbeing (8–10).

Our qualitative study contributes to this nascent field by exploring the post-migration experiences of Somali refugees and their mental health and wellbeing in the context of urban neighborhoods in London and Bristol. The Somali refugee community presents an interesting case as they have resided in the UK for a significant period since the outbreak of the Somali Civil War in 1991. Indeed, the Somali population in the UK is the largest in Europe, with an estimated 108,921 Somali-born permanent residents, approximately 59,000 of which have obtained British citizenship (11). A significant number of Somalis living in the UK are also citizens of other EU countries. Their longer-term experience living in UK urban neighborhoods provides crucial insight into how societal and physical features of environment intersect over time with adversity, trauma and stress to shape their mental health and wellbeing.

In our study, we asked the following questions: What urban neighborhood features do Somali refugees consider important for their experiences of settlement and belonging? How do these features shape their mental health and sense of wellbeing? What are the underlying processes that mediate between social and physical environments of neighborhoods and refugee mental health and wellbeing? To answer these questions, we draw on an eco-social framework (12–14) and explore the complexities of the interplay between individual, social, physical and temporal dimensions of everyday refugee life in the city. Research among refugees has underscored that refugee mental health is not only an outcome of individual pre-migration experiences but also the result of complex interactions between people and their post-migration environments, both social (e.g., poverty, unemployment, legal challenges, interpersonal violence, social support) and physical (e.g., neighborhood characteristics, green spaces, housing conditions) (12, 15). In other words, our emphasis is on 'social ecology' where mental health outcomes experienced by refugees are located within their respective living environments. Everyday stressors and sources of resilience are embedded within such material conditions, social networks, community structures, and the policies of the host society (13). The eco-social framework further posits that "humans create and inhabit, shape and are shaped by their 'ecological niches'" (14:3), foregrounding the need to recognize refugee agency as a key element in the processes of adaptation and settlement in new environments. This leads to our focus on urban neighborhoods as eco-social niches that play a pivotal role in the experiences of displacement and migration. Understanding urban neighborhoods as eco-social niches enables us to examine how refugees navigate and inhabit urban places on different scales, from housing estates to the city streets, and how making a place for themselves shapes their mental health and wellbeing over time.

In the following, we introduce the UK asylum context, outline a brief history of Somali refugees in the UK and explore some of their conceptions of mental health and wellbeing based on available literature. In the results section, we present three salient themes that emerged from thematic analysis of our data, revealing features of urban neighborhoods as human ecological niches that afford and impede settlement with implications for mental health and wellbeing. We conclude by discussing the implications of our findings for understanding refugee mental health and wellbeing in urban contexts.

UK asylum landscape and urban refugees

Refugees in the UK are increasingly facing restrictive asylum regimes embedded within broader 'hostile environment' policies (16). For many refugees, their very first experience as asylum seekers in the UK is that of languishing in unfavorable and unpredictable environments which severely limit the "individual and collective process of creating spaces of belonging" (17). For instance, around 93% of asylum seekers are dispersed to housing estates which are often located in areas of economic decline where refugees are exposed to social isolation and discrimination which elevate their mental health and wellbeing risks (18–20).

Due to long delays in processing asylum claims in the UK, asylum seekers are forced to live in limbo for months on end with an average waiting time of between one and three years (21). Once individuals receive refugee status, they undergo a 28-day transition period[2] from asylum to welfare system, which creates financial instability and upheaval due to frequent changes in accommodation (23, 24) and can have detrimental effects on the mental health of refugees (25). Many refugees live in poverty and face unemployment, underemployment, inadequate housing conditions, limited support networks, low English proficiency and discrimination which, in turn, are variously experienced and exacerbated by additional intersectional factors such as LGBTQ+ identity, gender, age and disability (26–28).

1 While we acknowledge the complexity of this terminology, the 'Global South' refers to countries predominantly in Latin America, Asia, Africa, and Oceania (4). These regions are often distinguished by their historical, socio-economic, and geopolitical characteristics, which typically position them as less economically developed compared to Global North regions such as Europe, North America, and Australia.

2 Since the writing of this article, changes in the application of this policy have resulted in newly recognized refugees having as little as seven days to secure housing and financial support, a task that is virtually impossible (22).

To positively facilitate refugee settlement in urban neighborhoods, 'refugee-integration-opportunity structures' (29) and inclusive social and physical environments have been shown to be essential (30, 31). Specific locations within cities, such as public parks, libraries and urban allotments, can offer therapeutic sensory and embodied experiences that improve mental health and a sense of belonging for refugees (31–34). Voluntary onward migration also plays a significant role as refugees seek to resettle in urban neighborhoods that provide better opportunities and closer proximity to their family and community networks (35, 36). These findings appear to be in line with the effect of ethnic density on better mental health outcomes and reduced risk of psychosis in migrants (37). However, for refugee communities to thrive, the broader cultural and ethnic diversity of the city is equally crucial in promoting acceptance and reducing hostility (38).

Somali refugees in the UK

Somali settlement in the UK dates to the late nineteenth century, with seamen from colonial British Somaliland settling in port cities like London, Cardiff and Liverpool. Later in the mid-twentieth century, Somali migrants arrived in industrial cities such as Sheffield, Manchester and Birmingham (39). However, the demographic shifted notably after the full-scale outbreak of the Somali Civil War in the early 1990s, leading to the arrival of refugees who faced challenges such as limited employment opportunities, language barriers and reliance on the welfare system (40, 41). Today, there are several London boroughs with a notable Somali community presence (42), and Somalis are the largest ethnic minority group in Bristol according to the City Council (2022). In both cities, Somalis live in some of the most deprived areas, characterized by high unemployment, poverty and poor housing (43, 44). Up to 75% of UK Somali refugees are unemployed (45), and they are among the most affected ethnic minority groups suffering from poor health conditions such as tuberculosis (46).

Such post-migration factors have been found to contribute to an increased risk of poor mental health outcomes in Somali refugees (47–49). For example, a comparative study of Somali refugees in Minneapolis, USA, and London, UK, found refugees in both cities felt disempowered and disillusioned due to restrictive social and legal environments, limiting their agency and socio-economic participation (50). Somali refugees in London experienced additional challenges relating to family separation, legal uncertainties and unemployment compared to those in Minneapolis, and they were more likely to report major depression and any mental disorder. Another study showed that Somali refugees in London moved an average of four times in five years before securing permanent accommodation. This resulted in considerable stress and negative impacts on their lives, such as family and social ties, child development and stable access to health and social care services (51). Somali refugees who relocated within five years of arriving in the UK were more vulnerable to psychiatric disorders (25).

While little is known about prevalence rates of mental disorders, an earlier study by Bhui and colleagues (52; see also 53) found that more than one-third of Somali refugees surveyed via GP registers and community sites in the UK had a mental disorder, the most prevalent being common mental disorders and post-traumatic stress disorder. Such mental health problems are further increased due to intra-community stigma surrounding mental health issues and limited culturally appropriate mental health services (54–56). Such services need to take Somali conceptions of mental health into account which intertwine social and spiritual wellbeing, embedded within collective experiences rather than individualized concerns (57, 58). For instance, Somalis commonly use idioms of distress such as 'thinking too much' to draw attention to social ruptures, injustice and practical problems like social isolation, poverty and racism. They may also present with physical symptoms such as headaches, insomnia and chest pain (59–61). Family members are often the first to address distress, with faith-based organizations and cultural activities providing support, a sense of community and spiritual guidance (62, 63). This clearly shows that the social ecology in which Somalis live is not only implicated in their mental health and wellbeing, but also in the ways mental health care and social support are provided.

Methodology

This study followed a qualitative approach to investigate how features of urban neighborhoods afford and impede settlement with implications for the mental health and wellbeing of Somali refugees. To ensure rigor and cultural sensitivity, an advisory group was formed consisting of six Somali community representatives and an academic with extensive experience of working on mental health issues in post-conflict societies. The advisory group provided feedback on the early stages of the study and on the development of the interview guide.

Between September 2020 and April 2022, semi-structured interviews were carried out at three sites, South and Northwest London and Bristol, with substantial Somali diaspora communities allowing comparisons between them. Although in both cities participants lived in some of the most deprived urban neighborhoods in the UK, they also provided different contexts in terms of population size, urban density and community spaces. Research in South London took place in Brixton, an inner-city neighborhood characterized by comparatively greater urban density than the northwest neighborhood of Willesden and its more suburban surrounding areas. Interviews conducted in Bristol took place in the inner-city area of Easton. Brixton and Willesden are amongst the 20% most deprived neighborhoods in the country and Easton is amongst the worst 10% (Indices of Deprivation 2015 and 2019).

A total of twenty-six Somali refugees took part in the study (Table 1). Eighteen Somali refugees were living in London (eight in the Northwest and ten in South London) and eight in Bristol. Participants comprised eleven women and fifteen men between the ages of twenty and sixty-five; six participants disclosed a diagnosis of mental health disorder, all of whom were living in London. Most

TABLE 1 Study participants*.

Participant	Gender	Age	Marital status	Employment status	Arrived in UK
BF1	F	40-50	Married	Unemployed	2005-2010
BF2	F	40-50	Divorced	Unemployed	2015-2020
BM1	M	20-30	Married	Employed	2005-2010
BM2	M	40-50	Married	Employed	2000-2005
BM3	M	40-50	Married	Self-employed	2000-2005
BM4	M	20-30	Single	In education	2015-2020
BM5	M	20-30	Single	Unemployed	1990-1995
BM6	M	60-70	Married	Retired	1990-1995
LF1	F	40-50	Married	Unemployed	2010-2015
LF2	F	40-50	Single	Part-time	2000-2005
LF3	F	40-50	Married	Unemployed	2015-2020
LF4	F	30-40	Married	Unemployed	2005-2010
LF5	F	30-40	Married	Volunteering	2000-2005
LF6	F	40-50	Divorced	Unemployed	2000-2005
LM1	M	40-50	Divorced	Unemployed	2005-2010
LM2	M	30-40	Single	Unemployed	2005-2010
LM3	M	40-50	Single	Unemployed	2010-2015
LM4	M	40-50	Married	Employed	1990-1995
BrF1	F	40-50	Married	Self-employed	2000-2005
BrF2	F	40-50	Divorced	Self-employed	2000-2005
BrF3	F	40-50	Widowed	Self-employed	2010-2015
BrM1	M	50-60	Married	Self-employed	1990-1995
BrM2	M	40-50	Divorced	Employed	2010-2015
BrM3	M	40-50	Married	Employed	2005-2010
BrM4	M	30-40	Married	Self-employed	2010-2015
BrM5	M	30-40	Divorced	Self-employed	2010-2015

*BF, female/Northwest London; BM, male/Northwest London; LF, female/South London; LM, male/South London; BrF, female/Bristol; BrM, male/Bristol. To protect participant anonymity, the age and year of arrival in the UK is provided within the 10-year and 5-year range, respectively.

participants had lived in the UK for an average of fifteen years, with the longest period being thirty-one years and the shortest being five. Participants were recruited in close collaboration with two voluntary sector organizations specializing in community outreach and psychosocial support for Somali refugees. A purposeful sampling approach was used to recruit participants from the Somali diaspora in the two cities, allowing us to find cases that were 'information rich' (64). We sought to include female and male participants who currently lived in London and Bristol, although we did not specify the length of residence in the inclusion criteria. Specifically, participants were included if they were Somali born (settled or re-settled in UK as a refugee); were current UK residents; have refugee status (indefinite leave to remain) in UK or other European country; may or may not have gained British or other European citizenship; were eighteen – sixty-five years old; were able to give informed consent.

A semi-structured interview guide was developed to focus on the neighborhood and place-specific factors and their relevance for refugee mental health and wellbeing. Most of the interviews occurred face-to-face in the office of one of the Somali community organizations in Northwest London and in public spaces, such as Somali cafés. One interview was conducted online, one via telephone, and two at the participants' homes. Most interviews took place in English and, for the participants who switched between English and Somali, Somali representatives from the community organizations provided a translation. Interviews ranged from thirty to ninety minutes. All interviews were audio recorded for transcription and analysis.

Interviews were conducted by the first author who has previous experience of conducting research with Somali diaspora. All participants received detailed information about the study prior to their interview. We made it clear that the interviews would focus

on how their current living environments and post-migration experiences affected their mental health and wellbeing, rather than delving into potentially traumatic pre-migration events. Informed consent was obtained before each interview, either in writing for face-to-face interactions or verbally for interviews conducted over the phone or internet. For those hesitant to sign documents, verbal consent was deemed acceptable. This approach is often necessary in refugee research, where past persecution and a current status of vulnerability and marginalization heighten concerns about confidentiality, anonymity, and trust (65, 66).

Interviews were thematically analyzed (67) through an initial open coding process aided by NVivo 12. This was followed by a focused coding to draw out categories and key themes from the data. The coded data were organized into categories, establishing connections between these categories and their properties, including settlement experiences, social and material living conditions, daily life routines, principal stressors, and sources of support. This interpretative process enabled the identification of three distinct but interconnected themes (Table 2) which are further elucidated in the subsequent results section: 1) Local Area: Settling and Finding Safety; 2) Neighbors and Everyday Social Integration; and 3) Life and Wellbeing in Urban Communities.

Results

Our findings show that Somali refugees navigate a complex urban environment comprising various neighborhood features which include important places near home, interaction with neighbors, and community spaces. While these features afford them resources to improve mental health and wellbeing, they also present challenges such as high urban density, exposure to violence or discrimination, and neighborhood disorder. Our framework reflects the notion of neighborhood as an eco-social niche embedded within the broader urban context and the themes represent overlapping zones of living.

Local area: settling and finding safety

All participants emphasized the significance of the local area in their settlement experience and wellbeing. They used the term *xaafad* (neighborhood) to refer to the neighborhood area in proximity to their homes consisting of places they sought to access after arriving, such as shops, parks, mosques, schools, cafés, pharmacies and markets. While participants did not strictly define the boundaries of such local areas, they described them as a network of points of interest within a walking distance or with a short ride between them. Daily access to these places helped participants become familiar with their new environment, developing a sense of attachment and safety over time. This was particularly significant during the early periods of settlement in the UK and when moving and settling in a new neighborhood.

Arriving in a new environment was initially an isolating and disorienting experience for most participants. A middle-aged married woman and mother of two remembered this first experience as follows: "*When I came to this country, I felt depressed because I ran away from conflict. I did not know anyone, and I felt isolated. I did not know anyone to talk to … Now, I feel like I'm home because I get used to living here, yeah, and I'm familiar with the area, so I feel like I'm home*" (LF5). Arriving from Mogadishu in 2004, she first lived in Croydon, South London, in temporary accommodation where she felt isolated and lonely. She described her primary concern to get to a 'safe place' and 'away from conflict', but once arrived: "*not knowing anyone as a very young person, it was quite a scary time for me, yeah*". When she moved to Brixton in South London, she established connections with other Somalis there, enrolled in college and now volunteers to help Somalis from the neighborhood and surrounding areas.

TABLE 2 Themes and sub-themes.

Theme	Sub-theme	Description
Local Area: Settling and Finding Safety	Familiarity and Attachment	The process of becoming familiar with and attached to local amenities which facilitates a sense of home in a new environment. Challenges faced by refugees when first arriving in a new country, including feelings of isolation, disorientation and search for safety.
	Spatial Routines and Therapeutic Significance	The importance of developing spatial routines that provide comfort and a sense of safety, and the therapeutic significance of certain locations and places within the neighborhood.
	Navigating Urban Environments	Challenges related to moving through busy urban landscapes, like public transportation systems. The stresses associated with living in densely populated areas, dealing with noise and air pollution, and the overall nature of urban life.
Neighbors and Everyday Social Integration	Initial Relationships and Support	The role of neighbors, both Somali and non-Somali, in helping refugees settle and integrate into the host society, including language support, socialization and forming close-knit relationships.
	Reciprocity and Cultural Exchange	Everyday interactions and mutual support between refugees and their neighbors, fostering social integration and a sense of belonging and place attachment.
	Incidents and Safety Concerns	Challenges and stressors faced by refugees living in shared accommodation. Encounters with anti-social behavior and concerns about racism and neighbourhood violence in certain areas and housing environments.
Life and Wellbeing in Urban Communities	Somali Diaspora and Social Networks	The influence of Somali diaspora on local economies and the establishment of community spaces, which facilitated friendships, social ties, and a sense of belonging and agency.
	Community Beyond Somali Diaspora	Engagement with wider community groups and centres, particularly for those facing mental health issues or intra-community stigma, and the formation of supportive networks outside the Somali community.

For all participants, time played a crucial role in settling in. Having regular access to places of interest in the vicinity contributed to increasing familiarity and eventually led to the formation of a sense of attachment to place that many described as 'feeling home'. However, most participants had moved several times within and between cities before settling in their current address. A middle-aged male participant in Bristol who had previously lived in London and Birmingham, explained motivations for him to move were connected to having friends and employment opportunities. However, he was also drawn to Bristol due to its smaller size. He could easily access his workplace, hospital, pharmacy, market and city centre which were within a ten-minute walk from his home in the Somali-populated neighborhood of Easton.

Familiarity with the local area also afforded access to locations with therapeutic significance for some participants. A middle-aged man who lived in supported housing in Brixton highlighted the importance of going out and 'having some fun' to help him cope with feeling depressed and stressed. He noted: "*I like it because it's a nice place, the market, my friends are here, men's [mental health support] group*" (LM2). Similarly, another participant emphasized the significance of her local area in managing her mental health condition, particularly when her social anxiety worsened and prevented her from traveling further away. Her routine mostly involved going to the park and sitting down by herself, which she found to be soothing. These examples illustrate that people developed spatial routines that enhanced their sense of familiarity, attachment and safety, and connected to this, feelings of wellbeing.

Study participants valued such spatial routines and expressed a preference for maintaining a sense of safety and attachment to their familiar surroundings, even if it meant living in substandard housing or densely populated areas. For example, a single mother residing in a hostel in Brixton for two-and-a-half years faced challenges in securing council housing in the same area but was determined to remain there. Despite feeling unsafe and stressed within the hostel, she emphasized the importance of proximity to her workplace, amenities and her son's school. She stated, "*I'm mum alone [single mother] working sixteen hours, my job's around this area, yeah, if I could live around here it's fine. All around here, yeah, the shopping close to us, yeah, we are safe around here*" (LF2). Her situation as a single parent in part-time employment underscored the significance of maintaining a stable routine and a sense of safety derived from familiarity with the neighborhood.

However, some participants also pointed out how their local area had changed over time with a growing number of people and cars and a lack of green spaces due to new properties being built. One male participant who moved from London to Bristol stated: "*I don't like the emissions when they go high, you know, you feel it affects your mental health and your health as well. So, when I come back to Bristol, I always feel better*" (BrM4). Despite acknowledging many benefits of the local area, high urban density neighborhoods such as Brixton in South London made it especially challenging for women to navigate the busy streets with children: "*I had cases where people are just getting very, you know, verbal abusive, where they're like, oh move, when you have a child with you. Yeah, I feel like the atmosphere is very stressful to be honest, and people, maybe people are stressed*" (LF4).

Neighbors and everyday social integration

Xaafad, or local area, was intertwined with the term *deriska*, translated as 'neighbors'. As part of an immediate living environment beyond family and household, interactions with neighbors, including non-Somali ones, shaped participants' experiences of settlement and social integration. All viewed London and Bristol as cities with a diverse mix of cultures and ethnicities. Some participants cherished memories of specific events or extended relationships with 'English' or 'British' neighbours who welcomed them and helped them settle in their early days in the UK. A twenty-five-year-old participant in North London recalled:

> *Neighbors, actually, um, tried to help us settle and there were Somali neighbors and there was also a British lady who was actually giving me some English classes because she felt sorry for me because I wasn't in school, and I was struggling with language. But she, yeah, it was a lovely experience (BM1).*

During the initial stages of settlement, participants recalled that having 'British' or 'English' neighbors who could help them with language, food and documentation was particularly important. Some participants used kinship terms to describe their relations with these neighbors. Developing strong ties with neighbors that resemble parental or extended family relations highlighted how personal and formative these experiences have been. For example, one participant in South London described a 'white English man' who lived next door and provided support with claiming benefits and asked about his wellbeing and daily activities: "*As a neighbor he was saying like, do you eat, are you okay, how's your day, did you go to college today, that kind of like, you know, father figure*" (LM4).

Such interactions not only presented opportunities to connect with a diverse group of people but also to reflect on one's own positionality and identity. Reciprocity with neighbors fostered social integration and a sense of belonging through experiences of cultural exchange. For example, one participant in South London talked about exchanging gifts of food during Eid and Christmas: "*When we've got Eid, we give them gifts, like some food with no animal product but just say normal sweets, and at Christmas they brought like a cake, chocolate, stuff like that so we share with each other*" (LF1). Resembling the traditional Somali expression *nabad iyo caano* (peace and milk) which evokes a state of wellbeing, she emphasized the degree of mutual acceptance and reciprocity shared with neighbors: "*Like Somali people, I knocked on the door, 'can I get a milk?' if I run out of milk, and she gives me milk, and when she runs out, she knocks my door and I give her milk*" (LF1). This example suggests a strong sense of self-identity and place attachment embedded within the immediate living environment in which neighbors play a key role.

However, neighbors could also be a considerable source of stress for participants who lived in shared accommodation such as hostels or supported housing. They reported witnessing or experiencing incidents involving other residents or outsiders. A participant in Brixton who lived in shared accommodation described how he avoided leaving his room for fear of being racially abused by his

neighbor: "*My neighbor, he smoking too much weed and drinking night-time, he not sleeping, sometimes he abuse you, abuse me, yeah, abuse me. He says 'fucking', he's talking to himself, yeah*" (LM1). The transient nature of occupancy in shared accommodation also presented challenges. One female participant in Brixton felt she had little control over her daily living conditions as she had found people from the street inside the premises. She feared for her safety and avoided shared areas such as the kitchen and bathroom. Another participant shared similar experiences, as his sleep was regularly disrupted by anti-social behavior in the shared accommodation: "*A lot of people [in the house], so sometimes I feel dizzy. Because I think it's downstairs, you know, there are lots of people, sometimes making like you have 'goo-goo-goo-goo', like this, I recognise it music*" (LM3). For this reason, these participants tried to spend most of the day outside the accommodation to avoid contact.

Participants' concerns about their wellbeing also influenced their choices regarding council housing and they expressed reservations about certain neighborhoods due to the fear of encountering racism. As a participant in Bristol explained: "*Our part of Bristol is fine, but only in some area they say that they're racist. Like Knowle, Whitchurch, that area. Because they get house, but they said we can't, we are not going because they are scared for their security*" (BrM5). Furthermore, the presence of gang activity was highlighted by many as concerning and distressing. Women especially feared for their safety due to violence, including sexual assaults, and the drugs trade. One participant explained: "*I've been kidnapped, I've been raped. It's the same area that I'm living, still I'm living. That's why I mean, I have a mental problem all that that's happened to me*" (LF6). She was experiencing flashbacks of the assault and worried about her safety and the safety of her autistic son. Daily encounters with neighbors who made her feel uneasy added to her sense of insecurity. Some male participants who arrived as child refugees recalled conflicts in housing estates that involved threats of violence and altercations. One participant became involved in petty crime and substance use at an early age, he witnessed gang violence and stabbings and believed this experience eventually resulted in a mental health crisis and diagnosis of paranoid schizophrenia. Many participants who were parents therefore considered moving, or wanted to move, to less crime-ridden areas of the city, or even away from the cities if such an opportunity would present itself.

Life and wellbeing in urban communities

The term 'community' was used by participants to refer to both Somali diaspora and social networks and specific places where Somali shops, cafés, madrasas, mosques and other amenities were located. These places served as a socio-cultural infrastructure that facilitated the formation of friendships and close social ties based on everyday interactions. Participants also viewed the community as contributing to the development of local economies, particularly in the Bristol neighborhood of Easton and Willesden in Northwest London, where the Somali diaspora has a prominent presence.

Participants on Stapleton Road in Bristol highlighted the key role played by the Somali community in their neighborhood regeneration due to an increasing number of Somali-owned businesses and their influence on boosting the local economy. A middle-aged male participant stated, for example: "*Before this street was not like this. My friends, they told me before ten years there was nobody here. These shops were closed. But when more Somalian people come in, they open the shops. Because there is good commercial in Somalian people*" (BrM2). Male and female participants said those Somali businesses provided them with employment and an opportunity to cater to their own community. For some it was also an important reason to move to the area. One participant who had moved from Glasgow stated: "*In Glasgow I had no community. At times, I didn't see anyone to say hello to or look at me in my face. I sell many, many things to people that know me and I'm famous now. Ask anyone, I'm at Somali's, everyone knows me in Bristol*" (BrM3). Participants recognized the reciprocal relationship between their community, neighborhood and city, mirroring the reciprocal connections they formed with their neighbors. They actively shaped a part of the neighborhood by establishing community spaces and relationships, which in turn contributed to their wellbeing by fostering a sense of belonging and agency. One participant expressed this sentiment, stating: "*When you can see your friends, you get excited, and you get a power from the community*" (BrM3).

Some participants discovered a sense of community beyond the Somali diaspora. They revealed that their mental health conditions compelled them to avoid areas with a high concentration of Somalis because of the intra-community stigma. Instead, they primarily sought support from a close-knit circle of friends, family members and local mental health community groups. A participant in Northwest London described his experience with a local community centre as follows: "*It's got a good community feeling. They know about my mental health problems, so they always help me in any way they can, which is really encouraging, and yeah, it's a really nice area*" (BM5). Recently, his condition had significantly improved when he moved back in with his family after he had been sectioned. Being with family helped him find a sense of belonging in the local area and included regular visits to the community centre. Similarly, a female participant in South London shared her experience of being labelled 'mad' by her own community, which only worsened her feelings: "*How can you meet somebody who tells you 'don't trust, don't talk to her, don't listen to her because she's mad'? That's just making you worse in your life*" (LF6). While experiencing stigma had reduced her engagement with the Somali community in London, she had discovered a sense of community through her local mental health support group: "*Now they've built my life, to be honest, because you have somebody that's similar. What's happened to me in the past … but we have somebody who knows your concern or your problems, somebody like you. We just feel like we are family*."

Discussion

Urban neighborhoods as human ecological niches can either facilitate or hinder peoples' ability to lead fulfilling lives. According to this perspective, urban neighborhoods "afford certain ways of

acting […] within a particular form of life, as it is lived by a particular 'kind' of person" (14:5-7). Instead of solely examining the influence of neighborhood factors on mental health and wellbeing, the three themes emphasize how refugees actively engage in shaping their lives within the urban neighborhoods as eco-social niches. We illustrate that neighborhoods have features that can simultaneously be accommodating, safe and familiar, while also being alien, threatening and unwelcoming. The dynamics of such overlapping neighborhood features are context-dependent, varying across scales and timeframes. For instance, one's home may feel secure while the surrounding neighborhood may not, or a busy street may induce stress while a café in the local area provides relaxation. Refugees play an active role in shaping their living environment, seeking to maximize their wellbeing and mental health. Their experiences, both positive and negative, are further influenced by factors such as gender, age, and other aspects of their identity that have a significant impact on their mental health and wellbeing.

Research indicates that refugees' perceptions of their settlement location can evolve over time, presenting therapeutic opportunities under favorable conditions (8, 68, 69). In this study, the participants found a sense of familiarity and safety in their local area, afforded by proximity to essential locations such as markets, shops, workplaces, schools and places of entertainment. Developing a sense of local area contributed to their mental wellbeing. Environmental psychology explains this phenomenon as place attachment, encompassing affective, cognitive and behavioral processes that fulfil basic and psychological needs (70). Because displacement disrupts fundamental human needs, including shelter, security, agency and belonging, it is vital to address and satisfy these needs to develop a sense of place attachment in a post-migration context (71). Recent studies among urban international migrants highlight that meeting place-based needs encourages further exploration and cultivates a sense of home (72). In this context, daily places become meaningful elements of the settlement experience, afforded by physical and social infrastructures (14). Drawing on the perspectives of refugees, our findings contribute the importance of proximate physical environment in this process.

Our findings have shown that within these local areas, Somali refugees actively built community networks. Importantly, such networks were embedded within particular physical locations, such as cafés and shops. It was in these locales that entrepreneurial and cultural spaces were created and formed sources of empowerment and participation in local economies. This supports a growing recognition of the need to provide asylum seekers and refugees with opportunity structures in their respective localities and the importance of social integration and participation (29). While these networks were often co-ethnic and cultural in nature, they also extended beyond the diaspora and as such were essential in serving as a crucial buffer against adverse experiences (73, 74). For example, some participants who disclosed mental health conditions emphasized the importance of local community day centers and mental health charities. They brought up intra-community stigma associated with mental health problems that forced them to distance themselves from their diaspora community members and neighborhood areas (62).

In addition to these communal structures, our study sheds light on the significance of interactions and relationships with neighbors as a facet of social integration that unfolds within urban neighborhood contexts. Interacting with neighbors constituted the most immediate localized form of social contact beyond the household and community networks. This involved reciprocal exchange of household items, gifts and invitations to social gatherings. Being welcomed and accepted by neighbors emerged as a positive indicator of refugee perceived wellbeing from the early days of settlement. Existing research suggests that social inclusion of refugees dispersed to rural areas often hinges on neighborly interactions, where small population size and neighborhood homogeneity make wellbeing both salient and challenging (75). Our study suggests a similar importance of neighborly relations in urban settings, which are typically seen as less socially cohesive and close-knit compared to rural areas (76).

Besides these positive aspects, neighborly relations could also be strained, especially for people living in shared accommodation. Participants living in shared accommodations reported frequently witnessing or experiencing incidents of anti-social behavior and violence, confirming that refugees with psychiatric disorders living in supported housing were exposed to stigma and hostility which has been suggested to cause forced residential mobility (25). At the same time, our study also shows that some participants were unable to move away from places where they felt threatened, either at the level of the local area or within the confines of accommodation. Their choices were constrained either by lack of housing options or by reservations about moving to certain neighborhoods due to fears of racism and discrimination. Some participants, particularly males who arrived as child refugees, recalled conflicts involving violence and criminal activities while growing up. These experiences were aggravated by neighborhood disorder, residential instability and urban density, all of which have been shown to have long-term implications for mental health (51, 77).

Based on our findings, we recommend implementing policies and initiatives that address refugee safety concerns, offer appropriate housing options, and promote positive recreational activities to enhance mental health and wellbeing of refugees within urban neighborhoods. To ensure successful settlement and wellbeing of refugees, it is essential to provide continuous support for education, employment and socialization throughout the entire asylum process and transition into the general welfare system. Enabling refugees to establish their daily lives in familiar and safe environments is crucial for fostering mental health, and minimizing post-migration forced mobility plays a significant role in achieving this. Recognizing the agency of refugees holds the potential to bring about positive transformations in the human ecologies of urban neighborhoods. Community networks should be acknowledged not only as sources of interpersonal support but also as catalysts for local economic development. From an eco-social perspective, the distinction between private and public spaces is not rigid as factors influencing mental health and wellbeing intersect and intertwine across these domains. Rather, as we have shown, the personal and social dimensions are interconnected through the physical and temporal continuity of the living environment.

Study limitations

The study has several limitations. Firstly, it focused on a specific refugee population, potentially limiting the generalizability of the results to refugee groups with different cultural, ethnic, and socioeconomic backgrounds. Secondly, even within the Somali refugee population, variations exist in terms of social and spatial distribution based on clanship and kinship networks, factors that likely influenced participants' settlement choices. While this study does not delve into the complexities of Somali clanship, it presents an area for future research. Thirdly, the participants in the study had, on average, resided in the UK for fifteen years, with some having resettled from other European countries. Settlement experiences and perceptions of urban neighborhoods are likely influenced by the trajectory of resettlement and the duration of stay in the country. Nevertheless, the study, benefiting from the longevity of Somali refugee settlement in the UK, offers valuable insights into the enduring influence of refugee life in urban neighborhoods on mental health and wellbeing. The study focused on the post-migration experiences and place as a modifiable risk factor. Therefore, we were not able to address the important role of pre-migration experiences. Lastly, in this study, although some participants disclosed diagnosis of mental health disorders, they were not grouped separately for analysis. However, we have acknowledged relevant mental health diagnoses in our analysis where applicable. While we feel that our predominantly non-clinical sample does not limit the study of place and mental health, future research specifically involving refugees with mental health diagnoses would greatly contribute to our understanding of the influence of place and social ecology in the development and treatment of mental health issues post-migration.

Conclusion

In this study, we have highlighted how urban neighborhoods, conceived as eco-social niches, influence refugees' mental health and wellbeing, presenting both challenges and opportunities. The societal and physical features of urban neighborhoods such as significant places near the home, housing environments, interactions with neighbors, and community spaces play an important role in refugee settlement, sense of belonging, and their mental health. By acknowledging the complex and dynamic role of urban surroundings in refugee daily lives, this research emphasizes the primary importance of stable and safe living conditions. This is particularly pertinent given that places where refugees live are a potentially modifiable factor. We also highlight the importance of refugee agency in shaping these environments, with implications for their mental health and wellbeing. Future research could include consideration of broader institutional domains that contribute to the eco-social dynamics of urban environments in which refugees live.

Data availability statement

The datasets presented in this article are not readily available because the raw qualitative data is not able to be shared since it possesses identifiable information from the participants. Requests to access the datasets should be directed to guntars.ermansons@kcl.ac.uk.

Ethics statement

The studies involving humans were approved by KCL Research Ethics Committee (HR-19/20-13702); UK Health Research Authority (21/WM/0187). The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

GE: Writing – original draft. HK: Writing – review & editing. PS: Funding acquisition, Writing – review & editing.

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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.

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Acute Stress Disorder among 2022 Ukrainian war refugees: a cross-sectional study

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Introduction: Fleeing from war can be terrifying and result in Acute Stress Disorder (ASD), a mental health condition that can occur in the first month after a traumatic event. The study aimed to identify the prevalence of ASD among Ukrainian refugees and identify its risk factors to create a profile of the most vulnerable refugees.

Methods: This cross-sectional study of 637 Ukrainian war-displaced persons and refugees in 2022 used the Acute Stress Disorder Scale.

Results: The prevalence of ASD among participants was high (93.5%). Several factors increasing the risk of developing ASD in the sample were identified, e.g., witnessing Russian attacks (OR 2.92, 95% CI 1.26–6.78), insufficient financial resources (OR 3.56, 95% CI 1.61–7.91), and feeling of loneliness in the host country (OR 3.07, 95% CI 1.58–8.69). Pre-existing depression and the death of a close person, among others, were found to significantly ($p<0.05$) exacerbate the ASD symptoms. At the same time, neither age, the distance traveled, time spent on fleeing the country, nor the type of companionship during refuge (escaping alone, with children, pets or the older adults) correlate with the severity of symptoms.

Conclusion: The study shows extreme levels of trauma among Ukrainian war refugees and displaced persons. Knowledge regarding ASD vulnerabilities in the present conflict may facilitate prompt and adequate psychological help. Since ASD can be an antecedent of PTSD and several autoimmune disorders, these results may also serve as a predictor of future challenges for Ukrainian society.

KEYWORDS

refugees, displaced persons, war, stress, trauma, health, Acute Stress Disorder, Ukraine

Introduction

Russia's aggression against Ukraine

Russia's full-scale aggression against Ukraine, which began on February 24th, 2022, resulted in a humanitarian catastrophe comparable to those caused by contemporary armed conflicts in Syria, Iraq, Yemen, Libya, Afghanistan, and Sudan (1). It is the fourth humanitarian disaster to hit Ukrainian society in the last century. Currently, the

Ukrainian civilian population is affected by acts that fit the definition of crimes against humanity of the Rome Statute of the International Criminal Court (2) (Article 7), as it was during the Civil War of 1918–1920, the Great Famine of 1932–1933, and World War II. Nearly one-third of Ukrainians have been displaced from their homes, according to UNHCR estimates. Over six million have fled the war, with 90% of displacements being women and children. From 24th February 2022 to 17th April 2023, the Office of the UN High Commissioner for Human Rights (OHCHR) recorded 22,904 civilian casualties in the country: 8,534 killed and 14,370 injured (3). By November 21st, 2023 the number of killed civilians topped 10,000 (4). However, Ukrainian sources reported that in 2022, as a result of Russia's invasion, 16,502 people were killed (5). According to the UN, the largest numbers of Ukrainian refugees are reported in (excluding Russia) Poland (1,573,267), Germany (1,055,323), and the Czech Republic (501,540). As of 20th March 2023, 8,157,230 Ukrainian refugees were recorded in Europe (6).

Fleeing a war is an acutely stressful experience. The necessity to leave everything, home, belongings, and loved ones within hours or days, combined with the uncertainty of ever coming back, is a traumatizing event. This trauma can be exacerbated by pre-migration and other acutely stressful experiences or potentially traumatic events (PTEs) such as being under shelling (frequently without access to shelters), trapped and unable to meet basic needs, including food, water, and medicines, witnessing war crimes or sex violence and evacuation difficulties. We also cannot forget about additional post-migration factors that could contribute to overall distress: fears for family and friends remaining in Ukraine, the uncertainty of settlement procedures, difficulty accessing healthcare, or challenges in securing stable work and accommodation caused by a large number of refugees, and previous labor migration. These mental health issues can lead to other serious health risks, such as cardiovascular, chronic respiratory, and infectious diseases or diabetes. Moreover, the Ukrainian health care system, strained by the war, faces a lack of funding and limited workforce capacity, worsening the situation for those needing mental assistance [which, to some extent, resembles the case of Iraq (7)], (8, 9). All of this happened during the COVID-19 pandemic, which was an additional source of stress and a considerable challenge for the healthcare system (10, 11).

Acute and post-traumatic stress

Previous studies of trauma in refugee populations focused mainly on post-traumatic stress disorder (PTSD). This psychiatric condition can occur in people who have experienced or witnessed a traumatic event, such as a natural disaster, a serious accident, a terrorist act, war, rape, or other violent personal assault. PTSD is characterized by a range of symptoms, including re-experiencing trauma through flashbacks or nightmares, avoidance of stimuli associated with the trauma, adverse changes in thoughts and mood, and alterations in arousal and reactivity. These symptoms cause significant distress or impairment in social, occupational, or other important areas of functioning (12). Refugees, having endured severe traumatic events, exhibit markedly high rates of PTSD and complex PTSD (CPTSD), a finding consistent across various studies and cultures (13). Key predictors for PTSD in these groups include torture and a history of multiple traumatic experiences (14). Notably, mental health disorders, including PTSD and depression, are prevalent in up to 30% of refugees, a rate significantly higher than in general populations in Western countries (15, 16). Several epidemiological studies have found a higher prevalence of autoimmune diseases in individuals with PTSD compared to those without. PTSD is associated with chronic stress, which can dysregulate the immune system. This dysregulation can manifest as immune suppression or overactivation, potentially leading to autoimmune disorders. The body's prolonged stress response in PTSD can alter the functioning of immune cells and the release of cytokines, which are critical in immune system regulation (17, 18).

This study focuses on Acute Stress Disorder (ASD) in the refugee and displaced persons population. ASD is a condition that can develop following a traumatic event and is characterized by symptoms similar to, but generally less severe than, those of PTSD. Symptoms of ASD include intrusive memories, negative mood, dissociation, avoidance of reminders of traumatic events, and increased arousal. These symptoms arise immediately following the trauma but are of a shorter duration, typically lasting from 3 days to up to 1 month after the event. ASD can be a precursor to PTSD, but the relation between these two conditions is complicated and not linear. DSM-5 revised ASD definition emphasizes immediate trauma reactions without implying future PTSD development. This change was influenced by longitudinal studies indicating that not all individuals with eventual PTSD initially meet ASD criteria (19).

This research treats the displacement of Ukrainians caused by the Russian invasion as a primary traumatic experience triggering acute stress reaction with a high risk of developing PTSD, which can be exacerbated by the circumstances in which the displacement was taking place as well as previous traumatic experiences and health conditions of the displaced.

Aims and scope

The study's main goal was to assess the incidence of ASD among Ukrainians caused by their displacement and to identify the factors that increase its odds and correlate with increased symptoms. To the best of our knowledge, such research has never been done on a study group consisting of war refugees. Therefore, the results might be helpful for the governments and organizations assisting the displaced persons to assess their needs in terms of psychological support and identifying the most vulnerable, to whom psychological help should be offered first. However, it is worth mentioning that diagnosing both ASD and PTSD in refugees is particularly challenging due to high comorbidity with other mental disorders. Refugees often experience a range of psychological issues, such as depression, anxiety, and substance abuse, which can overlap with the symptoms of ASD and PTSD. This complexity makes it difficult to isolate ASD or PTSD as a distinct diagnosis, requiring careful and comprehensive clinical evaluation.

The analyzed factors, which were selected based on personal experiences of research team members (OG is a displaced person

herself, MM, KKM, MSS, and PK hosted Ukrainians fleeing the war in their homes) can be divided into four groups: demographic characteristics (age, sex, financial resources), circumstances of the displacement (e.g., traveled distance, how long the journey took, whether the study participants experienced bombardments/shellings, left someone behind in Ukraine, with whom they traveled, did someone they knew died during the Russian invasion), their troublesome experiences in the place of refuge (whether they suffered from discrimination, aggression or the feeling of loneliness), which we thought could correlate with ASD and the severity of its symptoms. The fourth group included previous (pre-2/242022) traumas (combat injuries, forced relocation, domestic violence) and autoimmune diseases (thyroid disease, diabetes, irritable bowel syndrome, rheumatoid arthritis, depression, and anxiety). The questions regarding those variables were aimed at verifying the links between ASD and autoimmune diseases, and the peak-end rule (a psychological heuristic in which people judge an experience largely based on how they felt at its peak, i.e., its most intense point) (20–22) regarding the Ukrainian war trauma.

Methods

Acute Stress Disorder Scale and its adaptation

A structured research survey consisting of two parts was used. The first conceived purposefully for this study consisted of questions concerning the four abovementioned groups of independent variables.

The second part of the survey was the Acute Stress Disorder Scale (ASDS), a self-report inventory consisting of 19 items based on criteria for ASD as defined by the DSM-IV. The ASDS has been shown to possess good reliability and validity in previous studies and has good sensitivity (95%) and specificity (83%) for identifying ASD compared with clinical interviews (23). In the present study, the ASDS showed high internal reliability (Cronbach $\alpha = 0.831$).

The threshold score of 37 ($\geq$9 in the Dissociation and $\geq$ 28 in Reexperiencing, Avoidance, and Arousal subcriteria) was used as a cutoff for diagnosing ASD (24). Since ASDS serves as a measure of current trauma-related distress distinct from its prognostic significance (25), the total score was used as a measure of symptom severity. In addition, validation studies revealed that an ASDS cutoff score of 56 correctly identified 91% of people who developed subsequent PTSD and 93% who did not. It was therefore adopted as the PTSD prediction threshold (24, 26).

Although the ASDS was updated to meet the DSM-5 ASD diagnostic criteria, and its power as a PTSD predictor has been questioned (27), the 19-item version validated for the Polish language was used (24). It is because Ukrainian and Polish populations are alike in many aspects, and the usage of a diagnostic tool already applied in the Central/Eastern European social context had an advantage for comparative reasons.

The ASDS was further adapted in the following way. First, the team of two Eastern studies experts (KKM and MSS) prepared a draft translation of the survey from Polish to Russian and Ukrainian. Both versions were then edited by a Ukrainian and Russian native speaker, a war refugee from the current conflict (OG), and two other persons, a Russian and a Ukrainian native speaker. Based on the mutual feedback, the KKM, MSS, and OG team prepared a final bilingual survey version. To make sure that both language versions are semantically identical, in the second validation round, eight bilingual Ukrainian people of different sex, background, and education (one living in Ukraine, four immigrants, and three refugees from the current conflict, including one MD, two with a Ph.D.) filled in the survey and compared both versions for possible inconsistencies of meaning. Their comments were implemented in the final version of the survey. The research subjects were offered a choice of Russian or Ukrainian language version. 73.16% of the refugees chose the Ukrainian version, 26.84% preferred the Russian version. Both sets of data were analyzed together.

Sampling

Researchers approached the participants directly from late March to the end of May 2022 (when the first wave of refugees began to drop). The survey was circulated via newly established focused online groups of refugees and displaced persons (usually one per major city in the host countries). The study invitation stipulated that it was addressed to adults (18 and older) fleeing the war and reaching their place of refuge within the last 30 days. In that manner, we obtained a convenience sample of 637 participants from a number of European countries, but mostly Poland (see Table 1). This type of sampling is not representative; however, regarding the dire circumstances, it was the only one available, with the clear advantage of reaching to participants directly during their displacement.

Ethics approval and consent to participate

The authors assert that all procedures contributing to this work comply with the ethical standards of the relevant national and institutional committees on human experimentation and with the Helsinki Declaration of 1975, as revised in 2008. The Poznan University of Medical Sciences Bioethics Committee approved the survey as a non-experimental type (Decision no. KB-781/22). All participants were informed in two languages about the research aims and gave their informed consent for participation.

Statistical analysis

Logistic regression was used to predict an above-threshold score on the ASDS (both 37-point diagnostic and 56-point PTSD prognosis score). First, bivariate odds ratios for ASD were calculated for demographic and background variables. Next, to identify variables associated with higher scores on the ASDS, bivariate correlations were calculated between ASDS total score and quantitative variables (age, distance covered, time in travel) and T-test, Kruskal-Wallis H, and Mann–Whitney U tests and effect size tests (Cohen's d, η^2, r) were used for nominal and ordinal variables (circumstances of the refuge, e.g., witnessing bombardment, losing one's home, traveling with children,

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TABLE 1 The refugees' troublesome experiences in the host countries ($N = 637$).

Country	Experienced discrimination or disenfranchisement due to background and/or cultural differences		Experienced verbal or physical aggression		Experienced a feeling of loneliness*	
	Yes *n* (%)	No *n* (%)	Yes *n* (%)	No *n* (%)	Yes *n* (%)	No *n* (%)
Poland	33 (10.3%)	286 (89.7%)	15 (4.7%)	304 (95.3%)	194 (60.8%)	125 (39.2%)
Germany	14 (18.4%)	62 (81.6%)	3 (3.9%)	73 (96.1%)	58 (76.3%)	18 (23.7%)
Estonia	7 (21.2%)	26 (78.8%)	0 (0.0%)	33 (100%)	16 (48.5%)	17 (51.5%)
Lithuania	4 (15.4%)	22 (84.6%)	1 (3.8%)	19 (96.2%)	14 (53.8%)	12 (46.2%)
Slovakia	2 (10.0%)	18 (90%)	1 (5.0%)	19 (95%)	10 (50.0%)	10 (50.0%)
Netherlands	5 (21.7%)	18 (78.3%)	0 (0.0%)	23 (100%)	16 (69.6%)	7 (30.4%)
Ukraine	7 (15.2%)	39 (84.4%)	0 (0.0%)	46 (100%)	20 (43.5%)	26 (56.5%)
Latvia	4 (25.0%)	12 (75%)	1 (6.3%)	15 (93.8%)	11 (68.5%)	5 (31.3%)
Other	11 (14.1%)	67 (85.9%)	9 (11.5%)	69 (88.5%)	51 (65.4%)	27 (34.6%)
Total	87 (13.7%)	550 (86.3%)	30 (4.7%)	607 (95.3%)	390 (61.2%)	247 (38.8%)

* test $\chi 2 = 18.954$, df = 8, $p < 0.05$.

TABLE 2 The refugees' potentially traumatic experiences ($N = 637$).

	n	%
Bombardment/shelling/rocket attack	419	65.8%
My house was destroyed	45	7.1%
I was injured	3	0.5%
Someone I know was hurt	129	20.3%
Someone I knew died	176	27.6%
None of the above	151	23.7%

leaving closed ones behind in Ukraine; existing comorbidities, financial situation, experiences in the host country). All the tests were run using IBM SPSS Statistics v.26 software.

Results

Sample

The participants (98% women; $M = 37.8$ y;18–76 y; SD = 9.79) migrated from all over Ukraine to Poland (50.1%), Germany (11.9%), Estonia (5.2%), Lithuania (4.1%), the Netherlands (3.6%), Slovakia (3.1%), Latvia (2.5%); 12.2% migrated to other countries, and 7.2% were Internally Displaced Persons (IDPs) who sought refuge in western Ukraine. Most left their families in Ukraine: 46.5% left their spouses, 11.5% their child/children, 74.3% their parents and/or in-laws, and 54.3% their siblings. Only 3.3% of the sample left no family members behind.

During their refuge, the average distance covered was 1342.7 km (Me = 1,306 km, SD = 601.5 km, IQR = 691 km), and the average time of travel was 6.25 days (Me = 4.0, SD = 7.38, IQR = 5.0). They traveled with children (own – 69.9%, related – 9.9% or unrelated – 5.2%), the older adults (16.2%), the disabled (4.9%). Only 12.7% of the studied sample traveled on their own. The majority of participants (76.3%) experienced some form of direct physical threat or mental harm because of the Russian invasion, such as bombardment or injury (see Table 2 for details).

The refugees were also asked about their pre-24/02 trauma and health status. 6.6% declared to have had a combat operation injury, 5.3% experienced forced relocation, and 10.5% experienced domestic violence. 9.8% of the studied sample suffered from depression and anxiety, 13% from thyroid disease, 9.3% from irritable bowel syndrome, and 4.6% from rheumatoid arthritis.

The studied sample was also asked about their experiences in the countries where they sought refuge. Their financial resources in the host countries were insufficient. Only 15.5% declared that they could survive without any help for at least 3 months (see Table 3). 13.7% suffered from discrimination or disenfranchisement due to their background and/or cultural differences, 4.7% from physical or verbal aggression, and as much as 61.2% experienced a feeling of loneliness (see Table 1). However, the latter depended on the country they went to, with the highest number of lonely refugees in Germany (76.3%), and the lowest in Ukraine (43.5%).

ASDS scores

ASDS scores ranged from 26 to 94 (mean 66.447, Me 67.0, SD 11.25, IQR 14.0), with 95.3% of the total sample meeting ASD threshold criterion. 85.6% reached the 56-point threshold predictive

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TABLE 3 The refugees' financial situation at the host country ($N = 637$).

	n	%
I do not have money to buy food or pay the rent, I rely on charity	91	14.3%
I have money to buy food for some time, but I cannot afford to pay the rent even in the cheapest type of accommodation	250	39.2%
I have enough money to buy food and to rent the cheapest flat for some time	197	30.9%
I have enough money to buy food and to rent a flat for at least 3 months	99	15.5%

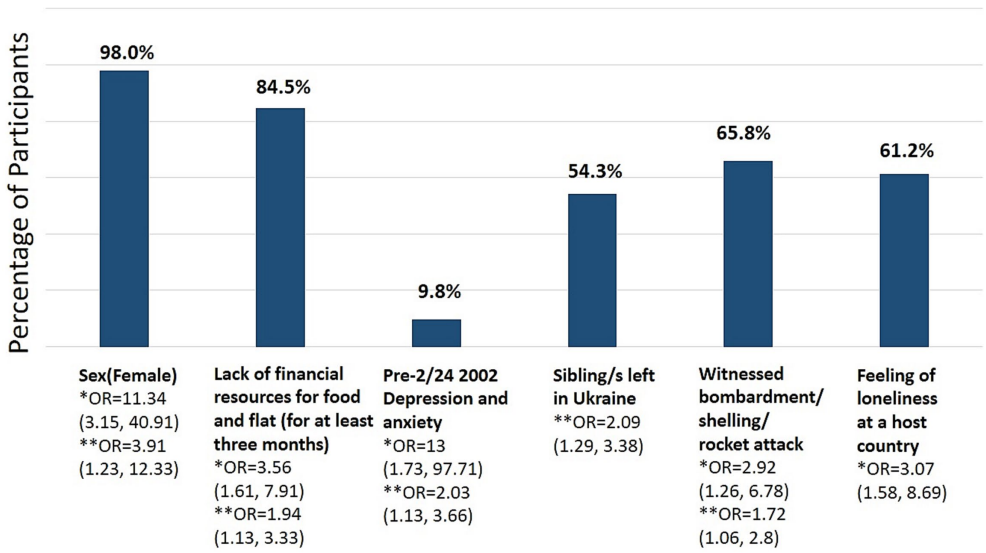

FIGURE 1
Variables increasing risks of ASD and PTSD development ($N = 637$). Bivariate odds ratios (OR) for associated ASD *(37 point threshold) and subsequent PTSD **(56 point threshold), CI 95%.

of the subsequent development of PTSD. The analysis showed no significant differences in ASDS scores between IDPs and those who fled the war abroad ($p > 0.05$). Logistic regression calculated separately for each demographic variable (sex, age), previous (before 2/242022) traumas and diseases, and circumstances of the refuge and their experiences in the host country, revealed variables predictive of scores above both thresholds, that is ASD and PTSD (See Figure 1).

As Figure 1 shows, being a woman increases the likelihood of developing ASD and subsequent PTSD the most. Also, suffering from a prior (pre-war) depression, witnessing bombardment or related attack, the feeling of loneliness in a host country, and the lack of adequate financial resources increases the chances of both ASD and likely the subsequent PTSD while leaving one's siblings in Ukraine (and neither spouses, parents, nor children) only the PTSD. Interestingly, neither age, the distance covered, time spent on fleeing the country, nor the type of companionship during refuge (escaping alone, with children, pets, or the older adults) correlate with the ASDS scores in the refugee cases that met the ASD diagnostic threshold ($N = 607$). On the other hand, several variables correlate with higher ASDS scores. Refugees who suffered from depression and anxiety before the Russian invasion, left their spouses in Ukraine, witnessed Russian attacks, lost their homes and saw injury and death of others, and were victims of discrimination in the host country suffer from more severe acute stress; however, the effect size of those variables is very small (see Table 4 for details).

Discussion

The prevalence of ASD among Ukrainian war refugees was catastrophic. 95.3% of the total sample met the ASD threshold criterion, and 85.6% reached the 56-point threshold predictive of the subsequent development of PTSD. DSM-5 estimates that ASD prevalence among those who experience an interpersonal traumatic event, such as mugging or sexual assault, is as high as 50%, and for other traumatic and catastrophic events less than 20% (28). Nevertheless, evidence indicates that using the DSM-5 criteria results in lower rates of ASD than the DSM-IV criteria [e.g., 14.2 vs. 18.6% (29)] upon which the ASDS is based. Still, the numbers would likely be comparably high. War refugee trauma appears more traumatizing than other stressful events. This shows that the countries hosting the refugees and displaced persons should consider that nearly all will need prompt psychological support regardless of their characteristics. Fewer refugees will require long-term psychological help. Studies show that between 20 and 43% of refugees develop PTSD symptoms (30–34), the

TABLE 4 Variables correlating with the severity of ASD symptoms ($N = 607$).

Variable		*n* (%)	Mean (Me; SD) ASD total score	Test results	
Depression and anxiety diagnosed before 2/242022	yes	189 (31.1%)	**71.132 (71; 10.20)**	U Mann–Whitney = 27,601; $r = 0.24$; $\eta^2 = 0.05$	$p < 0.001$
	no	418 (68.9%)	66.153 (66; 9.19)		
Spouse left in Ukraine	yes	284 (46.8%)	**68.722 (68; 10.07)**	T-Test = 2.4; Cohen's $d = 0.19595$	$p < 0.05$
	no	323 (53.2%)	66.808 (67; 9.46)		
Witnessed bombardment/ shelling/ rocket attack	yes	405 (66.7%)	**68.363 (68; 9.85)**	T-Test = 2.36; Cohen's $d = 0.20437$	$p < 0.05$
	no	202 (33.3%)	66.381 (66; 9.54)		
My house was destroyed	yes	45 (7.4%)	**70.911 (71; 8.78)**	U Mann–Whitney = 10005.000; $r = 0.095$; $\eta^2 = 0.009$	$p < 0.05$
	no	562 (92.6%)	67.447 (67; 9.82)		
Someone I know was hurt	yes	126 (20.8%)	**70.913 (73; 9.99)**	U Mann–Whitney = 22980.500; $r = 0.17$; $\eta^2 = 0.03$	$p < 0.001$
	no	481 (79.2%)	66.863 (67; 9.57)		
Someone I knew died	yes	172 (28.3%)	**69.860 (70;10.39)**	U Mann–Whitney =30818.500; $r = 0.14$; $\eta^2 = 0.019$	$p < 0.001$
	no	435 (71.7%)	66.851 (67; 9.41)		
Experienced discrimination or disenfranchisement due to your background and/or cultural differences in the host country	yes	85 (14%)	**69.941 (70; 9.40)**	U Mann–Whitney = 18837.000; $r = 0.09$; $\eta^2 = 0.008$	$p < 0.05$
	no	522 (86%)	67·339 (67.5; 9.81)		

The values has been bolded to highlight them as the most important numerical data.

most recent study on Syrian refugees in Greece shows that this number can reach 72% of male refugees, who seem more vulnerable than females (35). The mental health problems contribute to other serious health risks those leaving Ukraine face due to the ongoing war: cardiovascular diseases, chronic respiratory diseases, diabetes, chronic infectious diseases, and mental health disorders. At the same time, the Ukrainian population has a very low immunization rate for childhood diseases and Covid-19 (36).

Notably, the declared pre-war history of major depression and/or anxiety disorder was strongly positively correlated with the risk of developing ASD/PTSD. The results support the thesis that mental disorders rarely appear in isolation, and susceptibility to one type of disorder may provide some valuable clinical information about further vulnerability. The results also point to the characteristics of refugees that make them even more prone to develop ASD and suffer from more severe symptoms. Like in the case of Hurricane Katrina victims (37), female refugees and people with fewer financial resources are more vulnerable. Witnessing death and violence, losing home, and leaving loved ones behind also contributes to ASD in Ukrainian refugees in addition to preexisting (pre 02/242022) depression and anxiety. In contrast, male refugees with good financial resources, without comorbidities, and who did not witness bombardment nor feel lonely, are less likely to develop ASD. These results seem to match the findings of previous research in Syrian refugee population, which showed that women, persons with insufficient financial resources, experiencing language barriers, social exclusion, and insufficient emotional support are more vulnerable and suffer from PTSD, anxiety, depression, and low subjective well-being more often (38–40).

Therefore, the peak-end rule was only partially supported by the results. The peak negative experiences (spouse left in Ukraine, witnessing bombardment, home destruction or the death of an acquaintance) were the most important factors influencing the risk of ASD/PTSD development. However, the end experience seems to be of lesser importance due to the vagueness of the causal relation between ASD/PTSD and some other factors; for example, the feeling of loneliness in the host country could potentially be the result of poor mental health as well as a causal factor increasing the severity of ASD. Still, most refugees feel lonely (61.2%), even if moving within Ukraine (43.5%), and they develop ASD three times more often. In contrast to the abovementioned factors, the feeling of loneliness can be addressed in host countries by providing the refugees companionship and support. The same is true of discrimination and disenfranchisement due to background and/or cultural differences reported by 13.7% of the sample, which significantly increases the severity of ASD symptoms. Such discrimination may originate in previous labor migration from Ukraine, which had caused biased attitudes of the local populations, but in contrast to previous war experiences, it may still be subject to change. However, it remains unclear whether discrimination was a trigger augmenting the symptoms of ASD or the result of the hyper-pessimistic expectations about life in the target country.

The research shows no clearly detectable link between the development of ASD and declared autoimmune disorders such as thyroid autoimmune disorders, diabetes, irritable bowel syndrome, and rheumatoid arthritis. However, the study is based on subjective reports only, and the sample is relatively small for measuring such correlation; previous studies confirming the correlation had over 600 k and over 100 k participants, respectively (17, 18). Secondly, only a handful of autoimmune disorders were assessed, whereas other large studies took into account 41 of the most common among them (17).

After the 2013 Revolution of Dignity, Ukraine has been in the most active phase of systemic transformation since 1991. It has manifested itself on several levels: in foreign policy through the signing of an association agreement with the European Union in 2014; in domestic policy, in institutional reforms concerning

agriculture, local government, and force structures (41) as well as digitization (42), and in the development of the service sector. Finally, the transformation has manifested itself in a broad change in the sphere of values and memory. The latter involved, among other things, a turn in the public debate about the Ukrainian nation's past (43). At the same time, phenomena indicative of state dysfunctionality, such as demographic collapse, corruption (44), the inefficiency of the judicial system (45), and the privatization of violence, extended significantly in the border regions of the armed conflict in the Donbas (46), and the influence of big business on legislative bodies persisted (47–49). When reflecting on the condition of Ukrainian society in the near future, it is relevant to take into account the demonstrated scale of acute stress reactions among war refugees. In addition to the challenges it poses to health and welfare systems in the hosting countries, it also generates social problems in Ukraine. Weakened by the acute stress response and its long-term consequences, the population may be less able to help those fighting and loved ones who have remained on Ukrainian territory. Once the war is over, the long-term effects of war-induced stress would likely negatively affect the enthusiasm to continue modernization in the spirit of civic democracy and Europeanization.

Conclusion

When reflecting on the condition of Ukrainian society in the near future, it is relevant to take into account the demonstrated scale of acute stress reactions among Ukrainian war refugees. In addition to the challenges it poses to health and welfare systems in the hosting countries, it also generates social problems in Ukraine. Weakened by the acute stress response and its long-term consequences, the population may be less able to help those fighting and loved ones who have remained on Ukrainian territory. Once the war is over, in turn, the long-term effects of war-induced stress would likely negatively affect the enthusiasm to continue modernization processes in the spirit of civic democracy and Europeanization.

Limitations

The major limitation of this study is the study type and sample characteristics. However, considering the circumstances, other types of studies and sampling methods were unavailable. The sample consists primarily (98%) of women, who were the vast majority of Ukrainian refugees (men between 18 and 60 years were officialy not allowed to leave Ukraine).

Using the 19-item ASDS may also be considered a limitation since there is an updated version of the scale (the latter, nevertheless, not available in Polish).

Despite a large sample size ($N = 637$), the study's results cannot be easily generalized. Since the continuous variables did not present a normal distribution, the authors used mainly nonparametric tests to analyze covariations between the categorical variables and ASDS scores.

To summarize, this study was an attempt to assess the prevalence of ASD among refugees and identify the characteristics of the most vulnerable, but given the resources available and the circumstances in which it took place, it should be treated as an exploratory study.

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 humans were approved by Poznan University of Medical Sciences Bioethics Committee. The studies were conducted in accordance with the local legislation and institutional requirements. The ethics committee/institutional review board waived the requirement of written informed consent for participation from the participants or the participants' legal guardians/next of kin because the participants were asked to fill in a survey. In the invitation the authors explained the goals of the study and stated that participation is voluntary. Filling in the survey was understood as consent for participation.

Author contributions

PK: Conceptualization, Formal analysis, Methodology, Writing – original draft, Writing – review & editing. MR: Writing – original draft. MS-S: Conceptualization, Data curation, Investigation, Validation, Writing – original draft. KK-M: Data curation, Resources, Validation, Writing – original draft. OG: Data curation, Validation, Writing – original draft. MM: Conceptualization, Methodology, Supervision, Writing – review & editing.

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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.

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Impact of war-associated factors on spread of sexually transmitted infections: a systemic review

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Introduction: Statistical data indicate a link between war and the spread of sexually transmitted infections (STIs), then it is necessary to carefully analyze the factors that directly affect the identified pattern in order to overcome this problem. Therefore, the purpose of the study was to systematically analyze the factors that influence the spread of STIs during war.

Methods: The study included all original research articles and meta-analyses on the impact of war on the spread of sexually transmitted infections that met the following eligibility criteria: (1) articles published exclusively in English; (2) articles published in the period 2013–2023; (3) studies with quantitative, qualitative or mixed design. The search for relevant literature was conducted using four databases: PubMed, Embase, Web of Science, and Ebsco.

Results: The articles selected for our systematic review had different research designs and were mainly published as original studies (n = 8) and literature reviews (n = 6). As a result of the evaluation of the selected articles for the systematic review, the authors identified migration, a decrease in access to health care, difficult access to contraception, sexual violence as the most frequent factors directly affecting the spread of STIs during the war.

Conclusion: This systematic review systematizes data on the impact of hostilities on the spread of STIs and outlines the main factors that contribute to the dissemination of pathogens far beyond the territory at the epicenter of the conflict.

Systematic review registration: https://www.crd.york.ac.uk/prospero/display_record.php?ID=CRD42023479808, CRD42023479808.

KEYWORDS

sexually transmitted infections, war-associated factors, HIV, armed conflicts, war

1 Introduction

Full-scale wars and localized armed conflicts have a devastating impact on society and lead to critical material and human losses (1). According to the Uppsala Conflict Data Program (UCDP), as of 2021, just over 50 armed conflicts took place in the world during the twenty-first century. Moreover, it was believed that the period after the end of World War II was the most peaceful time in human history, during which there were no massive interstate wars (2). However, the morning of February 24, 2022, when military aircraft of another state took off over the capital of Ukraine, fundamentally refuted this statement (3). This was followed almost immediately by an escalation of the Israeli-Palestinian conflict. In this regard, society once again faced the challenges that arise from wars and the consequences they leave behind.

While the direct health consequences of armed conflict, such as injuries and mortality, are obvious and subject to constant monitoring and statistics, the indirect ones often remain hidden. Indirect health effects include post-traumatic stress, exacerbation and spread of infectious diseases (3, 4). Armed conflict is considered an important cause of the burden of the HIV and other sexually transmitted infections (STIs) epidemic (5).

It is known that STIs after World War I became the second most common cause of disability among U.S. Army personnel, second only to military injuries and concussions (6). Modern approaches to the prevention of sexually transmitted diseases and methods of armed confrontation have somewhat changed the structure of STI infection. The historically known syphilis and gonorrhea have been supplemented by a large number of other viral and bacterial agents, such as HIV, hepatitis B, chlamydia, human papillomavirus, and others (7). However, the tendency to increase the level of infection with sexually transmitted pathogens during conflicts continues to this day. For example, after the civil war in Guinea Bissau, HIV prevalence more than doubled, and in Uganda it increased by 14% (8, 9). Since the outbreak of the armed conflict between Russia and Ukraine in 2014, HIV incidence in some parts of Ukraine has increased by more than 15%, with statistics from some regions still unavailable due to the occupation (10). These developments and the humanitarian crisis caused by the war jeopardize plans to reduce the incidence of STIs and achieve the 90–90-90 goal of ending the HIV pandemic globally.

If statistical data indicate a link between war and the spread of STIs, then in order to overcome this problem, it is necessary to carefully analyze the factors that directly affect the identified pattern. Therefore, the purpose of the study was to systematically analyze the factors that influence the spread of STIs during conflicts.

2 Materials and methods

This systematic review was conducted in accordance with The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement and approved by the International Register of Prospective Systematic Reviews (PROSPERO), CRD42023479808, November 17, 2023.

2.1 Eligibility criteria

The study included all original research articles and meta-analyses on the impact of war on the spread of sexually transmitted infections that met the following eligibility criteria: (1) articles published exclusively in English; (2) articles published in the period 2013–2023; (3) studies with quantitative, qualitative or mixed design. Exclusion criteria were: (1) conference abstracts, dissertations, posters; (2) articles published before 2013; (3) articles in languages other than English; (4) articles that did not correspond to the research topic; (5) articles whose full text version is not available.

2.2 Sources of information and search strategy

The search for relevant literature was conducted using four databases: PubMed, Embase, Web of Science, and Ebsco.

TABLE 1 Search strategy for PubMed.

No	Request
1	(armed conflicts[MeSH Terms] OR (armed[All Fields] AND conflicts[All Fields]) OR armed conflicts[All Fields] OR war[All Fields]) AND (sexually transmitted diseases[MeSH Terms] OR (sexually[All Fields] AND transmitted[All Fields] AND diseases[All Fields]) OR sexually transmitted diseases[All Fields])
2	("sexually transmitted infection*" [Title/Abstract] OR "sexually transmitted disease*" [Title/Abstract]) AND ("war" [Title/Abstract] OR "arm*" OR "conflict" [Title/Abstract])

The search strategy used for the PubMed database is presented in Table 1. This search query was adapted and applied to all databases used in the study.

2.3 Data extraction

First, an initial search of all databases was conducted, followed by the removal of duplicates. Next, three authors (MF, YaB and YaL) independently screened articles by title and abstract. Articles that did not meet the eligibility criteria were excluded. At the end of this step, a collegial expert meeting was held to discuss the articles for which there were disagreements in the authors' decisions regarding acceptance for further work or rejection.

At the next stage, one author (YuK) extracted the necessary elements from the selected articles into a pre-designed standardized data extraction form. The final version of the data was checked and approved by all members of the research team. The data extraction form included: (1) DOI or PMID of the article; (2) First and last names of the authors; (3) Title of the article; (4) Year of publication; (5) Country included in the study; (6) Study design; (7) Period of the study; (8) Main findings on the impact on STI spread.

All data obtained were double-checked 1 month after the initial extraction to optimize the reliability of the internal estimator and minimize the risk of bias.

The quality assessment was conducted using the Critical Appraisal Checklist for Studies Reporting Prevalence Data, which was developed and validated by the Joanna Briggs Institute (11). It consists of 9 questions, to which researchers can answer "yes," "no," "unclear" or "not applicable (NA)" for each item. The more "no" or "not sure" are selected, the greater the risk of bias in each category and in each study. The critical appraisal was conducted taking into account the variables of interest in our review. This step was also performed by two independent and previously trained researchers (MF and YaB), with a third researcher (YaL) always consulted in case of disagreement.

3 Results

3.1 Characteristics of the included studies

A total of 752 publications were identified through database searches. After removing duplicates ($n = 256$), the articles were evaluated by titles and abstracts for relevance to the research topic.

The authors identified 365 articles, of which 149 were excluded due to the lack of full-text versions, 47 due to publication in languages other than English, and 153 due to the lack of information on the impact of war on the spread of STIs. At the end of the selection process, 16 articles were retained for full-text review and evaluation and subsequent inclusion in the systematic review. The study selection process is presented in Figure 1 (12).

The articles selected for our systematic review had different research designs and were mainly published as original studies ($n = 8$) and literature reviews ($n = 6$). We also included such publications as correspondence ($n = 1$) and perspectives ($n = 1$). The selected studies were published in 2016 ($n = 3$), 2021 ($n = 3$), 2022 ($n = 3$), 2023 ($n = 3$), 2018 ($n = 2$), 2015 ($n = 1$), and 2020 ($n = 1$). The largest number of articles were from the United States and Ukraine (3 from each country), 2 from Uganda, and one publication each from Austria, the United Kingdom, Greece, Ethiopia, the Netherlands, Rwanda, Libya, and Spain A general description of the selected articles and the main factors of the war's impact on the spread of STIs described in them are presented in Supplementary Table S1.

3.2 Factors influencing the spread of STIs during war

As a result of the evaluation of the selected articles for the systematic review, the authors of 11 articles (5, 8, 10, 13–20) out of 16 included in the systematic review identified migration as the most frequent factor directly affecting the spread of STIs during the war (Figure 2).

Even from a historical perspective, data show an increase in the incidence and spread of STIs during World War II, which is primarily associated with uncontrolled sexual intercourse between military personnel in different regions of Europe and beyond (14, 16). For example, literature data indicate an increase in the dynamics of HIV spread in Libya during the Second Civil War. After all, when changing their place of residence, temporarily displaced persons can spread new viral strains (8). Moreover, some female internally displaced persons, having lost financial support, resort to sex work as the most affordable and only source of subsistence (18, 19). According to a survey of sex workers as representatives of key populations for HIV in Odesa, competition has increased significantly since the beginning of the war

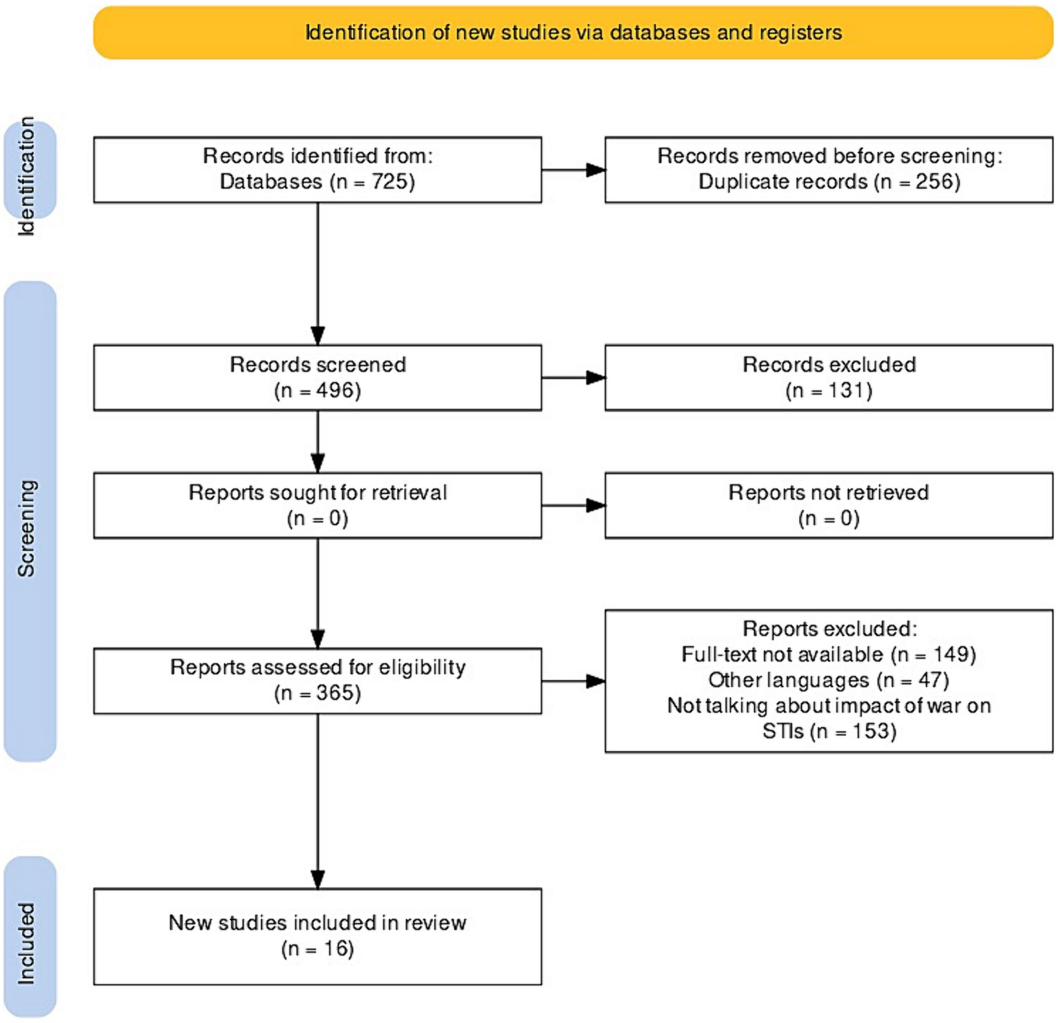

FIGURE 1
Flowchart of study selection according to the PRISMA guideline.

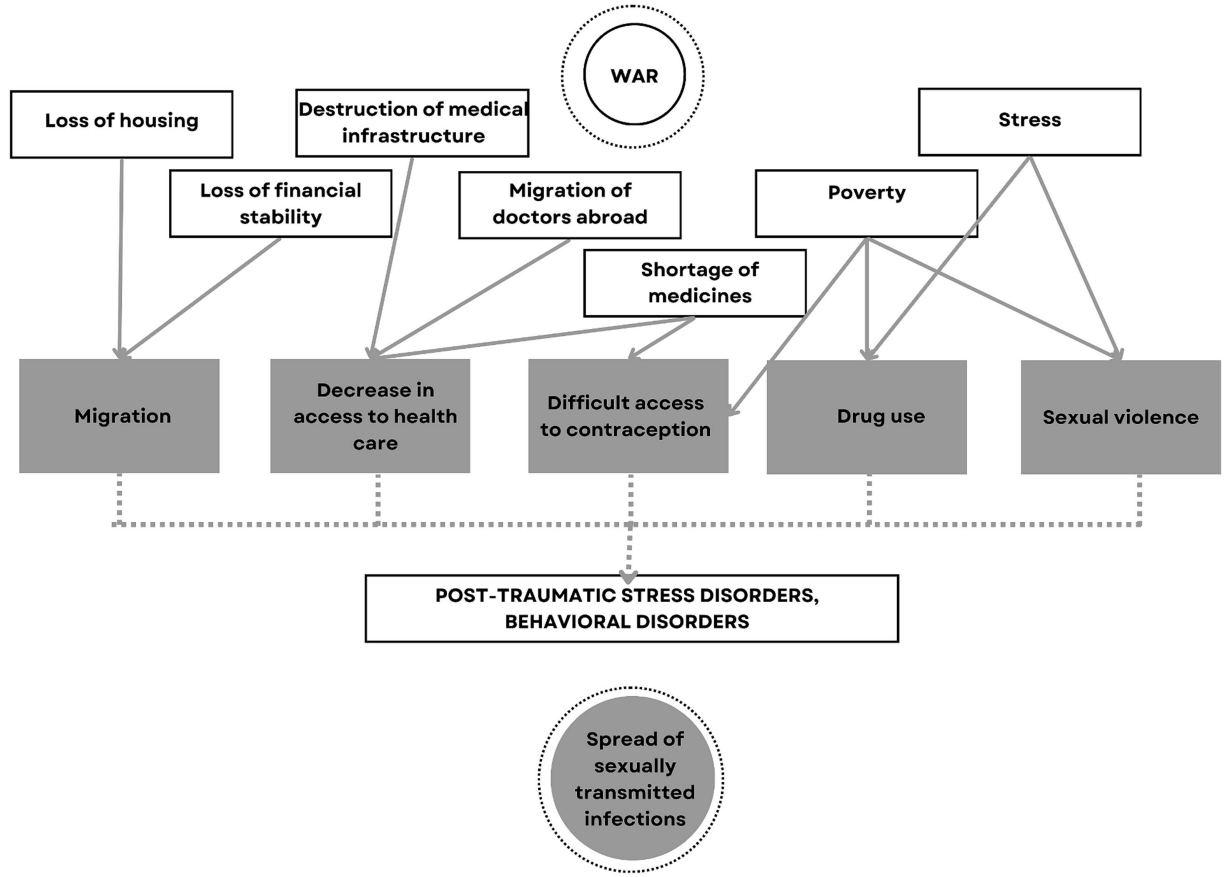

FIGURE 2
Flowchart of war-associated factors effecting the STIs.

in Ukraine, especially given the fact that internally displaced persons often offer services at reduced prices, including without condoms (18). In general, poverty and the stress of changing place of residence significantly reduce the adherence of HIV-positive people to treatment or even contribute to its temporary discontinuation. First of all, this leads to an increase in viral load and higher infectiousness of patients. However, at the same time, disruption of treatment regimens with non-nucleoside reverse transcriptase inhibitors, which are currently used in Ukraine for most first-line regimens, can lead to mutations and the development of viral resistance within a few weeks (10, 20).

Particular attention should be paid to the external international migration of the population of countries in armed conflicts. For example, more than 5 million Ukrainians, mostly women and children, left the country during the first months after the outbreak of full-scale war in 2022. Given the fact that heterosexual contact in Ukraine has been identified as the dominant mode of HIV transmission, a significant number of those infected (more than 120,000) are women. And this is a matter of concern for the European Union countries, which have accepted the lion's share of Ukrainian refugees (19). The long stay of women who have left their families and are left without means of subsistence facilitates the search for partners in the host country and, undoubtedly, the spread of infections. Moreover, the migration itself often lasts several days in overcrowded vehicles, during which refugees are exposed to extreme conditions of cold or heat, malnutrition, stress and poor hygiene, which cannot but affect their health and reactivation of persistent infections (13). That is why countries hosting refugees fleeing war must take swift and effective action to respond to STI screening, especially among key populations.

Another frequent factor associated with the war that affects the spread of STIs is a decrease in access to health care in 10 publications (10, 13–17, 19–22) out of 16. For example, research in Uganda in the post-war period showed that about 20% of HIV-positive women faced problems with access to health care related to their status (21). This is primarily due to the destruction of medical infrastructure in the country with active hostilities (13). According to official data, 120 medical institutions in Ukraine were damaged in the first week of Russia's full-scale invasion alone, 10 of which were completely destroyed (3). And throughout the war in the Tigray region of Ethiopia, 70% of local hospitals were destroyed (17). At the same time, health care facilities that continue to operate in wartime face a significant number of challenges that affect the availability, speed, and quality of health care. For example, the reduction in the number of hospitals, the concentration of people in safer regions, and the migration of doctors abroad lead to overloading of health care facilities (20). At the same time, there is a high probability of a shortage of medicines, including ART, diagnostic tests, and medical supplies due to disrupted supply lines both within the country and from abroad. It is worth noting that doctors themselves point to the fact that much less attention is paid to the diagnosis, prevention and

monitoring of STIs in wartime due to the overload of medical facilities with critical patients with war-related injuries (20).

Important factor that influenced the spread of STIs during the war was identified as difficult access to contraception in 9 articles (8, 10, 14, 15, 17, 18, 21, 23, 24) out of 16 selected for the systematic review. Despite the fact that armed conflicts and the stress associated with them lead to a decrease in sexual desire and, consequently, a decrease in sexual intercourse, meeting the needs of the population for contraception is an important key to preventing the spread of sexually transmitted diseases (18). As the experience of countries such as Libya, Ethiopia, Rwanda, Uganda, and Ukraine, which have experienced war in recent years, shows, a significant portion of the population does not have free access to condoms (15, 17, 18, 21). This is primarily due to the destruction of logistics chains and the occupation of territories, which makes it difficult or impossible to supply free contraceptives, and the decline in the population's ability to pay makes it impossible to buy them, if they are available (18, 20).

For example, according to studies after the civil war in Libya, only 39% of young people surveyed indicated the importance and regularity of condom use, and 21% of MSM belonging to key populations used a condom during their last sexual intercourse (15). A similar study in the post-war period in Rwanda showed that only 6.1% of women who did not know their HIV status used condoms in the vast majority of sexual intercourse. Moreover, the same study found an inverse correlation between the HIV status of women who reported sexual activity in the past 6 months and the frequency of condom use (23). A similar pattern has been found in Ukraine since the beginning of the armed conflict among people who use drugs. The authors found that condom use during sexual intercourse with casual partners is associated with fewer cases of imported infections (19, 20).

Despite the fact that people who use drugs are among the key populations in peacetime, 7 articles (5, 8, 15, 20–22, 24) among those selected for the systematic review indicated an increase in HIV incidence in this category of patients during conflicts. For example, after the civil war in Libya, 87% of people who use drugs were HIV-positive, which was a world record at the time (15). It is worth noting that literature data pointed to the prevalence of injecting HIV transmission in Muslim countries where armed confrontations took place, as opposed to, for example, Ukraine, where the main mode of transmission is sexual (8). The direct correlation between the increase in STI incidence and injecting drug use can undoubtedly be linked to the increase in the number of such people amid the hostilities. After all, internal displacement, change of social circle, stress, and the desire to "hide from reality" contribute to the first attempts at drug use. The situation is significantly aggravated by the problem of access to disposable syringes during the occupation of the territories (10, 20). At the same time, drug use can have an indirect impact on the spread of STIs. For example, American researchers have established an interesting pattern that with the increase in the use of psychoactive substances (alcohol, drugs, etc.), the link between armed conflict and HIV increases. In other words, factors that arise in the context of conflict, such as stress, changes in living conditions and sexual behavior in the presence of drug and alcohol use, increase the susceptibility of the population to STIs, including HIV (5).

Particular attention should be paid to rape, the frequency of which increases significantly during armed conflicts. That is why this factor in the spread of STIs was mentioned in 6 (8, 9, 17, 21–23) of the 16 articles included in the systematic review. After the civil war in Rwanda in 1994, the term "genocidal rape" was coined, when sexual violence was used as a weapon against women of all ages for a long time. According to research in Rwanda, more than 50% of the 800 women who took part in the survey had been raped (9, 23). According to the literature, the population of all countries in which armed confrontation is unfolding is exposed to sexual violence. For example, in Ethiopia, the percentage of raped women reached 10%, in Sierra Leone - 8%, and in Ukraine - 2.6%. However, it is clear that these figures are much higher in reality, as a significant number of women and girls often do not confess to sexual torture (17). There is no doubt that rape, sometimes repeated or gang rape, is directly related to the possibility of STI transmission. However, there is also an indirect relationship between them. According to statistics, rape survivors often have post-traumatic stress disorders related to sexual behavior, which in turn can lead to unconscious risky sexual intercourse and infection or transmission to the following partners (23).

4 Discussion

The fact that war has an irreversible destructive effect on various aspects of human life is obvious. In addition to the direct impact on the life and health of the population, military actions have an effect on the political, socio-economic situation. This creates a so-called vicious circle, since the decrease in economic indicators and social protection of people again shifts the vectors of influence in the direction of public health (25, 26). This burden falls on the shoulders not only of military personnel who are directly in the epicenter of the war, but also on the civilian population. Thus, according to the literature, during the 20th century, the number of war-related deaths totaled more than 190 million people, and almost half of them were civilians (27, 28).

The direct effect of war on the morbidity and mortality of the population is associated with the use of firearms, biological, chemical and nuclear weapons, bombings, missile attacks, which lead to trauma and injuries (Figure 3) (28, 29). According to the data of past wars the death rate after the use of weapons varies depending on the tactics of fighting and the type of weapon used. After all, the experience of

FIGURE 3
Flowchart of effects of war on health.

previous wars shows that bombing and missile attacks lead to an increase in the level of injuries and mortality, compared to one-on-one contact combat (29, 30). Recently, a significant part of military actions is precisely non-contact combat, for example, massive missile attacks and the use of unmanned aerial vehicles on the territory of Ukraine. This leads to the development of shrapnel, burn wounds and very often - mass death of people under rubble (25, 29). Along with this, war has a hidden effect on public health, worsening the situation with diseases not directly related to hostilities. Literature data indicate that the ratio of direct and indirect deaths during the war is 1:9. However, such conclusions do not have a strong evidence base. After all, recording the indirect effects of war on health is complex and often underestimated (28, 31). Moreover, some of the information may be classified or contain state secrets in the post-war period, and some aspects related to STI transmission may be downplayed or hidden due to religious prohibitions in certain countries (32).

The frequency of endemic and epidemic infectious diseases increases in wartime against the background of permanent stress, a decrease in the resistance of the body, malnutrition, deterioration of hygiene and a decrease in access to medical care (28, 33). Crowding of people in cramped spaces that are usually poorly ventilated (basements, shelters, etc.) contribute to the rapid spread of respiratory infections, while shortages of food and drinking water lead to the consumption of poor-quality products and, accordingly, outbreaks of intestinal disorders. Even vaccine-controllable infections can become active in times of war due to disruptions in drug supply chains and mass population migration. Thus, during the blockade of Syrian cities during the civil war, an outbreak of measles was observed in 2017–2018. Although previously, since 1999, this disease did not appear on the territory of the country (33). It is worth adding that in the context of infectious diseases, an important stumbling block is the rapid development of antibiotic resistance. After all, military injuries are very contaminated and often require urgent empirical use of antimicrobial agents on the battlefield. In addition, the lack of medicines and the medical supervision among civilians also further contributes to the uncontrolled use of antibiotics and, accordingly, the development of antimicrobial resistance (3, 34, 35).

The level of non-communicable diseases is globally high in peacetime and the increase in their frequency during wartime is underestimated compared to injuries and infectious diseases (28, 36). Chronic stress, malnutrition, excessive smoking, sleep and mental disorders, along with the lack of systemic adequate management of patients with chronic respiratory diseases, diabetes, cardiovascular diseases, and cancer, significantly increase the risk of severe complications or death. The experience of the wars in Bosnia and Syria showed an increase in death from non-communicable diseases both among women and men during and in the post-war period (37, 38).

A real "time bomb" can be considered mental disorders that are formed during the war, but can appear rather slowly for a long time even after the cessation of hostilities (25). Constant fear for one's life and the lives of loved ones, loss of housing and financial stability, migration, observation of deaths and injuries, exposure to violence contribute to the development of stress, insomnia, behavioral disorders and post-traumatic stress disorders (25, 28, 39). A very often unnoticed factor in the development of mental disorders in children are family problems arising during the war. As a certain part of families break up due to long-term separation of parents, use of alcohol or drugs by one of the partners to "evade" reality, etc. Against the background of constant stress, a vulnerable child's psyche experiences such situations excessively acutely, which can result in serious mental disorders in the future (25, 40).

This systematic review demonstrates the most important factors contributing to the spread of STIs during the war, because there is no doubt that their frequency is increased along with infectious diseases. The vast majority of publications addressed the impact of population migration, difficult access to health care and contraceptives, drug use, and sexual violence as factors that increase the transmission of STIs during hostilities. Along with this, we found only one study in Georgia, which showed no mathematical relationship between the increase in the frequency of STI diagnosis and population migration in the post-war period (41). Therefore, this fact requires further detailed research. Recent research in Liberia has been interesting and correlates with the data highlighted in the review regarding the increase in STIs in the context of war. Moreover, the authors indicate a significant dependence of the development of STIs s with socio-economic problems arising during war, exposure to trauma, sexual violence, stress and depression (42).

Undoubtedly, the implementation of classical STI prevention measures used in peacetime in military medicine should have yielded positive results. For example, the rate of STI infection among Polish special forces personnel who have been sexually active in recent months remained low due to their high awareness of protection methods and the full provision of condoms to their units (32). However, unfortunately, this is currently an exception rather than a systematic practice, as military prevention programs are extremely challenging (43, 44). Moreover, as the above factors show, the problem of STI spread during war concerns not only military personnel, but also the civilian population of the country, which can often pose a threat far beyond the borders of the state in which the conflict has unfolded (13, 45). That is why the issue of prevention and reduction of STI prevalence during conflicts is a global problem that all countries should be involved in solving. After all, national plans to combat STIs, including HIV, in the European Union are based on their own epidemiological experience and are aimed mainly at working with MSM and migrants from underdeveloped countries to a greater extent than with heterosexual women. Therefore, today it is worth shifting the focus to this new target group (19, 46). First and foremost, health care workers and community activists who are in direct contact with newly arrived refugees from war-torn countries should actively offer tests, preferably free of charge, and provide easy communication with health care facilities (19, 47).

Since the outbreak of full-scale war on the territory of Ukraine in 2022, neighboring countries that have hosted the vast majority of refugees have been continuously taking steps to actively involve displaced persons in the local health care system. Countries such as Poland, Romania, Moldova, Germany, Portugal, and others have enrolled Ukrainian IDPs in state health care programs, providing almost a full range of services, including access to free ART and HIV screening (20, 48). However, the statistics on STI-related medical care in these countries were extremely low (20). A rather serious problem in this context is the fear of stigmatization in a new team/society, disclosure of confidential information about HIV status, injecting drug use, or sexual activity. However, no less important is the

temporary shift in values from caring for one's health to the basic human needs of livelihood, housing, food, etc. The language barrier also plays a role, as many refugees literally do not seek help because they do not know the language (49).

Wars always lead to a humanitarian crisis, which, in turn, slows down both the country's development and the pace of achieving national plans and strategies (50–52). Therefore, an important element of combating the spread of STIs in the world during war should be the rational and correct distribution of the burden of the epidemic of these diseases among all countries by reducing stigma, creating free access to medical care and testing. After all, the more people who know their status in a timely manner and receive qualified care, the higher the chances of achieving the goal of eliminating or reducing the level of STI infection.

5 Limitations

Given the constant updating of scientific data on STIs, a selection of data by topic for the last 10 years was carried out, which could potentially discard a certain part of the studies.

Moreover, the limitation was the inclusion of only English-language sources of literature and only those that were available in the databases in the full-test version.

In addition, there was a potential bias in the selection of articles for the literature review, despite the authors' efforts to avoid this by independent review of the publications by three individuals.

A limitation may be the technique of quickly reviewing texts for compliance with the study design, which may have affected the depth and comprehensiveness of the review.

Prospectively, it is interesting to investigate this topic in the form of a meta-analysis in order to clarify the statistical data of the influence of certain factors on the spread of STIs, which was not covered within the scope of this study.

6 Conclusion

This systematic review summarizes and systematizes data on the impact of hostilities on the spread of STIs and outlines the main factors that directly or indirectly contribute to the dissemination of pathogens far beyond the territory at the epicenter of the conflict.

By assessing the challenges faced by countries involved in war, systemic solutions should be organized to potentially improve the situation:

- first of all, the unification of efforts of public and state organizations to establish an uninterrupted supply of medicines, contraceptives and rapid tests for the diagnosis of STIs in the territory of war.
- the deployment of state programs of psychological support for the population affected by the war, with the aim of timely detection of mental disorders and prevention of their complications.
- along with the supply of essential drugs (antibiotics, insulin, etc.), pay attention to the critical need for patients to receive antiretroviral therapy systemically, a break in the reception of which can lead to the development of resistance.
- to organize high-quality medical support for refugees in host countries with the aim of timely testing for STIs and providing support to patients.
- identification of persons, especially children and adolescents, who were subjected to sexual violence, followed by their psychological support.
- create barrier-free access to medical care.

Data availability statement

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

Author contributions

YK: Data curation, Formal analysis, Methodology, Writing – review & editing. MF: Formal analysis, Methodology, Software, Visualization, Writing – original draft, Writing – review & editing. KV: Data curation, Formal analysis, Writing – original draft. YB: Conceptualization, Data curation, Project administration, Writing – review & editing. YL: Conceptualization, Data curation, Methodology, Project administration, Supervision, Validation, Writing – original draft, Writing – review & editing.

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Prevalence and associated factors of common mental disorders among internally displaced people by armed conflict in Cabo Delgado, Mozambique: a cross-sectional community-based study

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Background: Humanitarian emergencies are a major global health challenge with the potential to have a profound impact on people's mental and psychological health. Displacement is a traumatic event that disrupts families and affects physical and psychological health at all ages. A person may endure or witness a traumatic incident, such as being exposed to war, and, as a result, develop post-traumatic stress disorder (PTSD). There is a lack of information about post-traumatic stress disorder, depression, and anxiety disorder in low and middle-income countries in humanitarian emergency contexts such as Mozambique. This study aimed to assess the prevalence of PTSD, depression, and anxiety, and associated factors among armed conflict survivors in Cabo Delgado, north region of Mozambique in 2023.

Methods: A community-based cross-sectional study was conducted between January and April 2023 among 750 participants, who were selected by convenience. A face-to-face interview used the Primary Care Post-Traumatic Stress Disorder Checklist (PC-PTSD-5) to evaluate PTSD, the Generalized Anxiety Disorder Scale (GAD-7) to evaluate anxiety and the Patient Health Questionnaire – Mozambique (PHQ-9 MZ) to evaluate depression. The association between PTSD and demographic and psychosocial characteristics was analyzed using bivariate and multivariable binary logistic regression. We used a 5% significance level.

Results: The three mental disorders assessed were highly prevalent in our sample with 74.3% PTSD, 63.8% depression, and 40.0% anxiety. The chance of developing PTSD was higher in females (AOR = 2.30, 95% CI 1.50–3.51), in patients with depression symptoms (AOR = 8.27, 95% CI = 4.97–13.74) and anxiety symptoms (AOR = 1.45, 95% CI = 0.84–2.50).

Conclusion: This study reported that the prevalence of PTSD, depression, and anxiety were high. Patients having depressive symptoms, anxiety symptoms, and being female are more at risk of developing PTSD. There is a need to integrate

screening for common mental disorders in the context of humanitarian emergencies and its adapted integration of psychosocial interventions.

KEYWORDS

post-traumatic stress disorder, anxiety, depression, internally displaced persons, humanitarian emergency, Cabo Delgado, Mozambique

Introduction

Displacement due to armed conflict in developing countries is increasing (1, 2). Displacement is a traumatic event that disrupts families and affects physical and psychological health at all ages (3–5). At least two-thirds of the countries in Africa have experienced conflicts leading to the displacement of millions of people (6).

Epidemiological evidence shows that the burden of mental disorders is becoming higher, particularly in post-conflict and conflict-affected populations (7, 8).

Mental disorders are a significant public health problem and 14% of the total burden of disease has been attributed to neuropsychiatric disorders including depression and other common mental disorders (9). Additionally, the proportion of global Disability Adjusted Life Years (DALYs) attributed to mental disorders increased to 4.9% (3.9–6.1) and Years lived with disability (YLDs) contributed to most of the mental disorder burden, with 125.3 million YLDs (95% UI 93.0–163.2; 14.6% [12.2–16.8] of global YLDs) in 2019 (10). Exposure to repeated trauma and extreme violence such as torture is associated with an increased risk for a mental disorder, including post-traumatic stress disorder, depression, anxiety, schizophrenia, and bipolar disorder (7, 11–13).

Recent meta-analyses of several studies published between1980 and 2017, where estimated the prevalence of PTSD (96/129; 74.4% of the studies), depression (70/129; 54.3% of the studies), and anxiety (38/129; 29.4% of the studies) identified a relationship between exposure to different types of disaster and conflict-related events and mental health disorders including anxiety, depression, and PTSD (7). The prevalence of mental health diseases was 21% (95% CI 18.8–25.7) at the point in time in the conflict-affected populations assessed (7).

According to the results of another meta-analysis, an estimated 242 million adult war survivors living in post-conflict areas were affected by PTSD, while major depressive disorder affected an estimated 238 million and 117 million suffering from both conditions (14). According to the findings of this meta-analysis, the estimated adult war survivors with PTSD, major depression, and both conditions in Mozambique were 2,339,450 (95% CI, 1,919,902–2,785,528), 2,296,218 (95% CI, 1,933,657–2,679,412) and 1,124,917 (95% CI, 695,524–1,557,525), respectively. (14).

According to studies of the general population, PTSD prevalence ranges between 1 and 5% (15, 16), while it has been shown to range from 3 to 58% in high-risk groups, such as those in conflict areas (16). Another systematic review reported that 3 to 88% of people in the general population have PTSD (7, 17). This is the case in Nepal and Palestine where PTSD prevalence is 53.4% (18) and 68.9% (19) respectively. Additionally, cross-sectional studies conducted among Internally Displaced People (IDP) assessment at community revealed that the prevalence of PTSD was 63% in Nigeria (20), 19.3% in Morocco (21), 28% in South Sudan (22), and 58.4% in the north (23) of Ethiopia.

On the other hand, mental health affects the immune system, damaging the body's immunity and defenses and leaving the individual more susceptible to infections; the endocrine system, increasing or decreasing the production of certain hormones; the nervous system, interfering with the production of neurotoxins (related to diseases such as Parkinson's and Alzheimer's disease), among other problems (24).

Mozambique hosts nearly 32,000 refugees and asylum-seekers, while more than one million people remain displaced internally due to violence perpetrated by non-state armed groups and the devastating impact of the climate crisis (Tropical Cyclone Gombe in March 2022) – where Mozambique is one of the most adversely affected countries in the world (25).

In October 2017, violence erupted in Cabo Delgado, northern Mozambique, when armed men occupied the Mocimboa da Praia district. This violence perpetrated by non-state armed groups worsened in 2020 resulting in an unprecedented humanitarian crisis with close to 1 million people living in a situation of protracted displacement (26). Violence against civilians continued such as killing, beating, extortion, widespread damage to property and core public services, severe violations of children's rights, and conflict-related sexual violence (27). Due to this violence, 2000 civilians died and around 34% of people and 28% of families including 353,601 children, were displaced/forced to move to different locations within Cabo Delgado province and other regions of Mozambique such as Sofala and Zambezia in the center and Nampula and Niassa in the north (28). The main destinations of IDP arrivals in Cabo Delgado were Pemba, Metuge, Mueda, Ancuabe, and Montepuez districts (29, 30), where displaced people were initially housed in transitional accommodation centers and later resettled or returned to their places of origin. The IDPs still live in small, overcrowded temporary shelters in the camps, without sufficient food, clean water, or toilets. Their lives are on hold, and their futures are uncertain (26–29). Individuals with an experience of abuse/violence were at risk of increasing mental health problems.

Abbreviations: AOR, adjusted odds ratio; CI, confidence interval; COR, crude odd ratio; COVID-19, coronavirus disease 2019; DALY, disability adjusted life years; GAD-7, Generalized Anxiety Disorder Scale; HIV, human immunodeficiency virus; IDP, internally displaced people; LMIC, low- and middle-income countries; NGO, non-government organizations; PHQ-9, patient health questionnaire; PTSD, post-traumatic stress disorder; PTSSs, post-traumatic stress symptoms; PC-PTSD-5, primary care post-traumatic stress disorder checklist; YLD, years lived with disability.

Screening is effective only when combined with high-quality services for mental well-being.

One of the challenges to ensuring appropriate services for IDP in Cabo Delgado is the lack of statistical data on the group's mental health status.

Despite the high prevalence of PTSD, depression, and anxiety in conflict areas around the world, data on the prevalence of PTSD, depression, and anxiety among IDPs in Mozambique, where we lived in a scenario of armed conflict (during 16 years of civil war), current terrorist attacks and violence since 2017, and recurring natural disasters are scarce. It is imperative to conduct research in this field to provide scientific support for the formulation of prevention and treatment plans for mental health issues during current and future civilian attacks or natural disasters. This study aims to assess the prevalence of symptoms and associated factors of post-traumatic stress disorder, depression, and anxiety among those who have experienced traumatic events during the armed conflict in Cabo Delgado province.

Materials and methods

Study design, period, and settings

A community-based, cross-sectional study was conducted with Internally Displaced Persons aged 14 years and over between January 2023 and April 2023.

Internally displaced persons (IDPs), according to the United Nations Guiding Principles on Internal Displacement, are "persons or groups of persons who have been forced or obliged to flee or to leave their homes or places of habitual residence, in particular as a result of or to avoid the effects of armed conflict, situations of generalized violence, violations of human rights or natural or human-made disasters, and who have not crossed an internationally recognized state border (31). In this study, an IDP was considered as someone who answered the questionnaire-screening questions that they had been forced to flee their homes because of the armed conflict and currently living in the IDP resettlement center.

Participants were excluded in cases of mental disability at the time of the survey that impeded their ability to competently consent and people who did not want to talk about their traumatic experience.

The present study was conducted in the *25 de Junho* resettlement center in Metuge district, Cabo Delgado Province, north of Mozambique. Cabo Delgado's capital is the city of Pemba, located about 2,600 km north of Maputo, the country's capital. The province has an area of 82,625 km^2 and had, in 2017, a population of 2,333,278 inhabitants. The province of Cabo Delgado is divided into 17 districts and has 5 municipalities: Chiure, Mocimboa da Praia, Montepuez, Mueda, and Pemba (32).

Metuge is the closest city to Pemba (34 km), with 5 primary healthcare serving a population of 91,000 and 119,317 IDPs resettled (30).

Metuge district was selected because (1) was considered a "safe" district at the time of the study and close to Pemba City (trip to and from Pemba City on the same day) (32); (2) after the Pemba district, Metuge is the district with the highest number of IDPs resettled (30); (3) has a type 2 health facility close to the IDP resettlement with health professionals trained in the management of mental disorders (Figure 1).

Study participants and sampling procedure

As the list of all IDPs who are resettled in the selected IDP resettlement was not available, the participants were selected by convenience. There were 7 villages in the reception center (considered as clusters) and the chief of each village was responsible for assisting with recruitment. Based on the time available for the team to be in the field, it was estimated that 50 interviews would be needed per day. So, the aim was to interview around 7–10 participants from each village per day. All houses were contacted by the chief of the village and those who agreed to take part in the study were referred to the project team to be interviewed.

Exposure to war, living in conflict zones, flight, and forced migration may create or increase the risk for broad sequelae of direct and indirect risks for physical and mental health, more so for children and adolescents, even more so for unaccompanied minors separated from their parents; the reason why we included the study participants who were at least 14 years old at the time of data collection. Written informed consent (including the assent term) was obtained from all patients.

Sample size determination

Based on the International Organization for Migration, Displacement Tracking Matrix Mozambique data, the Metuge district had 119,317 IDPs in March 2021 (30, 33). The sample size was calculated based on a confidence interval of 95% and a margin of error (E) of 5%; without general information on the population distributed in IDP camps, or results from the prevalence of PTSD, depression, or anxiety in previous studies, we considered a prevalence of 50%. Considering a 10% non-response rate and a design effect = 1.5 the minimum sample size was equal to 634.

Data collection procedures

From January 2023 to April 2023, three trained data collectors, supervised by the first author (NM), administered a structured questionnaire The face-to-face interview took place 1 person at a time for a maximum of 30 min, to ensure privacy. The respondents were given no monetary or food-item incentives. The questions were read aloud to the respondents 1 question at a time during the interview, and the respondents were asked which of the scale choices was acceptable. The coinvestigators reviewed the data collection sheets for completeness, accuracy, and internal consistency, which the principal investigator confirmed.

The interviews were conducted using tablets and included questions of sociodemographic and displacement characteristics, and screening measures for psychiatric disorders (PTSD, depression, and generalized anxiety).

The first section of the questionnaire assessed sociodemographic characteristics, including age (in years), sex (male or female), marital status [status (never married, widowed or divorced, and married),

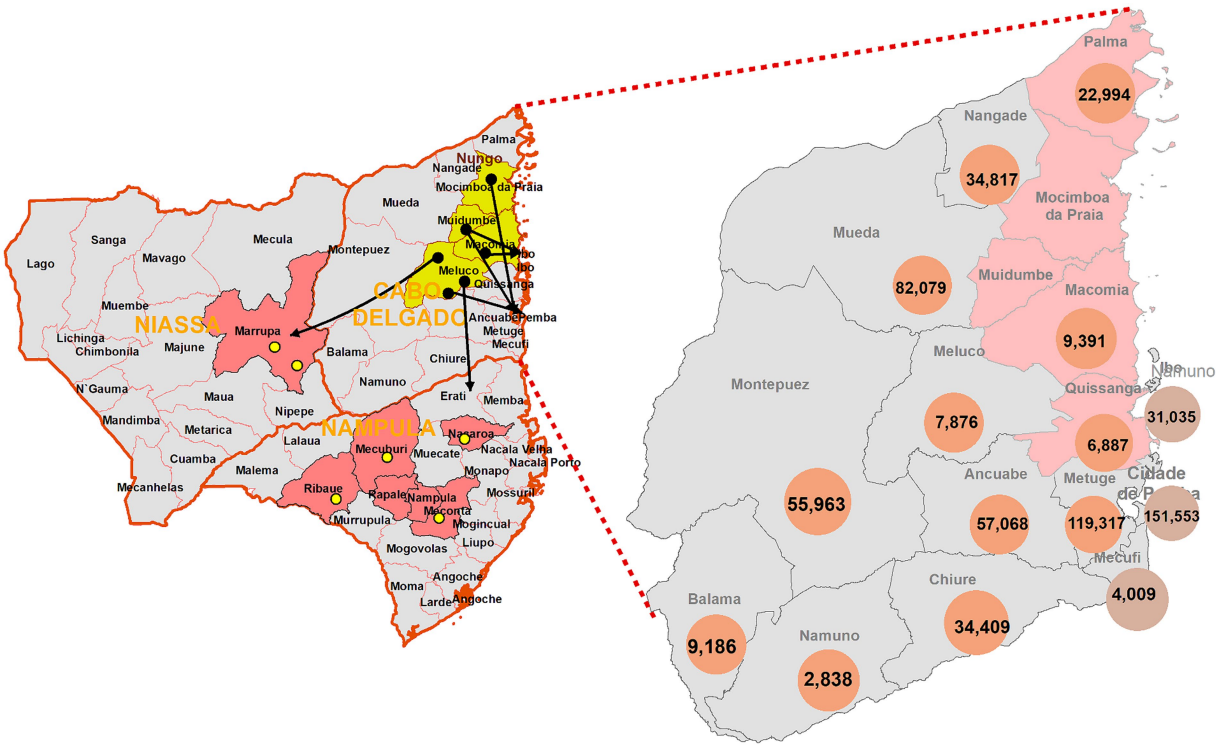

FIGURE 1
Distribution of internally displaced people in the districts of Cabo Delgado province in March 2021. Source: ADIN, 2020; IOM, 2020, 2021. Available at: https://unhabitat.org/sites/default/files/2021/05/un-habitat_positionpaper_mozambique_pt.pdf.

educational level (none school, primary school, and secondary school), religion (Muslim, Catholic, Protestant)], and provenance as well as psychosocial variables such as chronic medical illness (yes or no), whether family members or friends were killed during the armed conflict (yes or no), frequency of being in an armed conflict (1, 2 or 3 and more), last time were exposed to armed conflict (<12 weeks, 12 weeks to 1 year, and >1 year), missing family member (yes or no) were also recorded. Before administering the questionnaire, each respondent listened to the explanations about the aim of the study and terms of participation. The questionnaire was developed by the authors administered in Portuguese and translated into the local language (dialect) whenever necessary.

The outcome measures were PTSD, depression, and anxiety; these were measured using adapted and validated tools for low-and middle-income countries (LMIC) (34–36) including Mozambique (37–39). The primary care PTSD Screen for DSM-5 (PC-PTSD-5) was used to determine the presence of posttraumatic stress symptoms over the last month (40). It is a 5-item screen designed to identify individuals with probable PTSD in primary care settings in high-income countries (41) and it has been validated for use in LMIC adolescents living with HIV infection in South Africa (36) and Mozambique (37). Each of the five items was rated on a binary scale (0 = No, 1 = Yes) (40). Available data suggest the PC-PTSD-5 screen should be considered "positive" if the respondent answers "yes" to any 3 or more items in the questions (40). A score of = 4 was used as a cut-off for this study (41).

Depression was measured by the Patient Health Questionnaire (PHQ-9) with a recall period of the previous 2 weeks (42). The PHQ-9 is one of the most commonly used depression screening instruments (42, 43) and has been validated for use in adults in numerous community studies in LMIC, including Tanzania (34), South Africa (36), and Mozambique (38).

The PHQ-9 is a multipurpose instrument for screening, diagnosing, monitoring, and measuring the severity of depression. Total scores of 5, 10, 15, and 20 represent cut points for mild, moderate, moderately severe, and severe depression, respectively (42). The following cut-offs correlate with level of depression severity: score 0–4: none or minimal depression; score 5–9: mild depression; score 10–14: moderate depression; score 15–19: moderately severe depression; and score 20–27: severe depression (42). The cut-off score of depression screening was 10 or more in this study according to the results of a tool validation study carried out in Mozambique (37, 38).

Anxiety symptoms were assessed by the GAD-7 scale. The GAD-7 is a commonly used instrument to screen for anxiety in high-income countries (44, 45) that has been validated for use in LMIC adults (36, 42) and adolescents from Mozambique (37, 39). GAD-7 total score for the seven items ranges from 0 to 21 with a recall period of the previous 2 weeks (44). When screening for anxiety disorders, a score of 8 or greater represents a reasonable cut-point for identifying probable cases of generalized anxiety disorder (sensitivity of 92% and specificity of 76%) (44, 45). The following cut-offs correlate with the level of anxiety severity: score 0–4: minimal anxiety; score 5–9: mild anxiety; score 10–14: moderate anxiety and score 15–21: severe anxiety (44). The cut-off score of =10 or more was used as the cut-off for anxiety symptoms in this study (36, 37).

Data analysis

Descriptive statistics, such as percentages, average, median, and standard deviation were used to characterize variables depending on their distribution. We considered three main outcomes (dependent variables): PTSD, anxiety, and depression. The Chi-square or Fisher test was used to assess associations between the main outcomes and the independent variables. To estimate the determinants of PSTD, we calculated crude odds ratio (COR) and adjusted odds ratio (AOR) using logistic regression models.

Variables in the bivariate logistic analysis with a $p < 0.2$ were included in the multivariable model. We take $p < 0.2$ as the rule to include variables in the multivariable model as it is the most common rule available in the literature; as such our study will be comparable with others (46, 47).

We considered a 5% significance level. Statistical analysis was conducted using SPSS software version 28.0 (SPSS Inc., Chicago, Illinois, United States).

Results

Sociodemographic characteristics of study respondents

The study included 748 participants of the 750 invited. Of the 748 Metuge IDPs who participated, 487 (65%) were women. The median age of the respondents was 32 (IQ 23–49) years old, with an age range of 14–91 years. More than half of the participants (41.2–55%) were aged between 21 and 44 years old and 521 (69.7%) of the total respondents were married or living with a partner. In terms of occupation, 585 participants (78.2%) were unemployed, 16 were employed (2.1%) and 147 (19.7%) were students.

In addition, 656 of 748 respondents (88%) had a low level of education (35.2–47.1% had a primary school, and 30.4–40.6% did not go to school and could not read or write).

According to the place of provenance, 721 (96.4%) of the IDP participants departed from Quissanga district. In terms of religion, 514 (69%) were Muslim (Table 1).

Potential risk factors for PSTD, depression, and anxiety development

Overall, 114 (15.2%) participants were vulnerable persons (58.8% older adults, 19.2% orphans, 17.5% pregnant, and 4.4% physically deficient). Forty (5.3%) reported the presence of chronic medical illness.

Among the 35 (52.2%) participants with a history of previous mental disorders (anxiety, depression, and epilepsy), 13 (19.4%) reported also having hypertension, 3 (4.5%) HIV infection, 2 (3.0%) diabetes or 2 (3.0%) asthma as self-reported comorbidity.

Regarding trauma exposure, participants reported experiencing a mean of 2.46 trauma events. Approximately 50% (371/748) of IDPs enrolled had been in an attack situation for the third time or more.

TABLE 1 Sociodemographic characteristics of study participants from armed conflict area of Metuge district, Cabo Delgado ($n = 748$).

Characteristics	Category	Frequency	%
Age (years)	14–20	120	16.0%
	21–44	410	55.8%
	45–64	151	20.2%
	65+	67	9.0%
Sex	Female	487	65.1%
	Male	261	34.9%
Marital status	Single	179	23.9%
	Married	521	69.7%
	Divorced	19	2.5%
	Widowed	29	3.9%
Level of education	None	304	40.6%
	Primary School	352	47.1%
	Secondary School	92	12.3%
Occupation	Employed	16	2.1%
	Unemployed	585	78.2%
	Student	147	19.7%
Religion	Muslim	514	68.7%
	Protestant	146	19.5%
	Catholics	42	5.6%
	Others**	46	6.1%
Provenance	Quissanga	721	96.4%
	Metuge	16	2.1%
	Others***	11	1.5%

Others*: Orthodox; Others**: Macomia, Meluco, and Mocimboa da Praia. Chronic disease**** hypertension, mental disease, HIV, diabetes, and asthma. Vulnerable***** physical deficient, pregnant, elderly, and orphan.

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TABLE 2 Distribution of mental disorders among participants from armed conflict area of Cabo Delgado.

Variables	Category	Total (*n* = 748)	PTSD (*N*, %)	Depression (*N*, %)	Anxiety (*N*, %)
Age (years)	14–20	120 (16.0%)	81 (14.6%)	46 (9.6%)	24 (8.0%)
	21–44	410 (55.8%)	313 (56.3%)	270 (56.6%)	165 (55.2%)
	45–64	151 (20.2%)	116 (20.9%)	107 (22.4%)	76 (25.4%)
	65+	67 (9.0%)	46 (8.3%)	54 (11.3%)	34 (11.4%)
Sex	Female	487 (65.1%)	404 (72.7%)	353 (74.0)	220 (73.6%)
	Male	261 (34.9%)	152 (27.3%)	125 (26.0)	79 (26.4%)
Marital status	Single	179 (23.9%)	133 (23.9%)	110 (23.1%)	71 (23.7%)
	Married	521 (69.7%)	392 (70.5%)	334 (70.0)	212 (70.9%)
	Divorced	19 (2.5%)	11 (2.0%)	11 (2.3%)	1 (0.3%)
	Widowed	29 (3.9%)	20 (3.6%)	22 (4.6%)	15 (5.0%)
Level of education	None	304 (40.6%)	252 (45.3%)	230 (48.2%)	139 (46.5%)
	Primary School	352 (47.1%)	246 (44.2%)	195 (40.9%)	125 (41.8%)
	Secondary School	92 (12.3%)	58 (10.4%)	52 (10.9)	35 (11.7%)
Occupation	Employed	16 (2.1%)	8 (1.4%)	4 (0.8%)	5 (1.7%)
	Unemployed	585 (78.2%)	443 (79.7%)	406 (85.1%)	251 (83.9%)
	Student	147 (19.7%)	105 (18.9%)	67 (14.0%)	43 (14.4%)
Religion	Muslim	514 (68.7%)	376 (67.6%)	340 (71.3%)	202 (67.6%)
	Protestant	146 (19.5%)	108 (19.4%)	91 (19.1%)	66 (22.1%)
	Catholic	42 (5.6%)	35 (6.3%)	22 (4.6%)	15 (5.0%)
	Others*	46 (6.1%)	37 (6.7%)	14 (2.9%)	16 (5.4%)
Provenance	Quissanga	721 (96.4%)	541 (97.3%)	464 (97.3%)	296 (99.0%)
	Metuge	16 (2.1%)	10 (1.8%)	8 (1.7%)	2 (0.7%)
	Others**	11 (1.5%)	5 (0.9%)	5 (1.0%)	1 (0.3%)
Having chronic	No	681 (91.0%)	508 (91.4%)	430 (90.1%)	271 (90.6%)
medical illness***	Yes	67 (9.0%)	48 (8.6%)	47 (9.9%)	28 (9.4%)
Vulnerable	No	634 (84.8%)	470 (84.5%)	385 (80.7%)	237 (79.3%)
person****	Yes	114 (15.2%)	86 (15.5%)	92 (19.3%)	62 (20.7%)
Exposure to cumulative	1–2	377 (50.4%)	292 (52.5%)	239 (50.1%)	130 (43.5%)
trauma events	3+	371 (49.6%)	264 (47.5%)	238 (49.9%)	169 (56.5%)
Last time were	<12 weeks	260 (34.8%)	215 (38.7%)	211 (44.2%)	164 (54.8%)
Exposed	> 12 weeks – 1 years	4 (0.5%)	3 (0.5%)	1 (0.2%)	0 (0.0%)
to attack situation	> 1 year	484 (64.7%)	338 (60.8%)	265 (55.6%)	135 (45.2%)
Missing family	No	389 (52.0%)	295 (53.1%)	251 (52.6%)	157 (52.5%)
Member	Yes	359 (48.0%)	261 (46.9%)	226 (47.4%)	142 (47.5%)
Witnessed the death	No	537 (71.8%)	421 (75.7%)	361 (75.7%)	233 (77.9%)
of a family member	Yes	211 (28.2%)	135 (24.3%)	116 (24.3%)	66 (22.1%)

PTSD, post-traumatic stress disorder; Others*: Orthodox; Others**: Macomia, Meluco, and Mocimboa da Praia. Chronic Disease*** Hypertension, mental disease, HIV, Diabetes, and asthma. Vulnerable**** Physical deficient, pregnant, older adult, and orphan.

About 48% (359/748) of participants lost their family members and 28% (211/748) have witnessed the death of a family member in this war-related event. In terms of the last time that the IDPs were exposed to an attack situation, 65% (484/748) had been in this situation more than 1 year ago (Table 2).

The prevalence of PTSSs was 56.3% (313 of 556) for IDPs aged 21–44 years and 14.6% (81 of 556) for those younger than 21 years.

Among married participants, approximately 70% had PTSSs, depression, and anxiety, while among the never-married (single) respondents (23%).

We found that 252 of the 556 participants who did not have formal education (45.3%) had PTSSs.

Employed IDP participants had a lower prevalence of PTSSs, depression, and anxiety (1–2%) than unemployed IDP participants (80–85%).

Prevalence/frequency of PSTD, depression and anxiety

Of the 748 Metuge IDPs, 556 (74.3%) had post-traumatic stress symptoms (PTSSs) (CI = 71.04–77.42) (27.3% men; 72.7% women).

TABLE 3 Prevalence of post-traumatic stress disorder, depression, and anxiety among the respondents from armed conflict area of Metuge Cabo Delgado, Mozambique.

Characteristics	Category	Overall ($n = 748$)		PTSD		Depression		Anxiety	
		(*N*; %)	CI 95%	(*N*; %)	CI 95%	(*N*; %)	CI 95%	(*N*; %)	CI 95%
PTSD	No	192 (25.7%)	22.57–28.95	–	–	47 (9.9%)	7.33–12.88	34 (11.4%)	8.00–15.52
	Yes	556 (74.3%)	71.04–77.42	–	–	430 (90.1%)	87.11–92.67	265 (88.6%)	84.47–91.99
Depression symptoms	No	271 (36.2%)	32.77–39.79	126 (22.7%)	19.24–26.37	–	–	24 (8.0%)	5.21–11.71
	Yes	477 (63.8%)	60.21–67.22	430 (77.3%)	73.62–80.75	–	–	275 (92.0%)	88.29–94.79
Level of depression symptoms	None/Minimal	159 (21.3%)	18.37–24.36	52 (9.4%)	7.06–12.08	–	–	6 (2.0%)	0.74–4.31
	Mild	112 (15.0%)	12.49–17.73	74 (13.3.%)	10.59–16.42	–	–	18 (6.0%)	3.60–9.34
	Moderate	163 (21.8%)	18.88–24.92	144 (25.9%)	22.30–29.75	–	–	67 (22.4%)	17.81–27.56
	Moderately severe	143 (19.1%)	16.35–22.12	129 (23.2%)	19.75–26.93	–	–	84 (28.1%)	23.07–33.55
	Severe	171 (22.9%)	19.89–26.04	157 (28.2%)	24.53–32.18	–	–	124 (41.5%)	35.83–47.28
Anxiety Symptoms	No	449 (60.0%)	56.41–63.55	291 (52.3%)	48.09–56.55	202 (42.4%)	37.86–46.92	–	–
	Yes	299 (40.0%)	36.44–43.58	265 (47.7%)	43.44–51.91	275 (57.6%)	53.07–62.13	–	–
Level of anxiety Symptoms	None/Minimal	316 (42.2%)	38.67–45.87	177 (31.8%)	27.97–35.88	103 (21.6%)	17.98–25.56	–	–
	Mild	133 (17.8%)	15.10–20.71	114 (20.5%)	17.22–24.10	99 (20.8%)	17.20–24.67	–	–
	Moderate	224 (29.9%)	26.68–33.37	207 (37.2%)	33.20–41.39	204 (42.8%)	38.27–47.34	–	–
	Severe	75 (10.0%)	7.96–12.40	58 (10.4%)	8.01–13.27	71 (14.9%)	11.81–18.40	–	–

PTSD, post-traumatic stress disorder; CI, confidence interval.

The prevalence of depression was 64% (477 of 748; CI = 60.21–67.22) (26% men; 74% women), and the prevalence of anxiety was 40% (299 of 748; CI 36.44–43.58) (26.4%; 73.6% women). Post-traumatic stress disorder was found in 90.1% (CI 87.11–92.67) and 88.6% (CI 84.47–91.99) of patients with depression, and anxiety symptoms, respectively. The commonest level of depression symptoms was severe (171; 22.9%) followed by moderate depression (163; 21.8%). Nearly one-third of all respondents (224; 29.9%) had moderate anxiety and 75 (10%) had severe anxiety (Table 3).

Proportion of post-traumatic stress among the respondents in war-affected area of Cabo Delgado

Having witnessed the death of a family member, depression, and anxiety symptoms had a statistically higher difference than not having witnessed the death of a family member, without the presence of depression and anxiety symptoms ($p < 0.001$) to develop PTSSs (Table 4).

Post-traumatic stress disorder determinants among the respondents in the war-affected area of Cabo Delgado

The chance of having post-traumatic stress disorder was higher in females, in individuals having a family member or close friend injured or killed, and in those being screened positive for depression and anxiety symptoms.

Females had 2.2 times the odds of developing PTSSs than males (AOR = 2.30, 95% CI 1.50–3.51). The odds of developing PTSD were 4.8 times higher among had been exposed to war between 12 weeks a year compared with had been exposed to war for 11 weeks or less (AOR = 5.14, 95% CI 0.40–65.83). Having depressive symptoms (AOR = 8.27, 95% CI = 4.97–13.74) and anxiety symptoms (AOR = 1.45, 95% CI = 0.84–2.50) and suicide ideation (AOR = 1.54, 95% CI = 0.94–2.51) were significantly associated with post-traumatic stress disorder (Table 5).

Discussion

Nearly 120, 000 IDPs have lived in the resettle camps of the Metuge district since October 2017. During the displacement and post-displacement periods, IDPs faced multiple stressors (48). They live in small, overcrowded temporary shelters in the camps, without sufficient food, clean water, or toilets. Their lives are on hold, and their futures are uncertain. Individuals with an experience of abuse/violence were at risk of increasing mental health problems (17). This study provides a detailed view of the symptoms of traumatic distress (PTSD, depression, and anxiety) encountered by 25 de Junho resettle camps in Metuge district, Cabo Delgado province.

This study found a high prevalence of PTSD, depression, and anxiety symptoms in IDPs in Cabo Delgado province. People affected were relatively young, with 71.8% under the age of 44, and predominantly female (65%). The rate of illiteracy was 41% with 80% of respondents unemployed and 96.4% departed from Quissanga district-which is among the most affected by the armed violence affecting the province since October 2017 (30).

Our study participants had lower educational levels (90%) and a 41% illiteracy rate and women are almost twice as likely to be illiterate as men in concordance with the national average (39.9%) (32). The Cabo Delgado province, despite being abundantly rich in mineral and environmental resources, has the highest rate of illiteracy (52.4%; 12.5% above the national average in population aged 15 and above) and multidimensional poverty in the country (32).

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TABLE 4 Proportion of post-traumatic stress among the respondents from armed conflict area of Metuge, Cabo Delgado, Mozambique.

Characteristics	Category	PTSD = No	PTSD = Yes	*p*-value
Having chronic medical illness	No	173 (25.4%)	508 (74.6%)	0.597
	Yes	19 (28.4%)	48 (71.6%)	
Vulnerable person	No	164 (25.9%)	470 (74.1%)	0.769
	Yes	28 (24.6%)	86 (75.4%)	
Exposure to cumulative trauma events	1–2	85 (22.5%)	292 (77.5%)	0.049*
	3 or more	107 (28.8%)	264 (71.2%)	
Last time were exposed to attack situation	<12 weeks	45 (17.3%)	215 (82.7%)	
	>12 weeks – 1 year	1 (25.0%)	3 (75.0%)	<0.001*
	>1 year	146 (30.2%)	338 (69.8%)	
Missing family member	No	94 (24.2%)	295 (75.8%)	0.327
	Yes	98 (27.3%)	261 (72.7%)	
Witness the death of family member/ friend	No	116 (21.6%)	421 (78.4%)	<0.001*
	Yes	76 (36.0%)	135 (64.0%)	
Depression symptoms	No	147 (54.2%)	124 (45.8%)	<0.001*
	Yes	47 (9.9%)	430 (90.1%)	
Suicide risk	No	145 (35.2%)	267 (64.8%)	<0.001*
	Yes	47 (14.0%)	289 (86.0%)	
Anxiety symptoms	No	158 (35.2%)	291 (64.8%)	<0.001*
	Yes	34 (11.4%)	265 (88.6%)	

PTSD, post-traumatic stress disorder; *$p < 0.05$.

Additionally, the study participants had a high unemployment rate (78%) which is in concordance with the last report of the National Statistical Institute in Mozambique (32). The aggregate prevalence of depression, anxiety, and post-traumatic stress was considerably high, with a prevalence rate of 63.8, 40.0 and 74.3%, respectively, when compared with other studies conducted in armed conflict-affected populations (10.8% for depression, 15.3% for PTSD and 21.7% for anxiety) according to a systematic review and meta-analysis (15). Another systematic review (1981–2014) from six countries, five in Africa (18 studies), reported that the most frequent being post-traumatic stress disorder (range 3.1–75.9%), anxiety (range 6.9–75%), and depression (range 8.8–76.5%) (49).

The prevalence of PTSD at 74.3% was in line with the study carried out in Uganda (74%) (50) and lower than a study done in Medellin Colombia (88%) (51) and Iraq (83.4%) (52). Contrarily, the estimated PTSD prevalence of the current study was higher than the studies carried out as 63% in Nigeria (21), 40.8% in northwest and 58.4% in south of Ethiopia (24, 46), 19.3% in Morocco (22), 28% in South Sudan (23), 29.9% in Somalia (53) and 7.7% in Sri-Lanka (54), 46.6% in Bangladesh (55) particularly among women (5, 24, 55, 56).

The possible explanation for the observed difference could be the difference in tools, in which northwest Ethiopia (46), and northeast Ethiopia (56) studies used the post-traumatic stress disorder checklist for DSM (PCL-5), in Sri Lanka and Sweden studies used the Harvard trauma questionnaire (HTQ) (54, 57), and in Somalia and Uganda studies were used the International Neuropsychiatric Interview (MINI) (53, 58).

The high prevalence of PTSSs suggests that a scale-up of mental health care is needed, which could be met by increasing medical workers' capacity in the Metuge health facilities to diagnose and treat patients with mental disorders. However, the current resources for mental health services are insufficient in the Metuge district, and the number of mental health professionals (2) is too low to cover the entire Metuge population in need.

The prevalence of depression symptoms (63.8%) was higher than the studies carried out in Uganda (58%) (58), in the south (53.3%) (24) and North Ethiopia (39.3%) (46), Sweden (40.2%) (57), Sri-Lanka (22.2%) (54) and Somalia (32.1%) (53). Contrarily, the estimated depression symptoms prevalence of the current study was lower than the study carried out at 89% in Bangladesh (59).

Additionally, the prevalence of anxiety symptoms (40.0%) in the current study was lower than the study done in southwestern Uganda (73%) (58). On the other hand, the findings of the current study were higher than the study done in northeast Ethiopia (33.4%) (56), Sweden (31.8%) (57), Somalia (34.9%) (53), and Sri Lanka (32.6%) (54). A possible theory to explain the high prevalence of PTSD, depression, and anxiety symptoms may be the repeated exposure to war attacks and/or violence (previous and current armed conflict, natural disasters, and COVID-19 pandemic) (60) that these displaced individuals had been exposed to several moments (the last attack in Quissanga district being recorded 6 months before the beginning of the study) (61). Of note, the region has recorded extreme weather events, such as Cyclone Kenneth in April 2019, affecting around 500,000 households that saw their homes partially or destroyed, followed by the torrential rains recorded in December 2019 and January 2020 (62). Furthermore, the COVID-19 pandemic and several outbreaks of cholera caused limited access to essential health services and thousands of additional deaths (63).

PTSD was significantly associated with being female (2.2. times), suicide risk (1.54 times), being screened positive for depression (8.27 times), and generalized anxiety (1.45 times).

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TABLE 5 Proportion post-traumatic stress disorder and associated factors among the participants from armed conflict area of Metuge district in Cabo Delgado (n = 748).

Variable	Categories	Pos-traumatic stress disorder			
		Yes %	No %	COR (95% CI)	AOR (95% CI)
Age (years)	14–20*	67.50	32.50	–	–
	21–44	76.34	23.66	1.55* (0.99–2.42)	1.29 (0.67–2.45)
	45–64	76.82	23.18	1.59* (0.93–2.73)	1.05 (0.47–2.37)
	65+	68.66	31.34	1.05 (0.55–2.00)	0.33* (0.13–0.82)
Sex	Male*	58.24	41.76	–	–
	Female	82.96	17.04	3.49* (2.48–4.90)	2.30* (1.50–3.51)
Educational status	None*	82.89	17.11	–	–
	Primary School	69.89	30.11	0.48* (0.32–0.69)	0.59* (0.36–0.96)
	Secondary School	63.04	36.96	0.35* (0.21–0.59)	0.38* (0.19–0.77)
Occupation	Employed	50.00	50.00	–	–
	Unemployed	71.43	28.57	3.11* (1.14–8.46)	0.72 (0.22–2.35)
	Student	75.73	24.27	2.5* (0.88–7.09)	1.49 (0.43–5.14)
Exposure to cumulative trauma events	1–2	79.30	20.70	–	–
	3 or more	71.27	28.73	0.64* (0.45–0.92)	0.66* (0.43–1.01)
Last time were exposed to war fighting	<12 weeks	82.69	17.31	–	–
	>12 weeks – 1 year	75.00	25.00	0.62 (0.06–6.17)	5.14* (0.40–65.83)
	>1 year	69.83	30.17	0.48* (0.33–0.70)	1.24 (0.74–2.08)
Witness the death of family member/friend	No*	78.40	21.60	–	–
	Yes	63.98	36.02	0.49* (0.34–0.69)	0.61* (0.39–0.93)
Depression symptoms	No*	46.49	53.51	–	–
	Yes	90.15	9.85	10.52* (7.16–15.46)	8.27* (4.97–13.74)
Suicide risk	No*	64.81	35.19	–	–
	Yes	86.01	13.99	3.34* (2.31–4.83)	1.54* (0.94–2.51)
Anxiety symptoms	No*	64.81	35.19	–	–
	Yes	88.63	11.37	4.23* (2.82–6.35)	1.45* (0.84–2.50)

*$p < 0.2$. AOR, adjusted odds ratio; CI, confidence interval; COR, crude odd ratio.

Approximately half the respondents in our sample were female. The study findings show that mental health symptoms were more prevalent in female IDPs than in male IDPs. The odds of developing PTSD were 2.3 times higher in females compared to males, in line with the findings of other studies done in the south (24, 64) and north of Ethiopia (46, 56), and the fact that females have a higher risk of developing PTSD due to a lower threshold from exposure to psycho-trauma compared to males (51). In addition, many studies show that women were found to have a higher incidence of mental health disorders after rape or sexual assault (12, 65), the violent loss of a partner, or children, and becoming a single parent or widow (50, 66). Another reason could be that females tend to show a more emotional and ruminative response to stress (67). Contrarily, some studies found that symptoms of traumatic distress were more prevalent among male refugees than female refugees. (12, 55, 65)

Our research also found that IDPs who were unable to read or write had a higher prevalence of mental health symptoms (PTSD, depression, and anxiety) than those who had schooling. This finding is comparable to previous research that showed that poor education level was correlated to higher rates of PTSD (55, 68, 69) and increased risk of developing PTSD, depression, and anxiety (70).

Also, married respondents were more likely to have PTSSs, depression, and anxiety than those who were never married. This finding is comparable to findings in previous research (69).

Participants with depression were 8 times more likely to have PTSD when compared to participants without depression. Among patients with PTSD, depressive disorders, anxiety disorders, and drug misuse are 2 to 4 times more prevalent than among patients without PTSD (71). This is consistent with research conducted in Ethiopia (24, 56), Uganda (58), and Kenya (72). This has been related to participants with depression being more likely to have suffered traumatic experiences compared to participants without depression (67). Moreover, PTSD may increase the risk of suicide attempts (73).

Limitations

The results we present derive from a single center sample of IDP. The study participants were selected by convenience; and more representation of females may have impacted the results. Due to the cross-sectional nature of the study, we were not able to verify whether

the depression, anxiety symptoms, and substance use, preceded or followed PTSD. Despite this, the findings may be helpful to nations with areas devastated by armed conflicts or war.

Conclusions and recommendations

The high prevalence of self-reported mental health symptoms in this study was found in a displaced working-age population. Being female, having a clinical feature of depression and anxiety, and having antecedents of the death of a family member, were associated with the development of PTSD. These results highlight the need for surveillance and follow-up studies, and training on stress management for their violent memories in the context of humanitarian emergencies in displaced populations, aiming to early diagnose and deliver group or individual psychological support, may reduce the burden of severe mental health symptoms. Likewise, these results highlight the need for more evidence-based research specifically from policymakers and stakeholders at the national and global level to tackle the common mental disorders issues through intervention.

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 humans were approved by National Bioethics Committee for Health of Mozambique with registration IRB00002657. The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation in this study was provided by the participants' legal guardians/next of kin.

Author contributions

NM: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Software, Visualization, Writing – original draft, Writing – review & editing. HI-M: Investigation, Writing – review & editing. FP: Formal analysis, Software, Writing – review & editing. PD: Validation, Writing – review & editing. FM: Conceptualization, Methodology, Writing – review & editing. VC: Validation, Writing – review & editing. AM: Supervision, Validation, Writing – review & editing. MM: Formal analysis, Funding acquisition, Software, Supervision, Validation, Writing – review & editing.

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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

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A conceptual framework on pre- and post-displacement stressors: the case of Syrian refugees

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Researchers have documented multiple stressors and mental health problems along the journey of refugees as they are displaced to seek refuge in nearby and remote host countries. This article examines published research on Syrian refugees to propose a framework to conceptualize Syrian refugees' pre- and post-stressors and their collective impact on their mental health. The proposed framework provides a comprehensive understanding of the interconnected pathways between pre-displacement stressors, post-displacement stressors, and mental health outcomes for Syrian refugees. Pre-displacement stressors are best captured by the concept of trauma centrality and emotional suppression. Post-displacement stressors, categorized under financial, political, and social themes, have a direct impact on the mental health of the refugees, but could also play a partial mediating role on the impact of pre-displacement stressors on mental health. The framework suggests a direct pathway between the experience of war-related traumatic events and mental health and introduces the country of residence as a potential moderator of the severity of mental health. The latter is primarily influenced by local policies and the host communities' acceptance of refugees. We believe that the proposed framework can guide the work of researchers, policymakers, and practitioners concerned with the mental health and well-being of Syrian refugees. Additionally, although based on the experience of Syrian refugees, it presents a holistic perspective that could be adapted in other refugee settings.

KEYWORDS

Syria, refugees, pre-displacement, post-displacement, stressors, war, framework, mental health

1 Introduction

The global refugee crisis has reached an alarming peak, with a twofold increase in the number of individuals forcibly displaced over the past decade (1). As per recent data from the United Nations High Commissioner for Refugees (UNHCR), until mid-2023, approximately 110 million individuals globally experienced forced displacement, driven by factors including persecution, conflict, violence, and human rights violations (2). Notably, over half of all refugees (52%) under UNHCR's mandate originate from just three countries listed in descending order: the Syrian Arab Republic, Afghanistan, and Ukraine (2).

Refugees face an increased risk of mental health disorders surpassing the prevalence observed in non-war-affected populations (3). Earlier research on the mental health of refugees often assumed that symptoms were mostly linked to pre-displacement war-related experiences,

giving rise to a war exposure model of refugee distress. While research adopting this model generally supported a 'dose–response effect', with higher war exposure levels predicting increased distress or diagnosis likelihood (4, 5), the strength of this effect varied, and the model often failed to account for significant unexplained variance in mental health symptom levels (6–8). This variability was attributed to the exclusion of post-displacement stressors faced in exile, reflecting an underestimation of the psychological impact of displacement on mental health (9, 10). These stressors include social isolation, poverty, discrimination, uncertainty about asylum status, unemployment, poor housing conditions, and others (11, 12).

The subsequent ecological model of refugee distress, which also incorporates post-displacement stressors, proved more predictive than the earlier war exposure-focused model (13–15). In recent research, post-displacement stressors consistently predicted mental health disorder levels (12, 16–18), with numerous studies revealing that these stressors accounted for greater variance in depression and anxiety levels than war-related experiences of trauma and loss (14, 15, 19). Post-displacement stressors were also positively associated with post-traumatic stress disorder (PTSD) (20–22), possibly due to their traumatic nature and the depletion of coping resources in exile, rendering individuals more vulnerable to the effects of prior war exposure (23, 24).

While recent literature has broadened its scope to encompass post-displacement stressors in addition to traumatic events experienced prior to migration, there are still gaps in fully understanding and evaluating the intersectionality of pre- and post-displacement stressors on refugees' health. Furthermore, there is a tendency to generalize the same stressors to all refugees without accounting for the unique contextual factors experienced by different refugee groups in various host countries.

Syrian refugees have attracted considerable scholarly attention due to their major contribution to the worldwide refugee crisis and their widespread presence across numerous host countries. Drawing on literature published on Syrian refugees, this article seeks to offer a comprehensive exploration of the displacement stressors. This includes war-related stressors, with a particular emphasis on post-displacement stressors encountered in exile countries. Additionally, it aims to propose a framework to conceptualize Syrian refugees' pre- and post-displacement stressors and their collective impact on health.

2 The case of Syrian refugees

Even after more than a decade of the Syrian conflict, the Syrian refugee crisis continues to be one of the largest displacement and humanitarian crises globally (25). Following the war in Syria, which began in 2011, over 350,000 Syrians have lost their lives and over 14 million people have been forced to flee their homes in search of safety (26). Of these, nearly 6.8 million individuals remain internally displaced, and the rest seek asylum in over 130 countries (25). Neighboring countries bear the heaviest burden, with Turkey hosting the largest number of Syrian refugees (over 3.5 million), followed by Lebanon (over 814,000) and Jordan (over 660,000) (27). Germany is the largest Syrian refugee-hosting country in Europe (around 522,000 individuals). Other hosting countries by descending order include Iraq, Egypt, Sweden, Sudan, Austria, Netherlands, Greece, France, Bulgaria, Switzerland, Denmark, and many others (27). These figures only account for registered refugees under UNHCR and do not include the substantial number of unregistered refugees living in these nations (25, 28). Studies on mental health in adult Syrian refugees collectively show an increased susceptibility to mental illnesses, with potentially over tenfold higher likelihood of developing post-traumatic stress and other disorders compared to the general population in the host country (29). This increased risk is attributed to the substantial number and intensity of war traumatic events encountered, along with post-displacement stressors (29).

2.1 Pre-displacement stressors

2.1.1 The overall impact

A preponderant body of literature addressed the impact of war-related stressors on the mental health of Syrian refugees. A recent systematic review found that Syrian refugees have encountered a notably high number of traumatic events (29), with the prevalence rates for experiencing war-related events surpassing those observed in other groups of forced migrants (29, 30). The association between traumatic events and mental health disorders has been highlighted by several systematic reviews (29, 31, 32), with the severity of PTSD symptoms increasing with the number of traumatic events experienced (33–36). The most commonly experienced traumatic events in this population, as reported by a recent systematic review (32), were, in sequential order: 'living in a war-affected area; the experience of the death of someone close; experiencing a life-threatening accident; experiencing a life-threatening accident of someone close; experiencing the torture of someone close; experiencing the abduction or being taken hostage of someone close; experiencing torture; and experiencing someone else's torture, beating, or sexual abuse'. Other significant pre-displacement stressors include difficulty meeting basic needs (37, 38) and forced displacement (39).

2.1.2 The role of trauma centrality and emotional suppression

The impact of war-traumatic experiences on refugees' mental health is depicted by a complex framework that shows how traumatic events, trauma centrality, emotional suppression, PTSD, and psychiatric comorbidity are interconnected (40). War trauma centrality arises when adverse events experienced during wars can introduce a turning point in refugees' life course and create a traumatized identity (41). Emotional suppression is an individual's ability to consciously restrain the expression of unpleasant emotions such as anger and anxiety, thereby keeping these emotions unresolved (42). A Swedish study of 564 Syrian refugees demonstrated that emotional suppression acts as a mediator between trauma centrality and psychiatric disorders (40).

2.2 Post-displacement stressors

2.2.1 The overall impact

Most research addressing the experiences of Syrian refugees after their displacement has primarily focused on specific post-displacement stressors, while minimal attention was given to understanding their collective negative influence on the refugees' mental health, specifically PTSD, depression, and anxiety. To our

knowledge, only one systematic review has holistically evaluated the overall post-displacement stressors as predictors of Syrian refugees' mental health (31). This review identified specific factors, such as unmet social support needs, economic difficulties, and unemployment, that are associated with higher levels of anxiety, depression, and PTSD (31). Few other reviews have assessed specific stressors experienced during exile as potential indicators of their mental health outcomes, yielding inconsistent findings regarding the impact of economic challenges (32), legal status (32), and settlement types (29, 32). In contrast, within the systematic review, eight studies examining the resettlement period as a predictor of mental health among refugees revealed no association. The mean duration of resettlement across these studies ranged from 6.5 months to 3.4 years (32, 43).

2.2.2 Themes of exile stressors

To gain a better understanding of the specific post-displacement stressors and their types, multiple research studies were reviewed. In a mixed methods study among Syrian refugees in Jordan, Alfadhli and Drury reported a typology of 33 secondary stressors organized into three main themes: financial, environmental, and social (44). Financial constraints included loss of income and property, high living costs in exile, poor housing conditions, and insufficient access to healthcare and educational services (44). Environmental stressors arise from laws restricting the integration of these refugees into host countries, such as prohibitions on employment and legal status (44). Social stressors include social relationships with the Jordanian host community (prejudice and exploitation), safety concerns, and government-enforced discrimination (44). Similar patterns of post-displacement stressors were reported in Lebanon, Turkey, and Jordan, where refugees experienced poor living conditions (45), economic constraints (45–47), discrimination (45, 47), exploitation from the host community (45), feeling unsafe and unprotected (46), fears of being forced to return to Syria (47), and concerns about getting treatment for health problems (47). In the latter Jordanian study, out of 14 post-displacement stressors that were evaluated, it was found that each additional stressor was significantly associated with increased odds of mental health conditions, including 32% increased odds of depression, 28% increased odds of anxiety, and 46% increased odds of PTSD (47).

2.2.3 Key stressors

It is worth noting though that the majority of publications focused on one specific post-displacement stressor and the pathway by which this particular stressor affects the refugees' mental health. One important financial stressor is lower income which was directly correlated with higher PTSD symptoms among Syrian refugees in Germany (48). A study on perceived needs among in south-central Turkey in 2013 found that nearly three-quarters of the surveyed refugees identified 'income or livelihood' as one of their top three priorities (49).

Ethnic discrimination, a major social stressor in the context of Syrian refugees, was found to be significantly associated with higher levels of depression and anxiety (45, 50). Disrupted social networks are another significant stressor confronting Syrian refugees in exile. This point was demonstrated by a multi-centered study, through which lower social support levels were significantly correlated with higher levels of anxiety and depression (51). Conversely, higher levels of social capital and social cohesion were linked to improved emotional well-being among Syrian refugees in Lebanon (52). Loss of culture and support in the post-displacement environment was the most powerful, and the only consistent, predictor of mental health status among Syrian refugees in Turkey, even when pre-displacement factors were taken into account (53).

Political stressors, such as challenges in residence and work permits, also play a key role in predicting the mental health of Syrian refugees. In Germany, more severe symptoms of PTSD were significantly associated with shorter validity of the refugees' residence permission (54). In another study in Greece, the majority reported inadequate or nonexistent access to legal information and assistance regarding asylum procedures, and the heightened uncertainty surrounding their status intensified their anxiety levels (55).

2.2.4 Comparative analysis

Few articles in the literature discussed the differences in the impact of pre- and post-displacement stressors on the mental health of Syrian refugees, either directly or indirectly. Findings from hierarchical regression analyses in Turkish camps demonstrated that post-displacement living difficulties had a more substantial impact on mental health outcomes compared to pre-displacement traumatic events (53). When comparing the mental health of Syrian refugees in Turkey with internally displaced individuals in Syria, a study found a higher prevalence of major depressive disorder among Turkish refugees (56). Notably, post-displacement factors were identified as stronger predictors of depression and PTSD than pre-displacement events (56).

2.2.5 How post-displacement stressors differ in host countries?

It has been argued that the type and severity of post-displacement stressors can vary considerably among countries, partly influenced by local policies governing the refugees' residence, movement, and employment, as well as the acceptance of host communities toward refugees (22). Studies comparing the prevalence of mental disorders in Syrian refugees across different countries reveal that those who resettled in high income countries, such as Sweden or Germany, experience lower levels of PTSD (33), anxiety symptoms, and depressive symptoms (57) compared to those living in Turkey. In addition, higher prevalence rates of panic disorder, PTSD, and generalized anxiety disorder were found among internally displaced refugees in Syria than those in Turkey (56). This difference may be linked to the availability of better living conditions in Turkey, including secure and stable housing, access to clean water and sanitation, and a safer environment, as evidenced by 74.4% expressing satisfaction with their living conditions in Turkey (58). A multi-country study aimed at identifying and comparing self-reported post-displacement stressors among Syrian refugees in different settings found that more than half of the participants reported challenges linked to camp-related living difficulties (Jordan), financial challenges (Turkey), employment (Jordan and Switzerland), and government regulations such as temporary residency (Switzerland) (59).

3 The proposed framework

Drawing from the existing literature on Syrian refugees, we propose a conceptual framework to depict the stressors

encountered before and after displacement, along with their impact on their mental health (Figure 1). The preliminary Di-Acyclic Graphs (DAGs) corresponding to this figure are provided in Appendix A.

This framework includes the most frequently reported war trauma stressors as well as post-displacement stressors among Syrian refugees in various countries.

The framework presents a direct pathway between pre-displacement stressors and mental health. However, it integrates the trauma centrality concept to emphasize that war-related traumatic events may lead to a traumatized identity leading to mental health disorders, which are mediated by emotional suppression (33, 40–60). The importance of trauma centrality among refugees is especially apparent in war-related traumatic events (41). It is argued that for trauma to achieve centrality, it must be of high severity, serving as a pivotal turning and reference point in one's life and becoming an integral part of their identity (41). For Syrian refugees, war trauma goes beyond being a mere memory; it integrates deeply into their sense of self, forming a stable traumatized self across various situations (60). These intense traumas disrupt personal reference points, influencing how individuals attribute meaning to their existing beliefs, feelings, experiences, and future expectations (60). The memories of war become a crucial turning point, reshaping their personal identity (60).

The framework also emphasizes that exposure to pre-displacement stressors exhibits an indirect effect on mental health, which is partially mediated by post-displacement stressors. This suggests that individuals who have fled conflict and face post-displacement life challenges are at an elevated risk of mental health disorders (61).

The framework also shows the direct and strong impact of post-displacement stressors on mental health (31–56). These stressors are categorized into financial, political, and social themes, which are suggested to be interlinked. Each theme can potentially predispose or exacerbate the others. For instance, the restrictive laws in host countries act as primary drivers compelling refugees to seek informal employment, often under exploitative working conditions be it disproportionately low wages, thus becoming a significant contributing factor to poverty (62, 63). Thus, political stressors can predispose both social and financial stressors.

Importantly, the framework identifies the country of residence as a factor that moderates the association between post-displacement stressors and mental health.

4 Discussion

Our proposed framework aligns with a few existing models that address the mental health of refugees, although they are not specifically tailored to Syrian refugees. In our framework, we emphasize the direct impact of pre-displacement stressors on refugees' mental health, as well as an indirect impact partially mediated by post-displacement stressors. One of the existing frameworks presents an ecological model, which similarly indicates a direct impact of war exposure on mental health, along with an indirect impact partially mediated by post-displacement stressors (13). Another framework, centered on the Tamil refugees in Australia, suggests that war-related traumas directly affect Post-traumatic Symptoms (PTS) among refugees and also indirectly through specific post-displacement stressors (asylum difficulties, adaptation difficulties, and loss of culture and support) (61). However, the Tamil refugees model relied on data collected from 196 Tamil refugees living in Australia (61). Stressors excluded from the model, deemed non-impactful on PTS symptoms in this specific group, may still have a significant influence on PTS symptoms in diverse refugee populations and contexts.

In this framework, we posit that the impact of post-displacement stressors is major, sometimes exerting a more substantial influence on

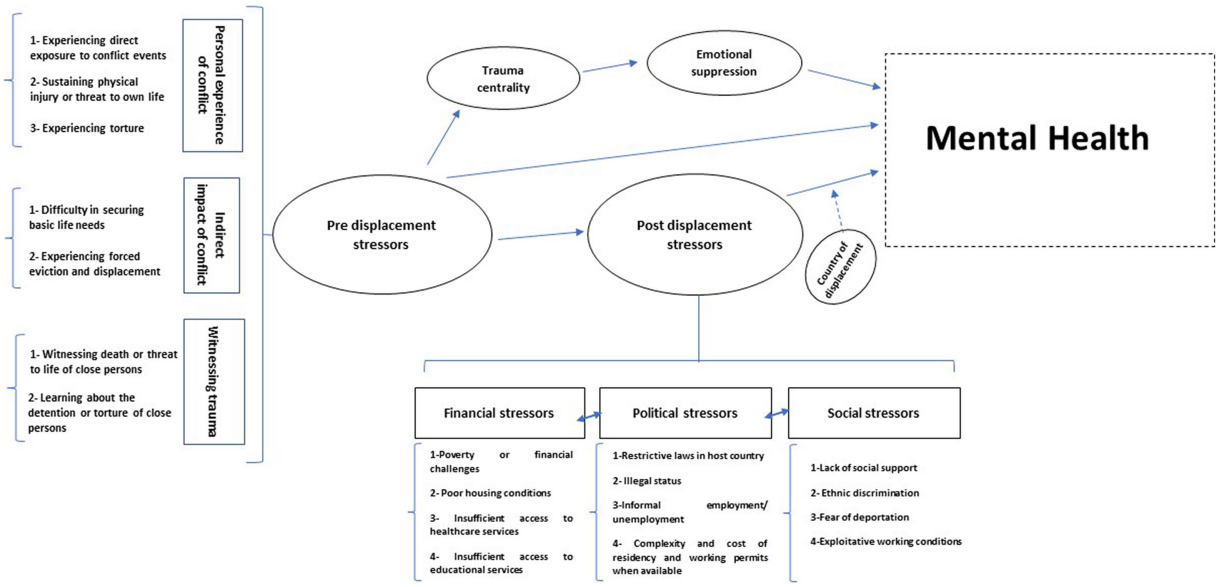

FIGURE 1
A theoretical framework describing the pre and post displacement stressors among Syrian refuges and their association with mental health. Dashed arrows represent a moderating effect.

mental health compared to war-related stressors in the case of Syrian refugees. This implies that it is crucial to prioritize and thoroughly continuous stressors arising in exile when addressing and evaluating mental health concerns within this refugee population.

Furthermore, our framework highlighted the interconnectedness of post-displacement stressors. Thus, interventions targeting one specific stressor in exile can create a cascading effect, reducing the occurrence and intensity of other stressors and contributing to the mitigation of mental health issues in this refugee population. Additionally, it considers the country of residence as a crucial moderator influencing the severity of mental health among refugees. The moderation effect of the country of residence is primarily influenced by local policies and the host community's acceptance of refugees which determine the types and severity of stressors in different host countries.

5 Implications and limitations

The conceptual framework proposed for understanding the mental health of Syrian refugees exhibits several notable strengths. First, it offers a comprehensive integration of the stressors experienced by refugees from war and throughout their settlement period. This inclusive approach enables a nuanced understanding of the complex interplay between various stressors and their cumulative impact on mental well-being. Second, the framework incorporates the concept of trauma centrality, shedding light on how war-related traumatic experiences can shape an individual's self-perception and contribute to mental health disorders.

This framework combines theoretical foundations derived from an extensive literature review with the addition of practical statistical considerations. The pathways presented in the framework facilitate a clear visualization of the sequential relationships between stressors and mental health outcomes, enhancing its explanatory power and utility for researchers. It serves as a foundational resource for designing comprehensive data collection tools and guiding the data analysis process by identifying factors that should be considered as moderators. This is especially relevant in multicentered studies investigating the impact of specific post-displacement stressors on mental health in Syrian refugees, particularly in diverse settings such as high and low-income host countries.

In addition, the framework proposed partial mediating pathways through post-displacement stressors and trauma centrality. Accounting for mediators is essential in statistical analyses, as it helps disentangle and understand the underlying mechanisms that drive relationships between variables. Incorporating mediators facilitates identifying and controlling for intermediate factors, providing a more accurate depiction of the true associations within the data. This approach does not only enhance the robustness of statistical models but also contributes to the development of more informed and targeted interventions or policies based on a nuanced understanding of the studied phenomena.

To illustrate, this framework provides a solid foundation for developing effective and comprehensive humanitarian approaches addressing the mental health of refugees. The majority of mental health interventions among refugees rely on trauma-treatment protocols, cognitive-behavioral methods (64), and psychiatric medications (65) to treat PTSD and depression, which are believed to stem from war exposure. The variability in the effectiveness of such interventions is mainly linked to the failure to address exile-related stressors such as poverty, unemployment, social isolation, and precarious housing conditions (66, 67). Consequently, comprehensive approaches addressing the impact of prior war exposure and ongoing stressors, appear to hold considerable treatment potential for refugees who have access to clinic-based mental health services. Additionally, in contexts where psychotherapeutic interventions are scarce, humanitarian projects targeting livelihoods, policy changes to support refugee employment and resettlement, and the creation of supportive environments would enhance refugees' mental health, even if not originally designed for this purpose. This has been demonstrated among displaced Rohingya adults, where access to employment opportunities and sufficient humanitarian aid have been identified as potential interventions to reduce the high prevalence of severe post-traumatic stress symptoms (PTSSs) (68).

Despite these strengths, the conceptual framework has a few limitations. Firstly, due to the emphasis on clarity and model simplicity, the framework did not incorporate all positive factors that could potentially act as buffers against displacement stressors on refugees' mental health. This exclusion notably includes community-level interventions, such as aid organizations, which may play a role in mitigating ongoing stressors' impact. Secondly, the framework did not include coping strategies and buffering factors like financial support, social networks, and cultural identity, which are known to influence resilience and mental well-being post-displacement. Lastly, while the framework suggests that ongoing post-displacement stressors may have a greater impact on mental health compared to war-related stressors, this assertion is based on limited empirical evidence, highlighting the need for further research to validate and expand upon these findings.

In conclusion, the proposed model introduces an innovative approach to conceptualizing the pre- and post-displacement stressors encountered by Syrian refugees and their impact on mental health. Although derived from literature focused on Syrian refugees, we posit that it can be adapted to other refugee populations. Considering the substantial size of the Syrian refugee population and their widespread distribution across various host countries, their diverse experiences in exile often mirror those of other refugees also displaced by war (2). Consequently, this framework could serve as a comprehensive foundation for researchers, policymakers, and practitioners interested in the health and well-being of refugees in general.

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 authors.

Author contributions

SA: Conceptualization, Writing – original draft, Methodology, Visualization, Writing – review & editing. IN: Funding acquisition, Methodology, Supervision, Visualization, Writing – review & editing. RH: Funding acquisition, Methodology, Supervision, Visualization, Writing – review & editing.

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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

Supplementary material

The Supplementary material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fpubh.2024.1372334/full#supplementary-material

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"We want our freedom back, that's our only need": a qualitative study of health and social needs among asylum seekers and undocumented migrants crossing the borders from Belarus to Lithuania

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Background: The influx of undocumented migrants and asylum seekers into Lithuania, particularly during the COVID-19 pandemic, presents unique public health challenges. This study employs the Social Determinants of Health framework to explore the healthcare and social needs of this vulnerable population.

Methods: In May 2022, we carried out a qualitative study through semi-structured interviews with asylum seekers across four centers in Lithuania. Employing both purposive and snowball sampling techniques, we selected participants for our investigation. The study comprised 21 interviews—19 conducted in Arabic and 2 in English—with durations ranging between 20 and 40 min each. We audio-recorded all interviews, transcribed them verbatim, and subsequently performed a thematic analysis using Atlas.ti software. This process of design and analysis strictly followed the principles of thematic analysis as outlined by Braun and Clarke, guaranteeing methodological precision and rigor.

Findings: 21 interviews revealed critical insights into the healthcare access challenges, mental health issues, and social integration barriers faced by the participants. Key themes included 'Healthcare Needs and the Impact of the COVID-19 Pandemic 'and 'Social needs and Aspirations Amidst Pandemic-Induced Uncertainty '. The findings highlight the multifaceted healthcare and social needs of asylum seekers, juxtaposed against significant barriers they face. Access to medical services is hindered by long waiting times and financial constraints, especially for specialized care such as dental services. Communication issues during medical appointments due to language barriers and the lack of gender-specific healthcare, such as access to gynecological services, further exacerbate the challenges. Additionally, the COVID-19 pandemic introduces hurdles such as limited testing, isolation measures, language-specific information barriers, and insufficient social distancing practices. Mental health has emerged as a critical concern, with asylum seekers reporting significant stress and emotional exhaustion due to uncertainty and restrictive living conditions. Social needs

extend to delayed asylum application processes, inconsistent language education opportunities, inadequate clothing, and nutrition that lacks cultural sensitivity, and living conditions characterized by overcrowding and insufficient facilities. The restricted freedom of movement within asylum seeking centres severely impacts their psychological well-being, underscoring a deep longing for autonomy and a better life despite the myriad of challenges faced.

Discussion: The study illustrates the complex interplay between migration, health, and social factors in the context of a global pandemic. It highlights the need for culturally sensitive healthcare services, mental health support, and structured language education programs. Offering educational avenues alongside language courses for children and adults is essential for fostering social inclusion and securing economic prosperity. Addressing the challenge of language barriers is of utmost importance, as these barriers significantly impede undocumented migrants' and asylum seekers employment opportunities and their access to crucial services. The findings emphasized immigration as a health determinant and underscored the importance of inclusive health policies and advocacy for undocumented migrants and asylum seekers' rights and needs.

Conclusion: There is an urgent need for comprehensive policies and practices that are grounded in the principles of equity, compassion, and human rights. Additionally, advocating for practice adaptations that are culturally sensitive, linguistically inclusive, and responsive to the unique challenges faced by undocumented migrants and asylum seekers. As global migration continues to rise, these findings are crucial for informing public health strategies and social services that cater to the diverse needs of this vulnerable population.

KEYWORDS

asylum seekers, Lithuania, undocumented migrant, COVID-19, health needs, social needs

Introduction

Undocumented migrants and asylum seekers, constituting a vulnerable population group, encounter formidable barriers to accessing healthcare, owing to their legal status, language impediments, and limited resources (1). The health needs of these individuals frequently go unaddressed, leading to adverse outcomes and heightened risks of morbidity and mortality (1–4). Legal constraints significantly impede the health and social integration of these individuals, with restrictive immigration policies potentially dissuading them from seeking essential healthcare, thereby posing notable public health risks (5–7). This predicament not only contributes to tangible health issues but also fosters profound feelings of isolation, marginalization, and an overarching sense of insecurity among undocumented migrants and asylum seekers (Supplementary Appendix 1) (8).

Undocumented migrants and asylum seekers grapple with a myriad of social determinants of health, including housing instability, limited employment opportunities, and educational barriers. These factors create a cycle of poverty and social exclusion, profoundly influencing overall well-being (9) This cycle of adversity significantly heightens the vulnerability of undocumented migrants and asylum seekers to a spectrum of health challenges, spanning both chronic and infectious diseases. Specific diseases, such as cardiovascular diseases, diabetes, tuberculosis, HIV/AIDS, hepatitis B and C, malaria, mental disorders, substance abuse, and sexual and reproductive health problems are prevalent among this population (10–12).

The experiences associated with asylum seeking can profoundly influence an individual's mental health. The diverse challenges faced by those navigating displacement, including instances of violence, persecution, and forced separation from family, are recognized as potential triggers for mental health issues such as post-traumatic stress disorder (PTSD), anxiety, and depression (13, 14).

Navigating an unfamiliar environment can intensify the myriad challenges faced by undocumented migrants and asylum seekers. These challenges include discrimination, social isolation, and economic hardship, which collectively contribute to heightened mental distress among this vulnerable population. For instance, individuals may encounter prejudiced attitudes, experience exclusion from social circles, and grapple with financial struggles, all of which significantly impact their psychological well-being (15, 16). Moreover, the fear of deportation and the constant uncertainty surrounding their legal status further intensify mental health concerns. This perpetual state of apprehension can lead to social anxiety and hypervigilance among undocumented migrants and asylum seekers, affecting their overall mental and emotional resilience (15, 16). The COVID-19 pandemic has further strained already limited health resources, making it even more challenging for these populations to receive healthcare (1). Globally, 15.9 million people (14.7–17.2 million) died

from all causes related to the COVID-19 pandemic during 2020 and 2021. This number includes deaths directly attributable to SARS-CoV-2 infection and those indirectly related to other social, economic, or behavioral changes associated with the pandemic (17).

The right to health is universally recognized and applies to everyone, irrespective of legal status or nationality. International law, aligning with the 2030 Agenda for Sustainable Development (18), ensures universal access to healthcare. Nevertheless, the provision of health care for undocumented migrants and asylum seekers varies considerably among European Union (EU) countries (19). To illustrate, some countries may have more inclusive policies, while others might have restrictive practices.

Culturally sensitive health services play a pivotal role in addressing these disparities and fostering resilience (20). Ensuring that healthcare is attuned to the cultural backgrounds of undocumented migrants and asylum seekers is crucial for overcoming challenges related to accessibility and effectiveness. This may involve linguistic considerations, understanding diverse health beliefs, and tailoring services to meet the unique needs of this population.

Background

The surge of undocumented migrants and asylum seekers from Belarus into Latvia, Lithuania, and Poland has been unfolding since mid-2021 and has brought to the forefront the pressing issue of their health and well-being (21). The following characteristics have been observed among the undocumented migrants who arrived in Lithuania from June 2021 to December 2023 (22). There were 4,614 undocumented migrants, the majority of whom originated from Middle Eastern countries, specifically Iraq and Syria. Iraq topped the list of countries of origin for migrants, with a total of 2,864 persons, followed by 193 from Syria. Analysis of the demographic data reveals a gender disparity among undocumented migrants: 72% were males, 28% were females. Additionally, 90% of them have requested asylum (23). Thus, Understanding the unique health needs of both genders is crucial for providing effective care and support. In 2021, the Lithuanian government established five centers for asylum seekers who have crossed the Belarussian border into Lithuania (24). Three of those centers were under the control of the Ministry of the Interior of the Republic of Lithuania. The other two centers were managed by the Ministry of Social Security and Labor (24).

Foreign nationals who are permanent residents in Lithuania and/or are insured by Lithuania's compulsory health insurance plan, including those seeking asylum or refugees, are able to access vaccination services, such as COVID-19 vaccinations, in Lithuania. This service is also available to all insured citizens of other EU member states (25).

The surge of undocumented migrants and asylum seekers crossing from Belarus into Lithuania introduced a host of challenges, particularly concerning the health and well-being of these individuals. To effectively address their immediate healthcare needs and long-term mental health, a precise and targeted set of measures must be implemented.

It is imperative to recognize that the exclusion of undocumented migrants and asylum seekers or the limited inclusion in healthcare and social systems may exert additional pressure on health and social systems. Additionally, addressing structural factors, including but not limited to living conditions, is crucial. Exploring the specific ways in which these factors influence health outcomes and proposing targeted interventions can contribute to a more effective response.

Conceptual framework

The conceptual framework of this study centers on the Social Determinants of Health (SDH), which delineate the conditions shaping an individual's life from birth to aging. These conditions are intricately entwined with the global, national, and local distribution of financial resources, power, and other assets (26). The prospect exists that SDH forms the crux of health inequities (27). This investigation adopts the Commission on Social Determinants of Health (CSDH) framework (28), a model pioneered by the World Health Organization. Envisioned as a tool for comprehending how political and socioeconomic policies impact the health and social requisites of migrants, the CSDH framework facilitates the nuanced analysis and communication of the intricate phenomenon of social determinants of health (28).

Within the CSDH framework, determinants are classified into two categories: structural and intermediary. Structural health determinants are influenced by cultural and social values, public policies, and political systems, all of which shape a spectrum of "structural mechanisms" including income, education, and occupation (28). These mechanisms perpetuate social stratification, fortify power dynamics, and sustain societal privileges, reproducing inter-group interactions. Gender discrimination is a pervasive element in numerous societies, subjecting women and girls to systematic disparities in power, prestige, and resource allocation. The repercussions of discrimination are profound, manifesting in immediate and severe health consequences such as rape, sexual exploitation, forced marriages, and gender-based domestic violence. Similarly, belonging to marginalized racial or ethnic groups profoundly impacts an individual's social status, economic prospects, and life trajectory in societies characterized by racial discrimination and exclusion. Health outcomes for oppressed racial and ethnic groups tend to be markedly lower than those for more privileged groups or the general population. Health inequity is contingent upon sociopolitical context and structural mechanisms. Furthermore, these determinants interconnect with another set of determinants known as intermediary determinants of health (28).

These intermediary factors encompass environmental aspects like neighborhood characteristics, housing quality, and work environment; socio-psychological factors such as psychosocial stressors and stressful living conditions; behavioral factors including nutrition, physical activity, smoking, and alcohol consumption; genetic and aging factors; and factors related to the healthcare system, including accessibility and affordability of services. As defined in the framework, intermediary determinants are social factors influencing health and contributing to unequal exposure and vulnerability to harmful conditions such as lack of access to safe drinking water, poor dietary choices, and unhealthy living conditions (28).

Importantly, immigration is positioned as a determinant of health in its own right for the purpose of achieving substantial enhancements in health outcomes (29). The immigrant experience significantly shapes behavior and modifies the impact of other social positions, such as socioeconomic status, given the ambiguous relationship between immigrants and state institutions, including healthcare (29). This holistic framework informs the study's exploration of the intricate dynamics influencing the health and well-being of undocumented migrants and asylum seekers.

Aim

The aim of this study was to thoroughly investigate the healthcare and social needs of undocumented migrants and asylum seekers who had crossed the borders into Lithuania from Belarus.

Objectives

To explore undocumented migrants and asylum seekers' healthcare and social needs in Lithuania.

To explore undocumented migrants and asylum seekers' perceptions and experiences regarding the impact of the COVID-19 pandemic on their health and social well-being.

Methods

Study design

The study employed a qualitative approach, semi-structured interviews to comprehensively explore the healthcare and social needs of undocumented migrants and asylum seekers in Lithuania. The qualitative approach enables an in-depth exploration of undocumented migrants and asylum seekers' lived experiences, offering nuanced insights into their healthcare and social needs. This methodology excels at uncovering complex dynamics and personal narratives, which quantitative methods may fail to capture, thereby offering a comprehensive understanding of the participants' challenges and needs (30). The research team meticulously developed the semi-structured interview guide in English, informed by existing literature and internal discussions. To ensure linguistic accuracy, the guide was translated into Arabic and back translated by two bilingual speakers. The interview guide covered a diverse range of topics, including healthcare access, existing healthcare-related needs, communication challenges, diet and meals concerns, social activities, social welfare, COVID-19 information, and obstacles to integration in Lithuania. The selected participants, undocumented migrants, and asylum seekers in Lithuania, were most appropriate because they directly experience the phenomena under investigation. Their firsthand accounts and perspectives provide critical insights into the healthcare access challenges, mental health issues, and social integration barriers they face, especially during the COVID-19 pandemic.

Sampling methods

Purposive sampling and a snowball sampling approach, as per Bryman and Bell (30), were employed for participant selection. In the recruitment process for our study, we employed a two-pronged strategy combining purposive and snowball sampling techniques to ensure a diverse and representative sample of undocumented migrants and asylum seekers. Initially, purposive sampling was utilized to select participants who met specific criteria relevant to our study.

Following the initial recruitment, we implemented snowball sampling to leverage the networks of our purposively selected participants. Participants were asked to recommend others within their community who met our study criteria and might be willing to share their experiences. This technique was particularly valuable in reaching a broader segment of the undocumented migrant and asylum seeker population.

The combination of these sampling methods enabled us to construct a robust sample that not only met our predefined criteria but also captured a wider range of experiences and perspectives among the study population. This approach enhanced the depth and breadth of our qualitative analysis, contributing to a comprehensive understanding of the complex issues faced by undocumented migrants and asylum seekers.

Data collection

Permission was obtained from the management of asylum seeker centers, and two members of the research team (RA and RU) visited the centers to invite participants. Information sheets were distributed, and the research team explained the study to potential participants. The study was conducted in May 2022, ensuring a comprehensive exploration of the healthcare and social needs of undocumented migrants and asylum seekers in Lithuania. The participants had the option to conduct the interviews either in Arabic or in English, interviews were between 20 and 40 min and were audio-recorded for verbatim transcription. Language proficiency was assessed informally through initial communications with potential participants. English and Arabic were chosen based on the predominant languages spoken by the asylum seeker population in the study setting, ensuring effective communication and understanding during the interviews. Additionally, the interviewer (RA) is fluent in these two languages but lacks experience speaking in other languages.

Setting

The study was conducted at four asylum seeker centers in Lithuania, managed by the Ministry of the Interior of the Republic of Lithuania, and the Ministry of Social Security and Labor. Conducting interviews in private spaces within the asylum seeker centers facilitated open and candid discussions. Field notes, capturing participant demographics and key interview points, were taken during interviews and later referenced in reflective conversations between researchers.

Population

The study targeted undocumented migrants (19 years old or older) who entered Lithuania from the Belarussian border after June 2021, regardless of nationality, gender, or current asylum status. For individual interviews, individuals under 19 and those not proficient in Arabic, or English, were excluded. Nationality and gender were not primary criteria for participant selection to ensure a focus on the shared experiences of healthcare access and social integration challenges among asylum seekers, regardless of their background. This approach aimed to capture a broad range of experiences, reflective of the asylum-seeking population's challenges in Lithuania.

Saturation point

The total number of semi-structured interviews aimed for data saturation, ensuring quality responses and conclusive findings. 21

interviews were conducted. Saturation was considered achieved when no new insights emerged from subsequent interviews. Thus, there was no need to conduct more interviews.

Data analysis

Qualitative data from semi-structured interviews were analyzed thematically using Atlas.ti. In this study, we employed a rigorous thematic analysis approach to identify, analyze, and describe the key themes and subthemes in the data. The transcripts were rigorously cross-checked against the original recordings, as outlined by Braun and Clarke (2006) (31), for the purposes of examining, interpreting, and reporting significant patterns or themes emerging from the data collected (31). One of the researcher team RA meticulously transcribed the audio-recorded interviews verbatim, and the transcripts were rigorously verified for accuracy against their respective source recordings. A qualitative data analysis software called Atlas.ti was utilized to enhance the analysis process (32). RA and RU independently coded the data, assigning codes to salient textual units.

The team participated in a comprehensive discussion, facilitating a consensus-based approach to resolving any discrepancies. This collaborative process ensured the consistency and robustness of the coding process. The codes were then systematically amalgamated into cohesive overarching themes and subthemes, enabling us to explore the participants' experiences and perspectives. The abduction approach was used throughout the data analysis process, as we iteratively moved back and forth between the data and existing theories, in order to generate new insights and explanations. In accordance with the recommendations of Green et al. (33) and Eakin and Gladstone (34), we generated meaningful insights and advanced our understanding of the research phenomenon by employing a rigorous and systematic approach to data analysis. The researchers played a critical role in the thematic analysis of the data, ensuring rigor and transparency. They independently coded the transcripts, discussed discrepancies, and reached consensus on the themes, which were then cross-checked with the original data. This process ensured a careful examination of the data and the reliability of the findings. Moreover, to mitigate potential biases arising from the researchers' roles, reflexivity was practiced throughout the study. Researchers (RA, RU) continuously reflected on their assumptions, beliefs, and interactions with participants to ensure these did not unduly influence the data collection, analysis, or interpretation. Peer debriefing and triangulation were also employed to enhance the credibility of the findings.

Results

The study included 21 participants, encompassing diverse social and demographic characteristics (Table 1). Among the study participants, 13 were men and 8 were women, aged between 19 and 40 years. The marital status of participants varied, with 9 being single and 12 married. Notably, a significant portion of the cohort (12 participants) was accompanied by family members, including siblings, children, spouses. All participants (21) were classified as asylum seekers, with 4 in the process of seeking asylum and 17 currently appealing because of the rejection of their previous applications. The predominant country of origin among the participants was Iraq (18 individuals), followed by Lebanon, India, and Sri Lanka, each represented by 1 participant. The results are presented in two primary thematic areas, each with multiple subthemes that emerged from the analysis of qualitative interviews. These themes encapsulate the complex interplay of healthcare access, mental health, social support, educational opportunities, living conditions, and aspirations amidst the pandemic-induced uncertainty.

Theme I: healthcare needs and the impact of the COVID-19 pandemic

Subtheme1: limited access and delays in medical attention

Participants frequently expressed frustrations regarding access to healthcare services. Long waiting times were a common grievance, often exacerbated by harsh conditions. One participant shared,

> *"We usually take an appointment with the doctor; however, we have to wait several hours outside in cold weather, people with us may get infected also."* R5.

TABLE 1 Social and demographic characteristics of the study participants.

	Description	Number of participants
Gender	Men	13
	Women	8
Marital status	Single	9
	Married	12
Accompanying family	With family members,i.e. brother, sister, daughter, son, husband,wife	12
Legal status	Asylum seeker	21
	Application in process	4
	With rejected application/appeal	17
Country of origin	Iraq	18
	Lebanon	1
	India	1
	Srilanka	1

Such experiences highlight the difficulties faced in obtaining timely medical attention. The situation is further complicated for those needing specialized care such as dental care taking into consideration the financial barriers, as another participant noted, *"I could not find a dentist in the camp. I have no money for treatment."* R2.4.

Subtheme2: challenges in communication and gender-specific healthcare needs

Communication barriers during medical appointments were shown, with some reliance on fellow asylum seekers for translation:

> "We have a translator (asylum seeker) who assists us during medical appointments." R10.

> *"The real problem is, the doctor does not understand our language, he gives the same pink pill, a painkiller."* R5.

This *ad-hoc* arrangement raises concerns about the accuracy and confidentiality of medical information. Furthermore, the lack of gender-specific healthcare services was a significant issue, particularly for female asylum seekers, as indicated by the absence of adequate facilities for their specific health needs*: "We need a gynecologist, unfortunately, we do not have one here." R10.*

Subtheme 3: direct impact of COVID-19

Testing and isolation protocols

The response to COVID-19 within the camps included regular testing and isolation of positive cases. One participant described the procedure: *"…they do COVID-19 testing, if they find a positive result, they move the infected ones into isolation wards."* R18.

While this indicates some level of proactive measures, the effectiveness and implementation of these protocols remain a concern.

Regarding the COVID-19 related information a participant expressed that the information was printed only in Lithuanian language.

> *"We have limited access to information about COVID-19…. all information was in Lithuanian language."* R9.

Vaccination and preventive measures

The approach to COVID-19 vaccination was described as optional, with participants having the choice to be vaccinated: *"Yes, we took the vaccine, they took the names of those who want to be vaccinated, it was optional, not obligatory."* R13.

However, preventive measures within the camps, especially regarding social distancing, were found lacking. One participant highlighted this concern: *"We panicked, although we received masks and hygiene, there was no social distance."* R14.

Subtheme 4: mental health crisis amidst uncertainty

The mental health impact due to the prolonged pandemic-related uncertainty and restrictive living conditions was significant.

One asylum seeker articulated their distress, saying.

"I am very stressed and emotionally exhausted, this is my eleventh month in this camp, I am not allowed to get out of it…" R13 Such statements reflect the psychological turmoil experienced. Mental health concerns on the asylum seekers children *"All refugees have psychological conditions, even my little child, he is so tired, feeling depressed."* R11.

Theme II: social needs and aspirations amidst pandemic-induced uncertainty

Subtheme 1: impact on asylum application processes

A critical systemic effect of the pandemic where there are delays in assessing the asylum application, as highlighted by participants, was its impact on asylum application procedures. One interviewee succinctly captured this issue: *"The pandemic affected the processing of our asylum applications, causing delays."* R12.

Subtheme2: language learning opportunities and challenges

One of the prominent challenges faced by asylum seekers in Lithuania, as revealed by our findings, is the inconsistency and inaccessibility of language education. The struggle to learn the local language in an environment lacking structured educational support is heard in the voices of the participants.

An issue impacting language acquisition for asylum seekers is the lack of consistent scheduling for language classes. Participants expressed frustration with the erratic scheduling, which disrupts the learning process.

One asylum seeker articulated this challenge: *"We want to learn the language, but we do not have a timetable for classes. Every time, they schedule it differently."* R16.

This lack of regularity and predictability in language education further compounds the difficulties faced by asylum seekers in adapting to their new environment.

The mental strain and exhaustion experienced by asylum seekers significantly hinder their ability to engage in language learning effectively. This is poignantly captured by a participant's statement: *"mastering the language is important for us, however, we do not have a relaxed mindset, we are emotionally exhausted, we have a distributed state of mind, we do not focus on what they say during the class."* R11.

This quote underscores the interplay between mental health and the ability to benefit from educational opportunities.

Subtheme 3: challenges in living conditions and basic needs

The quality of food and nutrition emerged as a significant concern among the asylum seekers interviewed for our study. Participants drew attention to several critical issues pertaining to the meals provided in the reception centers. A key aspect highlighted was the lack of variability and cultural sensitivity in the diet offered. In reception centers managed by social services, participants are involved in preparing their own meals, allowing for some degree of personalization. However, in other reception centers, particularly those under the supervision of the army, meals are provided with little consideration for individual dietary preferences or cultural

practices. This lack of customization is particularly problematic for individuals from diverse cultural backgrounds who might have specific dietary restrictions, such as not eating certain types of meat or avoiding pork.

> *"No halal food, they feel irritated when we ask them for that."* R6.
>
> *"Indian people do not eat beef, but they serve it here…One social worker tried to change the food for us."* R16.

The living conditions in the camps, particularly during the pandemic, were described as inadequate and challenging. One participant noted, highlighting the lack of facilities. *"We share kitchens with many families, it is overcrowding…We have many refugees, unfortunately, we do not have enough facilities."* R14.

The cramped and overcrowding spaces were also a major concern, as another participant described: *"The living conditions here are very bad. I live in a small room with 16 people."* R16 pointing to the physical constraints, privacy concerns and discomfort experienced.

Subtheme 4: restricted freedom and its psychological impact

The restrictions on freedom of movement within the camps had a significant impact on the asylum seekers. The longing for autonomy and better living conditions was palpable in their narratives.

> *"We live in an uncertainty, we kept detained for almost six months now, they did not provide any information regarding the detention period…. even if everything will be available here in this camp, we want our freedom back, that's our only Need"* R14.
>
> *"They treat us as if we are criminals, not refugees. We do not know when we will leave this camp, we do not hold any information to stand for."* R17.

In spite of the many challenges, the aspirations and hopes of the asylum seekers for a better future remained undiminished. Their narratives reflected a determination to overcome the barriers they faced. The deep desire for a better life was also evident: *"We desperately need people who can consider the situation we are going through every day… we want our freedom back, that's our only need."* R10.

Discussion

The study's findings-which encompass healthcare access, mental health, language barriers, and living conditions-offer profound insights into the complex realities faced by these individuals. The insights gained from this study not only echo existing research but also uncover new layers of challenges exacerbated by the pandemic. This includes the direct impact of COVID-19, the mental health crisis fuelled by prolonged uncertainty, the struggles with language learning in an already stressful environment, and the systemic effects on asylum application processes. Furthermore, we explored how these challenges aligned with the Social Determinants of Health (SDH) framework, offering a comprehensive understanding of how various socio-economic and political factors shape the health outcomes of undocumented migrants and asylum seekers.

The findings of our study align with the broader landscape of existing research on the health and social needs of undocumented migrants and asylum seekers, particularly focusing on the challenges amplified by the COVID-19 pandemic (1, 35, 36). Undocumented migrants are a vulnerable population group in the context of the COVID-19 pandemic due to increased risk of infection, severe morbidity, and mortality. Studies show that in other countries the pandemic disproportionately affected refugees and asylum seekers, leading to higher rates of COVID-19 transmission and mortality, exacerbated by disparities in healthcare access (1, 37). This underscores the need for policy reforms that prioritize equitable healthcare access, particularly in crisis situations. Our analysis reveals a complex interplay of factors affecting the well-being of this vulnerable group, encompassing healthcare access, mental health, language learning opportunities, and broader social and legal aspects of their lives in Lithuania.

The direct impact of COVID-19 observed in our study correlates with findings from modeling studies (38, 39), which have identified significant challenges in implementing effective testing and isolation protocols in camps housing migrants and refugees. Additionally, these studies note that refugees often face limited access to essential health services and humanitarian aid, including food, water, and shelter (40). An additional concern is the restricted availability of personal protective equipment, such as masks and gloves, in typical refugee settlements (41). This limitation is critical in efforts to prevent the spread of COVID-19 among refugee populations. Our study further underscores these challenges, highlighting the complexity and inadequacy of preventive measures, particularly the scarcity of masks and the absence of social distancing practices. These findings point to a significant gap in the comprehensive implementation of health policies designed to protect asylum seekers during the pandemic. Healthcare providers and social service professionals must receive cultural competency training to effectively address the needs of undocumented migrants and asylum seekers. Understanding the cultural nuances, language preferences, and unique challenges faced by this population is essential for providing equitable and effective care (20, 42).

The significant mental health impact due to prolonged uncertainty and restrictive living conditions reported in our study adds to the growing body of evidence on the mental health challenges faced by migrants (16, 43). Our study contributes to this discourse by linking these mental health challenges interplay with pandemic-related stress, and living conditions thus highlighting the need for targeted mental health interventions that are responsive to the unique circumstances of asylum seekers.

The struggles with language learning and the lack of consistent educational opportunities for asylum seekers, as revealed in our study, offer insights into the overlooked aspect of migrant integration challenges. Our findings indicate a deficit in structured language education, exacerbated by mental stress and unpredictable scheduling. This underscores the necessity for more robust language education programs, tailored to the needs and mental well-being of asylum seekers. Innovative educational practices for language learning among asylum seekers, can include blended learning (44), culturally responsive teaching (45), leveraging technology (46),

community-based learning (47), and peer learning (47). These approaches, such as combining online and traditional classroom experiences, adapting content to cultural contexts, and using digital tools for language acquisition, enhance learning effectiveness. However, they necessitate sufficient support in terms of technology access, specialized teacher training, and financial resources to be successfully implemented.

Our study uniquely highlights the systemic impact of the pandemic on the asylum application process, an aspect less explored in previous research. The delays in processing asylum applications, as indicated in our study, reflect broader systemic issues that extend beyond immediate health and social needs, impacting the legal and prospects of asylum seekers. These challenges call for increased investment in asylum systems to address backlogs and ensure fair treatment of asylum seekers (48). The finding is crucial for understanding the full spectrum of challenges faced by this group during the pandemic. Our insights into the living conditions and aspirations of undocumented migrants and reinforce the call for policy changes to improve living standards.

In our study on the healthcare and social needs of undocumented migrants and asylum seekers, we meticulously navigated instances of contradictory data, which revealed the intricate and diverse realities of this group's experiences. Notably, we observed divergent perspectives on the accessibility of healthcare services; some participants described satisfactory access, while others pointed to substantial barriers. Rather than overlooking these disparities, we engaged in a thorough analysis to uncover the nuanced dynamics at play, enriching our understanding of the participants' multifaceted experiences.

This deliberate examination allowed us to spotlight critical inconsistencies, particularly in healthcare accessibility and the efficacy of communication with healthcare providers. Our acknowledgment of these contradictions was instrumental in crafting a detailed portrayal of the undocumented migrants and asylum seekers' lived realities. It facilitated the development of more granular themes, enriching our insights and ensuring our findings faithfully represent the wide spectrum of experiences encountered by our study population.

Furthermore, this meticulous approach underscored our dedication to presenting an authentic and comprehensive analysis of the challenges these individuals face. It highlighted our commitment to contributing substantive, nuanced discourse to the broader conversation on migration and health. Ultimately, by embracing and methodically interpreting contradictory data, we have underscored the importance of designing bespoke interventions that recognize and address the varied needs and experiences of undocumented migrants and asylum seekers, advocating for solutions that are as multifaceted as the challenges they face.

Social determinants of health (SDH) framework

Our study's findings can be comprehensively analyzed through the lens of the Social Determinants of Health (SDH) framework, particularly considering the unique experiences of undocumented migrants and asylum seekers. This framework, developed by the Commission on Social Determinants of Health (CSDH) of the World Health Organization, provides a robust model for understanding the complex interplay of various social, economic, and political factors that influence health outcomes.

Our study's findings reveal how host country policies intricately shape healthcare accessibility for undocumented migrants and asylum seekers. These policies, often not tailored to the unique needs of this populations, result in significant healthcare disparities. This aligns with the SDH framework's assertion that political systems and socioeconomic factors critically shape health (26). For instance, the lack of policy provisions for language interpretation services in healthcare settings, as highlighted in our study, can be seen as a direct outcome of these structural determinants.

The SDH framework posits gender and racial discrimination as key determinants of health inequities. Our study underlines this by documenting instances where female migrants and those from certain ethnic backgrounds faced additional health challenges. These findings resonate with the SDH emphasis on the role of societal discrimination in shaping health outcomes (26).

The harsh conditions in the undocumented migrant asylum seekers camps, coupled with socio-psychological stressors such as anxiety due to uncertain legal status, reflect the SDH's intermediary determinants. Our study's findings on the mental health crises exemplify the impact of these environmental and socio-psychological factors on health outcomes, a correlation strongly emphasized in the SDH framework (26).

The limited access to healthcare services and constraints in making healthy lifestyle choices, as highlighted in our study, fall under the intermediary determinants of health. These factors contribute to unequal exposure to health risks and services, aligning with the SDH framework's assertion on the role of healthcare systems and behavioral factors in health inequities (26).

Consistent with the SDH framework, our study positions immigration itself as a determinant of health. The undocumented migrants and asylum seekers experiences, marked by challenges such as adaptation to new environments and precarious legal status, interplays with other social determinants, influencing health outcomes. This perspective broadens the scope of SDH, highlighting the need for health policies and practices to consider immigration status as a critical factor in health equity.

Recommendations

Healthcare services

It Is important to establish healthcare services that are culturally sensitive and linguistically tailored to the needs of undocumented migrants and asylum seekers. This initiative should include training for healthcare providers in cultural competency and offering language translation services. It's also imperative to implement healthcare services that address the unique needs of female asylum seekers, including reproductive health and support for survivors of gender-based violence. Additionally, to create dedicated services to cope with mental health problems and cater to the psychological stresses experienced by this group. Moreover, enhancing healthcare access for undocumented migrants and asylum seekers by reducing waiting times, offering mobile health clinics, and providing specialized medical services is crucial. Establish outreach programs to educate

undocumented migrants and asylum seekers about their rights to healthcare services and how to access them. Use community leaders and organizations to facilitate trust-building and communication.

Social services and integration

It is crucial to provide consistent and structured language education programs to facilitate the integration of asylum seekers and migrants into society. Address living conditions in asylum centers by improving aspects such as reducing overcrowding, enhancing the quality of nutrition, and respecting cultural dietary preferences. Create and maintain social support networks that provide emotional support, legal advice, and assistance with navigating healthcare and social services. Ensuring the ability to practice cultural and religious traditions helps maintain a connection to their heritage and supports psychological wellbeing. Spaces where cultural and religious practices can be freely observed are important for community cohesion. Conduct workshops and seminars to raise awareness about the cultural backgrounds of undocumented migrants and asylum seekers among the local population to foster a more inclusive community. Advocating for the rights and needs of undocumented migrants and asylum seekers at local and national levels. The ability to work legally and under fair conditions is a critical need. Initiatives to provide vocational training and job placement services can help undocumented migrants gain employment that offers dignity and a living wage.Use media campaigns to raise awareness of their challenges. Furthermore, policies restricting the freedom of movement within asylum centers should be reviewed and revised to promote better psychological health and autonomy.

Policy and advocacy

Streamlining the asylum application process is essential, ensuring efficiency and transparency, especially considering the challenges posed by the COVID-19 pandemic. Advocating for inclusive health policies that recognize and address the unique challenges faced by undocumented migrants and asylum seekers is necessary. It is recommended to engage migrant communities in decision-making processes to ensure their needs and voices are represented and empower them through community leadership programs. Foster partnerships between governmental bodies and NGOs to create integrated support systems for migrants. Additionally, collaboration with NGOs and international organizations is vital to provide comprehensive support. Increase funding for public health services and NGOs working with undocumented migrants and asylum seekers to ensure they have the necessary resources to meet their healthcare and social needs. Continuous research and monitoring of the evolving health and social needs of undocumented migrants and asylum seekers will ensure the effectiveness and relevance of services and policies. Public awareness campaigns should be conducted to increase understanding and empathy for the challenges faced by migrants and asylum seekers. Offering legal assistance to asylum seekers and undocumented migrants, along with advocating for their rights and equitable treatment, is also fundamental.

Strengths and limitations

Strengths of the study

Our study employed the Social Determinants of Health framework, offering a comprehensive lens through which to view the health inequities experienced by migrants and asylum seekers in Lithuania. This approach allowed for a nuanced understanding of the complex interplay of social, economic, and political factors influencing health outcomes in this vulnerable population.

The focus on undocumented migrants and asylum seekers, particularly during the COVID-19 pandemic, provided valuable insights into the experiences and needs of a group often overlooked in health research. The qualitative methodology, involving semi-structured interviews conducted in languages familiar to the participants, ensured a depth of understanding and cultural sensitivity in data collection.

The use of Atlas.ti for thematic analysis underscored the methodological rigor of our study, enabling a systematic and detailed examination of the interview data. The diversity in participant demographics enhanced the richness and applicability of our findings within the context of Lithuania.

Limitations of the study

Despite these strengths, our study has limitations. The specific focus on Lithuania limits the generalizability of our findings to other contexts or migrant populations. An additional limitation is that our study only included participants proficient in Arabic or English, excluding other asylum seekers who might have provided diverse perspectives but were unable to participate due to language constraints. Furthermore, our study focused exclusively on adult individuals, thus excluding children. This exclusion means that the experiences and needs of a significant segment of the asylum-seeking population in Lithuania, particularly those of children who often face unique challenges, were not explored.

While this study offers important insights into the healthcare and social needs of undocumented migrants and asylum seekers in Lithuania, particularly in the context of the COVID-19 pandemic, the findings should be interpreted with these limitations in mind. The strengths of the study lie in its comprehensive approach and focus on a vulnerable population, while its limitations point to areas for further research and methodological refinement, including the experiences of children and non-Arabic or English-speaking migrants.

Conclusion

In conclusion, our study contributes to the understanding of the challenges faced by undocumented migrants and asylum seekers in Lithuania, particularly in the context of a global pandemic. It highlights the urgent need for comprehensive policies and practices that are grounded in the principles of equity, compassion, and human rights. The intermediary determinants, such as living conditions, psychological stressors, and healthcare system factors, have further exacerbated their vulnerabilities, as evidenced by the mental health challenges and restricted access to essential services.

Healthcare services must be culturally sensitive and linguistically accessible, catering to the specific needs of diverse groups-including women and children. Additionally, social services, including language education and assistance with integration into the host society, are crucial for fostering a sense of belonging and community.

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.

Ethics statement

The studies involving humans were approved by the Ethical committee of the Department of Nursing of the Institute of Health Sciences of the Faculty of Medicine of Vilnius University (150000-KP-47). The studies were conducted in accordance with the local legislation and institutional requirements (49). The participants provided their written informed consent to participate in this study.

Author contributions

RA: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Supervision, Writing – original draft, Writing – review & editing. RU: Formal analysis, Investigation, Methodology, Project administration, Software, Writing – review & editing. AJ-A: Formal analysis, Investigation, Methodology, Writing – review & editing. MS: Formal analysis, Investigation, Methodology, Writing – review & editing. DA: Formal analysis, Investigation, Methodology, Writing – review & editing. EB-V: Formal analysis, Investigation, Methodology, Writing – review & editing. ER-A: Formal analysis, Investigation, Methodology, Supervision, Writing – review & editing. NI: Conceptualization, Formal analysis, Investigation, Methodology, Supervision, Writing – review & editing.

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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.

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Appendix 1: Glossary on Migration

Term	Meaning
Asylum seeker	An individual who is seeking international protection. In countries with individualized procedures, an asylum seeker is someone whose claim has not yet been finally decided on by the country in which he or she has submitted it. Not every asylum seeker will ultimately be recognized as a refugee, but every recognized refugee is initially an asylum seeker.
Internally displaced persons	Persons or groups of persons who have been forced or obliged to flee or to leave their homes or places of habitual residence, in particular as a result of or in order to avoid the effects of armed conflict, situations of generalized violence, violations of human rights or natural or human-made disasters, and who have not crossed an internationally recognized State border.
Migrant	At the international level, no universally accepted definition for "migrant" exists. The term migrant was usually understood to cover all cases where the decision to migrate was taken freely by the individual concerned for reasons of "personal convenience" and without intervention of an external compelling factor; it therefore applied to persons, and family members, moving to another country or region to better their material or social conditions and improve the prospect for themselves or their family. The United Nations defines migrant as an individual who has resided in a foreign country for more than one year irrespective of the causes, voluntary or involuntary, and the means, regular or irregular, used to migrate. Under such a definition, those travelling for shorter periods as tourists and businesspersons would not be considered migrants. However, common usage includes certain kinds of shorter-term migrants, such as seasonal farmworkers who travel for short periods to work planting or harvesting farm products.
Refugee	A person who, "owing to a well-founded fear of persecution for reasons of race, religion, nationality, membership of a particular social group or political opinions, is outside the country of his nationality and is unable or, owing to such fear, is unwilling to avail himself of the protection of that country.
Undocumented migrant	A non-national who enters or stays in a country without the appropriate documentation. This includes, among others: a person (a) who has no legal documentation to enter a country but manages to enter clandestinely, (b) who enters or stays using fraudulent documentation, (c) who, after entering using legal documentation, has stayed beyond the time authorized or otherwise violated the terms of entry and remained without authorization.

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Increasing perceived health and mental health literacy among separated refugee Ukrainian families with urgent needs occasioned by invasion—a group intervention study with participatory methodology in Sweden

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Background: With the increasing numbers of refugees from Ukraine affected by the ongoing war, there is a high risk of trauma-related stress due to low local health and mental health literacy care. Perceived good health is a human right. Earlier studies show that intervention for refugees can reduce and prevent post-migration stress and anxiety. The present explorative study aimed to investigate the feasibility and effectiveness of a short, trauma-focused group intervention (in Swedish "hälsoskola") for Ukrainian-speaking refugees (EU's mass refugee directive). This intervention was part of an ESF project aiming to get the subjects closer to the labor market in Västernorrland County, Sweden.

Materials and methods: A mixed-methods design, a participatory methodology, and an evaluation were used. Data were obtained with a short questionnaire in Ukrainian. It included a visual analogue health-rating scale, an observation, and an oral evaluation in groups. For practical and ethical reasons, there was no control group. Each group met five times for 2 h, a total of 10 h excluding pre- and post-assessment. There were eight sets of five group sessions per set, a total of 40 sessions. Brief initial and concluding breathing exercises sought to reduce stress among the participants.

Results: Baseline data were obtained from 99 participants, mostly females. Data gathered directly after the group intervention from 57 participants who had filled in both the pre- and post-questionnaires showed that (1) perceived anxiety/stress was significantly reduced (chi-2 25,53, df = 4, p < 001). (2) The participants showed significantly better perceived health as assessed on a visual analogue scale (average change from 63.16 to 71.18, $p < 0.001$). This result was supported by the participants' questions, which were qualitatively evaluated using thematic content analysis. Five general themes stemmed from questions raised in dialogue with the participants plus observation with the respective local expert. The participants received answers to their questions, and their perceived negative attitudes to authorities changed to more positive ones.

Conclusion: By dialogue between the participants' needs of knowledge and direct answers by the local expert, respectively, was feasible and effective as they

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perceived trust and health and mental health literacy increased. Implications for primary prevention are discussed.

KEYWORDS

refugees, EU's mass refugee directive, health promotion, trauma, stress, communication, separated families

1 Introduction

Several studies have shown that a prolonged asylum process not only increases the risk of ill health but also increases the risk of failed integration. This, in turn, can lead to segregation, exclusion, and mental illness (1). The ADAPT model (2) recognizes five main psychosocial posts, which may be disordered by conflict, separation, and displacement, i.e., systems of safety and security, interpersonal bonds and networks, justice, roles and identities, and existential meaning and coherence. These posts are stable in societies with peace.

Asylum seekers have specific healthcare needs; however, contextual and structural factors such as barriers to work, housing, and healthcare negatively affect their health and wellbeing. There have been insufficient efforts to address these needs in the reception programs (3).

The World Health Organization (4) report "Mental health of refugees and migrants: Risk and protective factors and access to care" identifies several risk factors such as trauma, violence, discrimination, exclusion, language barriers, and limited socioeconomic opportunities. The report also addresses several protective factors, including access to educational and work opportunities, social support, and cultural connection.

Research on the course of post-traumatic stress disorder (PTSD) after a single potentially traumatic experience shows that about one-third of subjects develop PTSD (5), but many probably have several traumas, so the number can be higher. Regardless of definite numbers, international literature underlines the urgent need for culturally sensitive interventions early in refugee reception centers in host countries to reduce and prevent acute and chronic illness.

A systematic review and meta-analysis of the efficacy and acceptability of psychosocial interventions in asylum seekers and refugees shows that most evidence-supported interventions are based on cognitive behavioral therapies with a trauma-focused component (6). A pilot study in a German reception center with psychotherapeutic group intervention using imaginative stabilization techniques for traumatized male refugees offers a promising and feasible approach to treating refugees in unstable reception-center settings. Existing international literature on evidence-based programs (especially trauma-focused interventions) for new groups of refugees shows research gaps according to existing needs and a lack of healthcare resources. It is also unclear how the study intervention tries to respond to existing needs (7).

Too little is known of how group interventions which reduce the newcomers' distress and anxiety symptoms while strengthening their internal resources and increasing their emotional stability could be developed as routine, and how they could be available in healthcare for asylum seekers and refugees with mental illness due to trauma.

Refugees have been identified as groups having lower health literacy, which may affect healthcare-seeking behavior (8). Health literacy "entails people's knowledge, motivation and competencies to access, understand, appraise, and apply health information in order to make judgments and make decisions in everyday life concerning healthcare, disease prevention and health promotion for themselves and those around them[(9), page 7].

One especially vulnerable group is the Ukrainians who according to the EU's mass refugee directive have received temporary protection in the European countries. The majority are women and children, while the husbands are soldiers in Ukraine. The Russian full-scale invasion of Ukraine on 24 February 2022, has led to one of the largest refugee crises in recent history. Javanbakht (10) addresses the following practical first steps in a host country to reduce the long-term impact of trauma and stress on refugees' mental and physical health and functioning. Steps include mental health first aid, education in mental health, and how to navigate the healthcare system. Furthermore, the literature shows a risk for separated couples to reach the exhaustion stage according to Selye's general adaptation syndrome (11), the consequence of which may be the divorce of the spouses. There is evidence that war trauma influences parenting behavior and women have a 2–3 times higher risk of developing post-traumatic stress disorder (PTSD) compared to men (12).

The effect of such stresses may increase conflict among spouses, family members, children, and close friends. Family coping resources are diminished by long forced separation, physical injury, and mental illness (e.g., negative thoughts). Children will forget their separated parents (often their father), and this situation risks destroying their development and trust. A study among transnational families shows that loss of social support and family cohesion arises when one of the parents migrates (13). Transnationalism relates to the way individuals, through migration, live in new social worlds, and construct social networks beyond their home country. The rapid transformation from one to the other may increase the risk that refugees become poor and marginalized, as well as increasing stress and worries from pre- and post-repatriation, with negative impacts on mental health and wellbeing. Lack of access to resources, and poverty, may be barriers to healing of past traumas (14).

Enhancing health and mental health literacy is of the utmost importance to improve the health and wellbeing of separated families. Unfortunately, there has been limited attention to investigating the means of improving asylum seekers' and refugees' health and mental health literacy through the perspective of families. Family health provides a holistic perspective on the overall wellbeing of the family unit and is an interdisciplinary and complex concept that involves multiple factors.

Given these potential risks of developing social, marital, and health problems among separated Ukrainian couples, it is important

to understand protective factors that may reduce these outcomes. However, to our knowledge, there is yet no literature on perceived health and mental health literacy for Ukrainian refugees. During the 10 years before the COVID-19 pandemic started in early 2020, culturally tailored participatory health promotion group intervention with trauma focus (in Swedish "*hälsoskola*") for newcoming mainly Arabic-, Dari-, and Somali-speaking women with war experiences showed promising results (8, 15–19). Pre–post-evaluation showed that the participants felt less stress and fear about the future and perceived higher health and mental health literacy. From clinical experience in general, primary prevention is today neglected, especially for vulnerable groups in need of care and poorly organized, though the issue is being addressed in many time-limited projects.

1.1 Hypothesis

This explorative study stems from the realization that there is a paucity of data on the health and mental health literacy of Ukrainian refugees (EU's mass refugee directive) in Sweden and postulates that a short trauma-focused group intervention (hälsoskola) for traumatized Ukrainian-speaking refugees reduce their perceived stress and anxiety and have a positive impact on their perceived health.

1.1.1 Aim

For these reasons, the present explorative study aimed to investigate the feasibility and effectiveness of a short trauma-focused group intervention for traumatized Ukrainian-speaking refugees, the majority of women, sheltered in five municipalities in Västernorrland, according to the EU's mass refugee directive.

2 Materials and methods

2.1 Context

This study was part of a social fund project (Care-Ukrainare i Härnösand 2022/00433, www.invandrarindex.se) and was performed in five municipalities in Västernorrland: Härnösand, Sollefteå, Sundsvall, Ånge, and Örnsköldsvik.

STROBE Statement—checklist (20) was used as a guide to reporting.

2.2 Procedure

We used the ADAPT theoretical model developed by Silove (2) and a participatory methodological approach (21) according to the five themes (Table 1). The first author trained and supervised the second and third authors about how to plan, perform, and follow up the group intervention (22). After that, we informed the local coaches and experts, on-site and/or online, weekly. At the beginning of the project, the three authors had a workshop with the local experts and coordinators regarding differences and similarities between Ukrainians and Swedes (see Table 2 for examples).

During a monthly information meeting in each municipality, potential participants received written and oral information in Swedish, Ukrainian, or Russian about the group intervention, in which participation was voluntary. Those who were interested signed consent forms. A local Swedish- and Ukrainian-or-Russian-speaking coach coordinated the intervention in each municipality. The sessions were in Ukrainian and Swedish, sometimes Russian as the participants had Russian as their mother tongue. Each group included approximately 10–12 participants, but for practical reasons outside our control, there could be fewer or more. A group of 12 deaf participants worked with an interpreter in Kyiv on Zoom

TABLE 1 Themes of intervention sessions led by different local experts (could be in different order locally and according to participants' length of stay).

Theme	Local experts
1.	Stress, recovery, and repatriation stress (by the three authors)
2.	Human rights issue (local police) or Migration Agency (local assistant)
3.	Asylum health (local nurse) and student health (local school nurse)
4.	Work options (the Employment Agency)
5.	Social welfare (local social secretary)

The intervention comprised a 2-h session/week for 5 weeks, totally 10 h excluding 1-h information and consent and 1-h evaluation.

TABLE 2 List of examples, experienced differences, and similarities in values between Ukrainians (U) and Swedes (S) before starting the short intervention.

Differences	Similarities
1. Email usage: U prefer phone apps (WhatsApp, Telegram, and Viber) for personal and official communication, while S uses personal email more often.	1. Education: Both U and S attach great importance to education. They have well-established educational systems and both countries have high literacy rates.
2. Cultural diversity: U may have less experience with cultural integration compared to S, leading to communication difficulties.	2. Love of nature and animals: Both U and S deeply appreciate nature. Both countries have much natural beauty, and many people enjoy outdoor activities such as hiking, camping, and fishing.
3. Communication style: U tend to be more direct and straightforward in communication, while S communicates more indirectly and politely.	3. Strong work ethic: Both U and S are known for their strong work ethics. They take their jobs seriously and strive to achieve their goals.
4. Punctuality: U may be more relaxed about timing, while S highly value punctuality.	4. Respect for the boundaries of another persons: Both U and S deeply value personal boundaries and the boundaries of others.
5 Socializing: U place a high value on socializing and spending time with family and friends, while S may prioritize personal space and privacy.	5 Communication with colleagues: Both U and S like to go to coffee/breakfast to chat with colleagues.

(these participants knew sign language in Russian but not Ukrainian).

The three authors usually attended the first of the five weekly sessions to inform and start up. The authors then participated online, as the geographical distance between Stockholm and Härnösand was 430 km and there was no project budget to go by train every week. When being in Härnösand car transport was necessary to go even further during several hours to the other four municipalites. The second and third authors noted questions from the participants and answers from the local experts.

The groups were closed to increase trust during each session. There were eight basic principles: (1) The interpreter had a duty of confidentiality and translated everything said in the room. (2) Everything said in the room stayed in the room. (3) Mobile phones were switched off. (4) Concentration on the here and now and feeling mentally good. (5) Religion and politics as well as economy and housing discussed in other contexts. (6) Hands were raised for questions and comments. (7) "It's a closed group-no one comes or goes." (8) No information was given to authorities (privacy was the main policy, but there were several exceptions such as reporting obligations under Swedish legislation governing professionals).

Each session included a pause for refreshments. At the beginning and end of each session, there was a short breathing relaxation exercise supervised by the second and third authors to reduce participants' stress. The first author has included breathing exercises in the earlier mentioned short group intervention (hälsoskola) toward newcoming refugees and with positive results; reduced perceived stress and anxiety. Perciavalle et al. (23) have shown results obtained from research that support the possibility that the deep breathing technique is capable of inducing an effective improvement in self-reported evaluations of mood and stress and objective parameters (e.g., heart rate and salivary cortisol levels).

2.3 Study design

The design was based on Ranganathan and Aggarwal (24). The study had a mixed-methods design (8). The measures had been developed within earlier projects performing short group intervention (hälsoskola) by the first author and co-authors. Yet no reliability and validity measures have been performed due to time-limited projects and have been explorative for different language groups.

The following assessment points were defined:

- *Baseline measurement of the severity of anxiety/stress symptoms related to perceived health*: The anxiety/stress question had three response options (none, to a certain extent, and to a great extent) with subsequent questions with open-response options: Before: if you feel anxiety/stress, what do you feel is the cause of your anxiety/stress? If you feel anxiety/stress what do you usually do to feel better? Further, estimated perceived health was assessed on a visual analogue scale where 0 represented the worst possible perceived health and 100 the best.
- *Pre–post perceived health and mental literacy:* If you feel anxiety/stress, what do you experience after the group intervention are the causes of your anxiety/stress? What knowledge and tools have you gained during the group meetings to feel less anxiety/stress and feel better?
- *Direct after, follow-up symptom-severity measure of perceived anxiety/stress*: We used the same three-option question regarding anxiety/stress as for the baseline measurement to assess symptom reduction. Estimated perceived health was assessed again on a visual analogue scale where 0 represented the worst possible perceived health and 100 the best.
- *Group dynamics:* Group dynamics were operationalized by estimating activity by the participants who asked questions and made comments in each meeting.
- *Follow-up with individual psychosocial support online under supervision*: The results will be reported elsewhere.

2.4 Participants

2.4.1 Inclusion criteria

Ukrainian people residing for a fixed period in the above five municipalities in Sweden according to the EU mass refugee directive. They were not allowed to seek asylum. They could communicate with relatives daily but at a distance. All these issues were special for this refugee group. At the start of the project, the target group had permission to stay until 4 March 2023. This was then extended to 4 March 2024 and subsequently 4 March 2025.

100 Ukrainian participants, mostly women, participated between 1 October 2022 and 30 September 2023.

2.4.2 Exclusion criteria

Newcomers from other countries, and Ukrainians who had not arrived under the mass refugee directive and lived in other municipalities.

2.5 Translation and back translation as a culturally adapted guideline

The information, consensus, and pre- and post-intervention questionnaires were translated from Swedish into Ukrainian or Russian and back according to WHO's recommendation (25). The material was also culturally adapted and discussed among the three authors.

2.6 Quantitative and qualitative analysis of independent and dependent variables

All statistical analyses used the Statistical Package for the Social Sciences (SPSS) program version 28.0.1.1. Demographic variables and baseline characteristics were analyzed using descriptive statistics (frequencies, means, and standard deviations). *Independent* var*iables*: age, number of children, number of months after arrival, number of moves in Sweden for reasons given by the Swedish Migration Agency, country of birth, mother tongue, status, work in Ukraine, and work in Sweden.

Dependent variables: The anxiety/stress question had three response options (none, to a certain extent, and to a great extent). Perceived health was assessed on a visual analogue scale where 0 represented the worst possible perceived health and 100 the best.

Pre–post-comparison used statistical differences ($p < 0.05$) and correlation with background data (Spearman because the data

distributions tended to be slightly skewed), chi-square test *when comparing two categorical variables,* and paired-samples *t*-test determining whether there is a significant difference between the means T1 and T2.

The answers to the open questions were data-analyzed using content analysis as outlined by Graneheim and Lundman (26). Here, the entire data noted by the second and third authors was read and re-read repeatedly. It was then condensed into meaning units, which were sorted into codes containing the core messages. The codes were revised and sorted into preliminary themes and sub-themes. To increase validity, each of the three authors independently read the notes and discussed them until an agreement was reached.

2.7 Ethical considerations

Several ethical aspects need consideration in this explorative study. First, the study focused on newly arrived Ukrainians rather than patients. Ukrainians arriving under the mass refugee directive may be vulnerable as they have permission to stay for a certain period and cannot apply for asylum, but by detecting those with high anxiety/stress and perceived illness and offering knowledge and tools to increase perceived health and mental health literacy, one may prevent them from becoming patients. It was also important to consider that questions and discussions during the sessions could raise unwelcome feelings for the participants, reminded of situations that they may wish to avoid. In such cases, our subjects were advised to contact health and mental care and/or follow up online individually with the second and third authors, supervised by the first author. The confidence of the participants was also important. They had consented to participate on the condition of staying anonymous. Thus, any information that might reveal their identity was anonymized.

The strength of the study lies in its integration of a participatory methodology (21), based on a need-based trauma approach, with the experience of refugees in Sweden across diverse domains (Table 1) including psychological and social aspects.

The project was approved before the start by the Swedish Ethical Review Authority (2023-00092-02). All participants gave their written informed consent in accordance with the Declaration of Helsinki.

3 Results

3.1 Characteristics

The group intervention included eight sets of five group sessions per set (see Table 1), a total of 40 sessions. During the study period, 100 participants participated at the start of the eight sessions. One participant had to be excluded for private reasons. Ninety-nine participants answered the pre-questionnaire before starting (T1).

The results (T1 and T2) of a drop-out analysis ($N = 42$) showed no significant differences between those who answered the questions and those who did not.

Most of the participants were women (83, 83.8%). Half were married (50, 50.5%); approximately one-fifth (23, 23.2%) were unmarried. Just over one-tenth were divorced (15, 15.2%), and about one-tenth (8, 9.0%) were widows. Average age was 45 years (S.D.13.52). The participants had between no and four children (mean 1.51, S.D. 0.973). They had spent on an average of 1 year in Sweden (range 1–17 months) and had in general moved twice due to Migration Agency decisions, but frequency ranged between 1 and 11 times.

The most common mother tongue was Ukrainian (67, 67.8%) followed by Russian (19, 21.2%) and both Ukrainian and Russian (12, 12.1%). Approximately 9 of 10 were born in Ukraine (89, 89.9%) and the others in Russia or the former USSR.

Before arrival, all participants had been working in Ukraine, for example in industry, healthcare, and service. In Sweden, after arrival most had no paid job (72, 80.9%). One-tenth of the employed worked unqualified in hotels, car wash, or restaurants.

3.2 Measurement of anxiety/stress and perceived health (T1)

At baseline, T1 ($N = 93$) one-fifth (20, 21.5%) felt no anxiety/stress, two-thirds (62, 66.7%) answered that they felt anxiety/stress to a certain extent, and one-tenth (11, 11.8%) largely felt anxiety/stress before the start. Before the intervention, participants reported the cause of anxiety/stress as follows:

> "I've lost my job, my home, my financial stability. I'm in a foreign country."
>
> "I worry about the children and their adaptation."
>
> "War, anxious about my relatives and not sure about my future, new country, do not understand the mentality and culture and always moving in Sweden."
>
> "Psychological, mental, somatic (bad health exacerbation of chronic diseases), internal discomfort, a sense of injustice."
>
> "No opportunity to work and communicate with loved ones."
>
> "I feel fear for my military brothers."
>
> The participants with perceived anxiety/stress before the intervention replied that they did the following to feel better:
>
> "I try to distract myself with everyday life or a movie."
>
> "I communicate with positive people, walk and have fresh air, watch good films."
>
> "I feel better when I watch TV, cook, do something in the kitchen."
>
> "Communication with family."
>
> "I pray, draw and read; I am creative."
>
> "I try to shout."
>
> "I eat sweets."
>
> "I smoke, I listen to music; sometimes I drink alcohol."
>
> "I go to gym, listen to music, dance, watch videos, bite my nails, cry."

> "Spend more time with kids, we go and see new places."

At T1 ($N = 94$), the participants noted their present health on a visual analogue scale from 0 to 100, answering on average 63.16 (SD 22.46, range 10–100).

3.3 Symptoms of anxiety/stress and perceived health (T1-T2)

Directly after T2, nearly one-third (19, 32.8%) felt no anxiety/stress, six of 10 answered that they felt anxiety/stress to a certain extent and a few (2, 3.4%) answered that they largely felt anxiety/stress direct after. Among those who rated in both T1 and T2, the perceived anxiety/stress was significantly reduced (chi-2 25.53, df = 4, $p < 001$).

After the intervention, the participants perceived anxiety/stress as caused by family, social and economic problems, and adaptation problems such as moving around Sweden as required by the Migration Agency and living in a room with strangers, no work, uncertainty about the future, and relatives in Ukraine.

The participants answered that during the intervention they had received the following knowledge and tools to reduce perceived stress/worries:

> "I got contacts I needed, answers to my questions (social, medical), to know the right people, and pleasure from communication."

> "Control of my breathing under stress. I got information from various organizations about their activities: health, safety, and society; what to do act in various problem situations."

> "I have an idea how the health care system works, and the school education system, and where to go in case of need. I also learned to restore my balance with the help of breathing. Thanks to the psychologists for their individual consultation."

At T2 ($N = 61$), perceived health was on average 71.18 (range 50–100, S.D. 15.89). Perceived health significantly improved between T1 and T2 ($N = 57$, $t = -3.136$, df = 56, $p < 0.001$).

The participants found the controlled breathing exercise very useful in between the meetings, and this was also mentioned in the evaluation.

3.4 Spearman's correlation coefficient

There was a positive significant Spearman correlation between age and number of moves; i.e., the younger had had significantly more moves since arrival (−0.257, $p < 0.017$). There was also a positive significant correlation between the number of months in Sweden and perceived anxiety/stress after intervention (0.325, $p < 0.017$).

There was a negative significant correlation between perceived anxiety/stress before and perceived health before the intervention (−0.589, $p < 0.001$) and perceived health before and anxiety/stress after the intervention (−0.274, $p < 0.041$). There was a positive significant correlation between perceived anxiety/stress before and after the intervention (0.449, $p < 0.001$) and between perceived health before and after the intervention (0.528, $p < 0.001$). There was a negative significant correlation between perceived anxiety/stress and perceived health after the intervention (−0.319, $p < 0.015$).

3.5 Group dynamics during eight sets of five intervention sessions

The authors noted that the group dynamics during the total 40 sessions were high; i.e., many of the participants felt trust and asked questions to which they wanted to have answers. This was facilitated by such factors as:

- The participants in most cases knew each other (they were small communities).
- Safety and trust: the rules/policy of the group and the confidentiality of all information were explained before each meeting.
- Primary tension was reduced through initial and concluding breathing practices led by the second and third authors.
- The participants could freely reflect during the meeting (this was facilitated by the open dialogue format of the meetings).
- Active presence of moderators (the second and third authors noted all the questions and answers).
- Emotional expression: The participants openly expressed their feelings and thoughts, which led to a deeper understanding of emotions and contributed to personal growth.
- Support and compassion: The participants offered each other support and compassion. The communal nature of the group allowed people to feel understood and cared for, creating a sense of belonging and reducing feelings of isolation.
- Confidentiality and non-judgment: Confidentiality was strictly enforced within the group, and an atmosphere of non-judgment was cultivated. This allowed participants to share their vulnerabilities without fear of criticism or judgment.
- The participants' preschool children were given a conducive environment to engage in activities tailored to their developmental needs during the sessions. This fostered a supportive setting that acknowledged the challenges faced by their mothers.

3.6 Thematic analysis of participants' questions

Table 3 presents qualitative results from content analysis of participants' questions in dialogue with the respective local expert during each session and noted down by the second and third authors. There were 25 sub-themes, and the five themes were as follows: stress and recovery connected to the invasion, health-concerned lack of knowledge on various levels, lack of human rights knowledge, and lack of contact with preschool authorities, and Swedish social legislation was misinterpreted.

4 Discussion

The study aimed to investigate the feasibility and effectiveness of a short, trauma-focused group intervention (in Swedish "*hälsoskola*")

TABLE 3 Content analysis, in five themes (columns) and 25 sub-themes of the questions raised by the hälsoskolan participants regarding the EU mass refugee directive ($N = 100$, 8 sets of 5 group sessions per set, a total of 40 sessions). New questions added during the dialogue with each local expert.

1. Stress and recovery connected to the invasion	2. Health concerned lack of knowledge on various levels	3. Split of human rights knowledge	4. Lack of contact with pre- and school authorities	5. Swedish social legislation is misinterpreted
1.1 Lack of personal anxiety management of relocation by the Swedish Migration Agency.	2.1 Language barrier when contacting medical institutions.	3.1 Ways to contact the police are unknown.	4.1 Concerned with bullying at school.	5.1 What the reasons and procedure are for removing children from the family.
1.2. Unaware of intergenerational effects due to psychological trauma.	2.2 Ambulance services and costs for medical service are surprising.	3.2 Interest in ways and means of self-defense in Sweden.	4.2 Wants to know the role of teachers, facilitators, nurses, psychologists, and others.	5.2 What the funeral procedure is for people under mass refugee directive.
1.3 Loss of social roles and existential crisis is easily freezed.	2.3 Women's health is not prioritized.	3.3 Protection of private property, and territory is central but how?	4.3 Meaning of school attendance as asylum-seeking children have right to attend non-compulsory pre- and school.	5.3 How social assistance and family counselling can be obtained under the directive.
1.4 The problem of divorced spouse and fear for loved ones are escalating.	2.4 Vaccination of adults and children differs between the countries.	3.4 Want knowledge about criminal liability and age.	4.4 Teenagers' working age and kind of work.	5.4 What support a family violence victim can receive.
1.5 Fear to returning home competes with wish to stay.	2.5 Difficulty to contact dentist.	3.5 Peculiar rules for Ukrainian refugees with EU mass directive.	4.5 How extracurricular activities for children are organized.	5.5 Facts about the spread of prostitution, drug addiction, alcoholism.

for Ukrainian-speaking refugees. A mixed-methods design and participatory methodology and evaluation were used to examine how Ukrainian refugees perceived their health before and after the intervention. The hypothesis was confirmed. The short group intervention had a significantly positive impact on perceived health, which significantly reduced perceived stress/anxiety and led to symptom reduction. The results of correlations can be interpreted in terms of stability of stress/anxiety and perceived health, but there is a need for longitudinal evaluation to measure the present state of reduction of mental health problems. The participants also performed brief, controlled breathing exercises to reduce bodily stress on their own in between the meetings. According to the five themes (Table 1), the findings are in line with the ADAPT theoretical model developed by Silove (2) and a participatory methodological approach (21). The dialogue between the participants' needing knowledge and the local expert's direct answers may have been a key to increased perceived health and mental health literacy. Qualitative results from content analysis of participants' questions raised in dialogue with their local expert during the session add supporting details regarding their limbo situation and separation from relatives; while the knowledge gained from the local expert increased their health and mental health literacy and they wanted to learn more. However, due to their perceived limbo situation, unemployment and separation from relatives, they wanted to learn more how to sustain control over perceived anxiety/stress in a follow up (hälsoskola) if possible in the future.

Given the unique demographic composition of the refugee population from Ukraine, characterized predominantly by mothers with children and bereft of spousal support, the study implemented a multifaceted intervention strategy to address distinct needs. Recognizing the intricate challenges faced by these mothers, particularly in the absence of paternal support, the study adopted a need-based approach to trauma during the sessions.

4.1 Discussion of results

Research on the development and course of post-traumatic stress disorder after a single potentially traumatic experience shows that approximately one-third suffer from PTSD (5), but many participants probably have several traumas, so the number can be higher. Swedish healthcare lacks resources to accommodate a third of the Ukrainian's estimated need for health and mental health literacy. For these reasons, health literacy should be central to refugee reception. A study by Wångdahl et al. (27) showed that a substantial number of refugees in Sweden are incompletely health literate and reported less-than-good health and impaired wellbeing; or that the informants had avoided seeking healthcare. Al-Adhami et al. (28) showed in a study in Sweden that extended health communication included in the civic orientation course improves health literacy of newly settled refugees. Thus, preventive intervention is of significance and may increase social inclusion and integration (8) as well as mental health support, for Ukrainian survivors under the EU mass refugee directive. The present short intervention for reducing stress and anxiety may also reduce a second emotional wave when a new trauma arises with the continuation of war following the Russian invasion. Stress-induced disorders, including depression and anxiety, are common and cannot wait until the war is over.

Family coping resources are diminished by long forced separation, physical injury, and mental illness (e.g., negative thoughts). Children will forget their separated parent (often their father) which may hamper their development and trust (13). Findings indicate the significance of engaging families in planning and skill-building to support healthy communication despite separation due to war. Given these potential risks of developing social, marital, and health problems among Ukrainian soldiers, it is important to understand protective factors that may reduce these outcomes and community reintegration into society (28). The integrated approach to reintegration practiced

by the International Organization for Migration (29) recognizes that the complex process of reintegration requires a holistic and a needs-based response at the individual, community, and structural levels.

One potential protective factor may be social support through communication (e.g., phone, WhatsApp, email, and video calls) with a separated significant person or loved one. This may protect against the psychosocial stressors of military deployment. Furthermore, another protective factor is the increase in our subjects' perceived health and mental health literacy through the participatory approach (21). To work with the topic of healthy communication in the field demands knowledge and experience, and this is supported by the WHO (4), statement that "addressing these determinants and enhancing the health of migrants, refugees and other displaced populations are essential goals for global health and sustainable development" (page 1).

The present study shows a need for a scientific and cultural methodological participatory approach (21) to increase perceived health and mental health literacy, by developing resilience through post-migration growth while reducing suffering and minimizing disability for survivors of traumatic life events (30). This should be a priority in the negative and positive components of family communication during displacement, promoting repatriation when possible.

4.2 Discussion of qualitative design

Below, we will discuss the significance of using qualitative methods, as we explored studying a new target group, and the aim has not been studied before.

4.2.1 Subjectivity and power

According to Malterud (31), that researchers do not influence content is a naïve perception, which is rejected in modern scientific theory. A qualitative design seeks to collect knowledge from the participants' own life experiences and is therefore suitable for exploring perceptions, attitudes, and experiences. The second and third author came from the same cultural and language background as the participants, and had field related expertise which increased the contact and trust with the participants. An interpreter was usually in the room during the group meetings and the authors mentioned could check the quality of the translation and explore if they found the interpretation difficult to understand.

4.2.2 Categories

In the qualitative content analysis, the sub-themes were developed from the codes and all three authors independently coded, discussed, and reached consensus during their frequent meetings. Further subcategorization according to, for example, social determinants was performed. However, the participants' stress and worries due to the EU mass refugee directive may have had greater weight than other background factors (education, gender, and socioeconomic status).

4.3 Strengths and limitations

The strength of the study is that the second and third authors have the same background and languages (Ukrainian and Russian), were educated in psychology mainly in the home country, and were supervised by the first author. They telegrammed the participants the day before the group meeting, and this promoted trust. The participants had high perceived trust in them but less in local and national authorities. The participants were given PowerPoint presentations translated by the second and third authors during each group meeting, and this may also have increased health and mental health literacy.

Further, to evaluate qualitative studies, an assessment of their reliability is central (trustworthiness). Graneheim and Lundman (26) take up three different aspects of trustworthiness as central: credibility, dependability, and transferability. Credibility concerns whether the chosen design is suitable to answer the aim and whether the analysis was performed expediently. We used qualitative content analysis as suitable for our aim, and there was an ongoing collaboration between the three authors, with triple coding and comprehensive discussion of categorization. To increase validity, each of the three authors independently read the notes and discussed them until an agreement was reached.

Dependability refers to changes in the material and analysis over time. As the project lasted only 11 months, our data are presumed to reduce the risk of changes in the analysis.

Transferability refers to whether the material can be transferred to other groups and contexts. To validate transferability, we informed newcomers about our experience in the project, and many were interested in participating. The validity of the assessment of mental health seems to be promising in the explorative study as pre- and post-assessments of stress/anxiety and perceived health showed improvements, which have also been shown in earlier studies by the first author and colleagues (8).

Limitations were the geographical distance between the participants and the three authors. This was solved by using Teams during four of the five meetings. However, Teams was not always optimal. Furthermore, due to the project's time limitation we were unable to follow up on the perceived health and mental literacy after 6 months or longer or to assess whether the participants could find a job related to their increased perceived health and mental literacy. Therefore, we were unable to study the theory of "the healthy migrant effect." This states that the person who emigrates shows better health both compared to the population in the home country and to the majority population of the new country upon arrival. That there is then a deterioration in health indicates that something happens during or after the migration that affects the individual's health negatively (32). Further, as the study was explorative the limitations regarding representativity and social desirability were not feasible to study.

4.4 Implications

According to Kumar et al. (1), migrant health research in the Nordic countries has yet not been prioritized and health policies and practice, especially long-term national plans, often exclude migrants and implications for policy and practice that could enable societal conditions to reduce avoidable health inequalities.

Up until now, and to our knowledge, Swedish refugee reception (The Swedish Migration Agency, Ministry of Foreign Affairs, SIDA) has rarely targeted these problems in the repatriation process and community reintegration (33). There is an urgent need to develop an

intervention to improve partnership quality and reduce the stressors that Ukrainian displaced partners and their children face. We do not know when the invasion by Russia will be stopped. What is needed is to examine whether couples' perceptions of positive or negative communication moderate the relationship between how frequently they communicate during separation and their mental distress.

4.5 Future research

According to the EU mass refugee directive on the time limit for stay (4 March 2025), the Tidal Agreement emphasizes repatriation and the build-up of infrastructure in Ukraine, highlighting trust and cohesion between separated couples to reduce mental distress, is also of importance. However, to our knowledge, this has yet not been studied. Further, a planned explorative study will approach collaboration, train-the-trainer, and dialogue online and as soon as real life permits, exchange with trauma centers in Ukraine.

5 Conclusion

The present co-creation short group intervention with separated Ukrainian families seems to be feasible and effective for increasing health and mental health literacy. It will promote prevention options for future repatriation. A better understanding of the individual and collective needs of newcoming Ukrainians will allow specialists in many areas to help people faster and better, also considering national characteristics. It is important as many Ukrainians have already become part of Swedish society.

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 humans were approved by Swedish Ethical Review Authority (2023-00092-02). The studies were conducted in accordance with the local legislation and institutional requirements. The ethics committee/institutional review board waived the requirement of written informed consent for participation from the participants or the participants' legal guardians/next of kin because informed consent is obligatory when you apply for ethical approval. Written informed consent was obtained from the individual(s) for the publication of any potentially identifiable images or data included in this article.

Author contributions

SE: Formal analysis, Investigation, Validation, Writing – original draft, Writing – review & editing. OG: Formal analysis, Investigation, Validation, Writing – review & editing. YS: Formal analysis, Investigation, Validation, Writing – review & editing.

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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

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The refugee and migrant health "global competency standards for health workers": results of a survey in general practitioner trainees in Sicily

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Background: Refugees and migrants may represent the most vulnerable communities in many societies. Health systems should be sensitive to needs of refugees and migrants. The document "The Refugee and Migrant Health: Global Competency Standards for Health Workers (the *Standards*)" identifies the competencies and areas of practice of health workers working with refugees and migrants. The aim of this study is to provide an analysis of these competences and training needs, identifying the educational priorities for the implementation of the *Standards* in Sicily, Italy.

Methods: A cross-sectional analytical pilot study was conducted by administering a questionnaire, in electronic format "Google Form ®," to doctors attending the Medical Training Course for General Practitioners in Sicily (Italy). Data obtained were collected in a Microsoft Excel database and analyzed with IBM SPSS Software 24 version. Absolute and relative frequencies were calculated for relevant categorical variables. Univariate analysis of the selected variables was subsequently carried out. The significance level chosen was a p value <0.05 (two-tailed).

Results: A total of 192 General Practitioner (GP) trainees responded to the questionnaire. They were asked if their training course comprised a Global Health Course that included the topic of health protection and social and health care for migrant populations and the 65.4% of them answered "No" or "Do not Know." GP trainees were also asked if they considered useful to include a Global Health Course dedicated to the management of patients with a migratory background within the training course in general medicine. Of the total 192 participants, 81.9% answered "Yes." Overall, in a simple regression model, the perception of having addressed migrants' health needs is positively correlated with having attended a Global Health Course (OR = 3.34 95%CI 1.2–9.1; p = 0.018).

Conclusion: This study identified educational priorities for the implementation of the *Standards* in Sicily for doctors attending the Medical Training Course for General Practitioners. We hope that the results of this study will guide and inform possible future projects to implement the *Standards* at a national level.

KEYWORDS

competency frameworks, public health, cultural sensitivity, health service utilisation, migrants, refugees, cultural competence

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1 Introduction

Refugees and migrants may represent the most vulnerable community in many societies. Too often they live in conditions of low security, on the fringes of society, in fear of deportation and without access to a reasonable level of essential services, including health services. They may suffer discrimination, social exclusion, negative attitudes, and stigmatizing stereotypes. All countries should aspire to build strong health systems, supported by a well-trained, culturally sensitive, and competent health workforce capable of responding to the needs of all. In this paper we refer, unless otherwise specified, to both groups of migrants and refugees. Regarding the definition of the two categories, the definition of a refugee is outlined in Article 1 of the 1951 Convention Relating to the Status of Refugees, which states: "For the purposes of this Convention, the term 'refugee' shall apply to any person … because of well-founded fear of being persecuted for reasons of race, religion, nationality, membership of a particular social group or for his political opinions, is outside the country of his citizenship and cannot or, due to this fear, does not want to avail himself of the protection of that country; or who, not having a nationality and being outside the country of his previous habitual residence as a result of such events, is unable or, due to such fear, is unwilling to return to it (1)." The term "migrant," according to the International Organization for Migration (IOM), is a generic term not defined by international law, and describes a person who moves away from their usual place of residence either permanently or temporarily for reasons related to work, economic, educational, or other motives, whether or not they are present in the host country (2). Therefore, the differences concern the reasons for moving, legal status, and rights to assistance and protection.

Migrants are granted a different legal status based on the country in which they stay, which may have different interpretations regarding the right and access to essential health services within a given national legislation. However, under international law, such access remains universal for all, in line with the 2030 Agenda for Sustainable Development (SDGs), with Sustainable Development Goal 3 (ensure healthy lives and promote well-being for all at all ages) (3). Health systems should be sensitive to the specific needs of refugees and migrants, also considering the peculiarities of their health problems. Comprehensive national health policies, supported by legislative frameworks and financial efforts, are therefore needed. Furthermore, the need to define and identify consistent standards of competence in practice for health workers providing services to refugees and migrants is becoming increasingly evident. The WHO Health and Migration Department, in collaboration with the "WHO Health Workforce Department," in 2021 identified the need to specifically personalize competences to respond to the different health needs of refugee and migrant populations, issuing the document "The Refugee and Migrant Health: Global Competency Standards for Health Workers (the *Standards*)" (4). This document is strongly aligned with the Global Competency Framework for Universal Health Coverage, developed by the WHO Health Workforce Department to identify the competencies and areas of practice of health workers in primary healthcare, but contains additional specifications for minimum behavioral standards and evidence of effectiveness (5). Competence can be defined as the ability to perform work tasks to a defined standard. It is multidimensional and dynamic, changing with time, experience, and environment, and is equivalent to possessing the competences necessary to carry out specific activities in each context (5, 6). The health workforce competencies and behaviors identified in the *Standards* are organized into five key domains. These are presented in a way that they can be applied to the context and environment in which healthcare workers carry out their work, taking into consideration the requirements and constraints of the local healthcare system and, equally, the peculiar characteristics of the migrant and refugees populations. Countries with a sizable presence of refugees and migrants have adapted their healthcare systems in various ways to meet the needs of these populations. General practitioners (GPs) are the first to come into contact with migrants and are also the first to interpret their needs and direct them towards a correct use of the National Health System (NHS). They play a pivotal role in addressing the healthcare needs of these population groups in Sicily, a region that has seen a significant influx of people due to its geographical proximity to North Africa and the Middle East. These primary care providers serve as the first point of contact within the healthcare system, offering essential services such as initial health assessments, treatment of common illnesses, and management of chronic conditions. GPs are crucial in identifying and addressing specific health issues prevalent among migrants, including infectious diseases, mental health concerns, and the effects of trauma. They also play a vital role in facilitating access to further medical services and coordinating care with specialists. By ensuring continuity of care and integrating health services, GPs may contribute significantly to the overall well-being and integration of migrants into the local.

The aim of this study is to provide an analysis of the competences and training needs regarding the health of migrants and refugees, identifying the educational priorities for the implementation of the *Standards* in Sicily. This study is structured as a pilot study at regional level with the intention of conducting a competence mapping at national level and then proceeded, based on the results obtained, with the implementation of the *Standards*. Doctors attending the Medical Training Course for General Practitioners (herein after referred to as "General Practitioner (GP) Trainees") in the Sicily region (Italy) were identified as the first target for piloting this project. These doctors were asked to respond to a questionnaire regarding healthcare competencies in the care of migrants. The aim was to highlight the critical issues that limit access to care and, above all, to identify potential actions in the field of training as well as political interventions that could address this inequality. Ultimately aims at strengthening the capacity of healthcare personnel through a competences-based approach to provide quality people-centered and culturally sensitive health services to refugees and migrants. The results of this study will guide and inform possible future projects at national level.

2 Materials and methods

In order to map existing competencies, evaluate the educational programs provided and assess the perception of health workers regarding the need for specific courses dedicated to the health of migrants and refugees, a cross-sectional analytical pilot study was conducted through the administration of a questionnaire in electronic format "Google Form ®." The questionnaire was administered to GP Trainees, identified as the first target group for this study. GP Trainees were recruited with the support of the Teaching Directorate of the General Medicine Course for the Sicily Region which took care of

sending the dedicated link, created on Google Form ® platform, to the mailing list of those enrolled. The questionnaire was administered in Italian. The purpose of the study, the treatment methods and the storage and protection of personal data were explained, and the informed consent form was signed and collected. The total number of subjects involved in the study is 275 in the triennium 2021/2024 and includes GP trainees of both sexes who, on a voluntary basis, decided to complete the administered questionnaire. Data was collected from 06/15/2023 to 08/25/2023. A minimum sample size of 161 subjects was calculated to provide 95% power with $\alpha = 0.05$.

The study was approved on 19 April 2023 by the Palermo 1 Ethics Committee. The decision to involve general practitioners in training involves several factors, primarily the fact that their education includes primary care, preventive medicine, and the management of chronic diseases. This leads us to believe that future general practitioners need to handle a wide range of health issues, including those affecting migrant and refugee populations. Furthermore, general practitioners often serve as the first point of contact with the national healthcare system. By focusing on GPs, we can gain insights into how primary care practices can be enhanced to better serve migrant and refugee populations.

2.1 The questionnaire

Participants filled out a questionnaire consisting of 38 questions divided into 5 sections. In the first section (5 questions) socio-demographic aspects are investigated (age, sex, year of the course) and any professional and training experience regarding health and migration issues (frequency of assistance to patients with a migratory background). The second section (9 questions) explored information relating to Global Health courses focusing on the protection of the health of migrants and refugees already attended by the participants and in particular: title of the Course, surname and name of the person in charge of the Course, role of the person in charge of the Course, number of teaching hours, number of credits, year of training in which the Course is included, courses or activities relating to the aforementioned topics outside the university context (Name of the course and body or association responsible for the course). The third section (5 questions) is based on the "Competency Standards" and collects the perception and views healthcare professionals have on their intercultural competencies. Furthermore, the healthcare worker is asked how much he/she deems appropriate and useful for the purpose of his/her profession to acquire specific competences on the management of patients with a migratory background. The fourth section (14 questions) includes multiple choice questions in which the healthcare professional is asked how frequently he believes he meets the health needs of patients with a migratory background. There are also multiple-choice questions by which participants are asked to indicate to what extent they agree or disagree with a series of general statements regarding the way they try to meet their health needs or how much often their competences are in line with good culturally sensitive care practices. In the last section (5 questions) participants are asked to express an opinion regarding the difficulties that can be encountered when the healthcare worker and patient have a different cultural background, and the usefulness of including a course dedicated to the management of patients with migratory background.

2.2 Statistical analysis

The data obtained were collected in a Microsoft Excel database, automatically compiled by the Google Form® online system. Absolute and relative frequencies have been reported for qualitative variables and means and standard deviation (SD) for quantitative variables. In order to assess which factors were associated with the perceived health needs of migrant populations, we used the Pearson's chi-square test and Fisher exact test, as needed.

Furthermore, a bivariable regression model was used to examine the correlations between perception of having addressed migrants' health needs or considering usefulness of including a Global Health Course (dependent variables), and some characteristics of GP trainees such as age, sex, having completed specific training course or clinical practice with people with different cultural background (independent variables). Odds ratios and related 95% confidence intervals (95% CI) were reported as well as the *p*-value. A multivariable regression model was used to analyze the factors associated with usefulness of including a Global Health Course in the training and evaluate the covariates associated at bivariable analysis with a p value equal or lower than 0.05. Adjusted OR and related 95% confidence intervals (95% CI) were reported as well as the *p*-value.

Data were analyzed by IBM SPSS Software 24 version (IBM Corp., Armonk, NY, USA). All *p*-values were two-sided and $p \leq 0.05$ was considered statistically significant.

3 Results

A total of 192 GP Trainees (70% of overall population) filled the questionnaire, administered in the period between 06/15/2023 and 08/25/2023, of which 144 were attending the second and 48 the third year of the Medical Training Course for General Practitioners (75 and 25% respectively). Table 1 reports the characteristics of the study population. The average age of the population is 36.1 (±6.1) years and includes 77 (40.2%) males and 115 (59.8%) females. When asked about the frequency with which they had to deal with patients with a migratory background in clinical practice, 32 (16.6%) GP trainees answered "Never," 46 (23.9%) answered "Almost never," 65 (33.8%) responded "Sometimes" (at least once every 3 months), 36 (18.7%) responded "Often" and 13 (6.7%) responded "Always" (more than once a month). When the residents were asked if their training course included a Global Health Course that covered health protection and social and health care for migrant populations, 65 (33.8%) responded "Yes," 40 (20.8%) "No" and the largest percentage (45.3%) responded that they did not know. The average number of teaching hours dedicated to global health was 6.3(±3.1) for a total of 7.6 (1.2) credits (Table 2).

In the third section (Table 3) of the questionnaire, GP trainees were asked to express their level of agreement with some statements based on the document "Competency Standards," on a scale from 1 to 5. Most of the interviewees said they "strongly agreed" with the statements that concerned the importance of considering the cultural background of the patient in treating her/him, the cultural sensitivity and the ability to communicate in an intercultural perspective as a value for providing better healthcare services, the usefulness, for the purpose of the profession, of acquiring specific competencies on the

TABLE 1 Characteristics of the study population.

Mean age ± SD	36.1 ± 6.1
Sex	
Male	77 (40.1%)
Female	115 (59.8%)
Year of course	
Second	144 (75.3%)
Third	48 (25.3%)
Have you ever, in clinical practice, had to deal with individuals with a migratory background?	
Never	32 (16.6%)
Almost never (1–2 times a year)	46 (23.9%)
Sometimes (at least one every 3 months)	65 (33.8%)
Often (at least once a month)	36 (18.7%)
Always (more than once a month)	13 (6.7%)
Is there a Global Health Course in your Training Course that includes the topic of health protection and socio-health care for migrant populations?	
Yes	65 (33.8%)
No	40 (20.8%)
Do not know	87 (45.3%)

TABLE 2 Global Health Courses.

Course information	
Average number of teaching hours	6.3(±3.1)
Average number of credits	7.6(1.2)

management of patients with a migratory background and the possibility for the Specific Training within the Medical Training Course for General Practitioners to provide deeper knowledge regarding the aforementioned topic.

Table 4 instead shows questions related to the resident's perception of addressing the health needs of people with migratory background. Half of those interviewed reported that only sometimes they felt being able to address the health needs of patients with a different cultural background. More than 50% of those interviewed also responded that they found it more difficult to get in touch with patients with a different cultural background while 20.8% reported that this was often the case. The vast majority of those interviewed (69.2%) support universal access to quality health care, irrespective of the person's legal status and related legal, administrative, and financial barriers to access. More than the half of the GP Trainees (respectively 49.4 and 68.2%) strongly agrees with assisting refugees and migrants to develop their awareness of the right to health. They also agree on supporting them to improve their knowledge of and ability to navigate, the host country's health system and that patients have the right to receive timely, gender- and age-appropriate information, including assistance with communication (Table 5).

The GP trainees were asked if they considered it useful to include a Global Health Course dedicated to the management of patients with a migratory background within the Medical Training Course for General Practitioners: of the total 192 participants the 81.7% answered "Yes." Almost 30% of the respondents (29.6%) considered intra network training the most useful training experience and live experience with a tutor the most useful learning method (52%).

Among those GP Trainees reporting previous experiences in dealing with people with a different background (114), doctors' perception of addressing their health needs is significantly associated with having completed a specific training course on migrant and refugee health ($p < 0.05$).

Overall, in a simple regression model, the perception of having addressed migrants' health needs is positively correlated with having attended a Global Health Course (OR = 3.34 95%CI 1.2–9.1; $p = 0.018$) and with to clinical practice with people with different cultural background (OR = 3.94 95%CI 1.8–8.9; $p = 0.001$).

These significant correlations were also both confirmed in a multivariable regression model. Regardless of gender and age (Table 6).

In a multivariable regression model, among all those interviewed, the inclusion of the course was considered useful by the female GP Trainees (OR 3.0 95%CI 1.4–6.7; $p = 0.005$; Table 7).

4 Discussion

Europe is currently the leading destination of international migration, with 87 million migrants (30.9% of the international migrant population), followed closely by the 86 million international migrants living in Asia (30.5%). North America is the destination for 59 million international migrants (20.9%), followed by Africa with 25 million migrants (9%) (7).

Italy is a country of entry, transit and in some cases arrival for refugees and migrants; it is easy to understand, given its geographical location, that it represents a key entry point for migrants from Africa who want to reach Europe (8). In (7), a 56% increase in sea arrivals, coupled with unprecedented refugee arrivals from Ukraine and increased land arrivals through Western Balkans, put Italy's asylum system under pressure. Most sea arrivals departed from Libya, followed by arrivals from Tunisia and Türkiye. Boats carried people mostly originating from Bangladesh, Egypt and Tunisia. 13,487 land arrivals were intercepted at the Italy-Slovenia border in (7), a 44% increase compared to 2021. People mainly originated from Afghanistan, Bangladesh and Pakistan (9, 10). Other migrant populations significantly present in Italy are: Albanians, Moroccans and Romanians (11).

Primary health care (PHC) in Italy is typically provided by GPs, although in recent years there has been a shift towards an integrated and multidisciplinary approach, with GPs and other health professionals moving to group practices (12).

Nevertheless, GPs are essential in meeting the needs of refugees and migrants by providing initial health assessments, managing acute and chronic conditions, and addressing mental health issues. By coordinating with other healthcare providers and social services, GPs should also help integrate migrants into the healthcare system and the broader community, enhancing their overall well-being. Findings from a study conducted in Australia highlighted the critical role GPs play in the resettlement of refugees and the necessity for greater information and resources to assist GPs in managing refugee health effectively. The study also pointed out several social factors that significantly impact the health of refugees, particularly their psychological well-being (13).

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TABLE 3 Competency standards.

Indicate how much you agree with the following sentences: by giving a grade from 1 to 5. (1 means "I do not agree at all" and 5 means "I strongly agree").						
	1	2	3	4	5	Do not Know
Health service providers should consider a patient's cultural background when treating him/her.	4 (2.0%)	0	23 (11.9%)	46 (23.9%)	113 (58.8%)	6 (3.1%)
Cultural awareness is important in providing best-practice health care.	2 (1%)	1 (0.5%)	12 (6.25%)	39 (20.3%)	131 (68.2%)	6 (3.1%)
Being able to effectively communicate cross-culturally with patients is important to best practice health care.	0	1 (0.5%)	11 (5.7%)	36 (18.7%)	138 (71.8%)	6 (3.1%)
It could be useful for my profession to acquire specific skills on the management of people with a migratory background.	1 (0.5%)	1 (0.5%)	21 (10.9%)	42 (21.8%)	121 (63.0%)	6 (3.1%)
The training course in general practice should provide me more professional knowledge to interact more appropriately with people with a migratory background.	3 (1.5%)	4 (2%)	26 (13.5%)	54 (28.1%)	97 (50.5%)	8 (4.1%)

Addressing these issues requires comprehensive training for healthcare providers to recognize and mitigate the social determinants of health and to advocate for enhanced mental health services and community support for refugees.

A survey conducted in 2019 evaluated the availability of training opportunities focused on the topic of global health in Italian Schools of Medicine and Surgery (14). A total of 38 Global Health courses have been identified, of which 7 are compulsory and 31 are elective. As regards geographical distribution, 9 courses took place in southern Italy, 9 in central Italy and 20 in northern Italy. In our study, when GP trainees were asked if their Medical Training Course included a Global Health Course that included the topic of health protection and social and health care for migrant populations, 65 (33.8%) said answered "Yes," 40 (20.8%) "No" and the largest percentage (45.3%) replied that they did not know. More than 60% of the GP trainees interviewed, therefore, have not attended or do not know whether a course with the aforementioned topic is included in the study plan and the data suggests that both at university and post-graduate training level the topic of global health and social and health care for migrant populations is not sufficiently taken into consideration, especially in Southern Italy (14). At the same time, when the GP Trainees were asked if they considered it useful within the Medical Training Course for General Practitioners to include a Global Health Course dedicated to the management of patients with a migratory background, most of the trainees (81.7%) answered "Yes." Overall, the attendance of a Global Health Course that included the topic of healthcare for migrant populations is positively associated with the perception of being able to meet the health needs of the migrant population (OR = 3.34 95%CI 1.2–9.1; $p = 0.018$).

The need to structure courses dedicated to this topic from which GP Trainees can benefit is clear. In fact, among doctors who have dealt with patients with a migratory background in their clinical practice, the perception of having addressed the health needs of migrants is significantly associated with the attending of a Global Health Course focusing on the above-mentioned issues ($p < 0.05$). The questionnaire may have helped general practitioners understand how much of their education is overlooked, as they are aware of the usefulness of specific training on the above-mentioned issues.

Twenty-nine percent of the interviewed physicians believe that lectures are the most useful training experience, and at the same time consider live experience with a tutor the most useful learning method (52%). Similarly, a significant number of participants to a study conducted in Australia (15) focusing on Sexual and Reproductive Health (SRH) expressed a willingness to engage in further training and acknowledged the lack of training and knowledge in SRH to refugee and migrant women. A study assessing the experience, knowledge, and attitudes of GP trainees towards caring for refugees, asylum seekers, and undocumented migrants, conducted among 30 final year GP trainees in the UK revealed a significant lack of knowledge regarding migrants' health needs and rights to care. The trainees also reported challenges in language barriers and a lack of experience and confidence in caring for this patient group (16). The identification of educational priorities in our study confirm the need for improved training on migrants' health rights and effective communication strategies, as suggested by the UK study.

Suurmond et al. (17) identified specific cultural competences required by nurse practitioners (NPs) working with asylum seekers in the Netherlands. The key competences included knowledge of political and health situations in countries of origin, awareness of the effects of refugeehood on health, and the ability to use interpretation services. Similarly, our cross-sectional analytical pilot study highlighted a significant gap in the cultural competence of GPs attending the Medical Training Course.

In recent decades, in the WHO European Region, the health status of the population has improved a lot, but not equally. Ethnic minorities and some migrant groups and communities may suffer the most. The rapid increase in chronic diseases and mental disorders, the lack of social cohesion, environmental threats and financial uncertainties make improvement in health even more difficult and endanger the sustainability of health and welfare

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TABLE 4 Addressing the health needs of those with different cultural background.

Question	Always	Often	Sometimes	Rarely	Never	Do not know
Do you feel to attend health needs of patients from different cultural backgrounds?	12(6.2%)	52(27%)	96(50%)	17(8.8%)	1(0.5%)	14 (7.2%)
Do you find it more difficult to come into contact with patients with a cultural background different from yours?	4(2%)	40(20.8%)	100(52%)	31(16.1%)	9(4.6%)	8(4.1%)
Do you feel that your cultural background makes some patients from a different cultural background uncomfortable?	4(2%)	16(8.3%)	64(23.9%)	51(26.5%)	44(22.9%)	13(6.7%)

How do you feel that you meet the health needs of patients with a different cultural background? Indicate how much you agree with the following sentences by giving a grade from 1 to 5. (1 means "I do not agree at all" and 5 means "I strongly agree").					
	1	2	3	4	5
I adapt practice to the needs of the person in view of their migration and displacement experiences, taking into consideration the impact of these experiences on access to health care, including barriers to access.	4 (2%)	2 (1%)	43 (22.3%)	71 (36.9%)	72(37.5%)
I Support universal access to quality health care, irrespective of the person's legal status and related legal, administrative and financial barriers to access.	3 (1.5%)	2 (1%)	13 (6.7%)	41 (21.3%)	133 (69.2%)
I assess the level of education and health literacy of the patient with a migratory background.	1(0.5%)	3(1.5%)	927 (14%)	68 (35.4%)	92 (47.9%)
I assist refugees and migrants to develop their awareness of the right to health by supporting them improve their knowledge of, and ability to navigate, the host country's health system.	2 (1%)	1 (0.5%)	33 (17.1%)	61 (31.7%)	95 (49.4%)
Patients have the right to receive timely, gender- and age-appropriate information, including assistance with communication.	1 (0.5%)	1 (0.5%)	15 (7.8%)	44 (22.9%)	131 (68.2%)
I involve qualified personnel, including interpreters and cultural mediators, as appropriate and/or use linguistic and communicative tools that are culturally appropriate and sensitive.	8 (4.1%)	9 (4.6%)	42 (21.8%)	50 (26%)	83 (43.2%)
I try to communicate in simple language, avoiding the use of medical jargon, and ensure that the patients understand the information about their health care taking into account language, communication and health literacy barriers.	0	1 (0.5%)	18 (9.3%)	37 (19.2%)	136 (70.8%)
When transferring a patient to the care of other caregivers, I include, through verbal and/or written communication, information about individual, cultural and linguistic needs, as well as the factors related to the migration process.	3 (1.5%)	4 (2%)	32 (16.6%)	54 (28.1%)	99 (51.5%)
I recognise that the health needs of refugees and migrants may differ from those of the general population.	0	2 (1%)	20 (10.4%)	59 (26%)	111 (57.8%)
I use evidence-based guidelines and standards, where they exist, to address the specific health needs of migrants and refugees, including mental health and psychosocial support, psychological first aid, pain management and medication management.	6 (3.1%)	3 (1.5%)	37 (19.2%)	58 (30.2%)	88 (45.8%)
I participate in the generation of evidence, where possible, to inform the development of guidelines and standards to respond to health needs of refugees and migrants and support the translation of evidence into practice when providing care to refugees and migrants.	24 (12.5%)	14 (7.2%)	49 (25.5%)	45 (23.4%)	60 (31.2%)

(Continued)

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TABLE 4 (Continued)

How do you feel that you meet the health needs of patients with a different cultural background? Indicate how much you agree with the following sentences by giving a grade from 1 to 5. (1 means "I do not agree at all" and 5 means "I strongly agree").					
	1	2	3	4	5
I believe that people with a migratory background may experience discrimination with potential impact on their health status.	9 (4.6%)	9 (4.6%)	35 (18.2%)	51(26.5%)	88 (45.8%)
I continuously adapt clinical practice to meet the needs of patients from a perspective of cultural sensitivity, aware of the impact of culture, beliefs, values and prejudices.	1 (0.5%)	4 (2.0%)	39 (20.3%)	62 (32.2%)	86 (44.7%)

TABLE 5 Usefulness of including a course dedicated to the management of patients with migratory background.

Would you find it useful to include a Global Health Course dedicated to the management of patients with a migratory background within the Medical Training Course for General Practitioners?	
Yes	157 (81.7%)
No	11 (5.7%)
Do not Know	24 (12.5%)
Which training experience would you find most useful?	
Lectures	56 (29.1%),
Professionalisation activities	55 (28.6%)
Intra-network training	57 (29.6%)
Traineeships	24 (12.5%)
Which learning method would you find most useful?	
Live experience with a tutor	100 (52%)
Discussion of cases	32 (16.6%)
Lessons	23 (11.9%)
Simulation	21 (10.9%)
Peer training	10 (5.2%)
Role playing	5 (2.6%)
Narrative approach	4 (2%)
Self-study	4 (2%)
Distance learning	1 (0.5%)

TABLE 6 Factors associated with perception of addressing health needs of patients with a different cultural background at bivariable (Crude OR) and multivariable (Adjusted OR) regression analysis (95% CI: 95% confidence interval).

	Perception of addressing health needs of patients with a different cultural background (Yes vs. No)			
	Crude OR (95% CI)	*p*-value	Adj-OR (95% CI)	*p*-value
Global Health Course in the medical training course for general practitioners				
No	Ref.	0.018	Ref.	0.026
Yes	3.34 (1.2–9.1)		3.26 (1.1–9.2)	
Clinical practice with patients with migratory background				
No	Ref.	0.001	Ref.	0.001
Yes	3.94 (1.8–8.9)		3.96 (1.7–9.2)	
Age				
	Ref.	0.448	Ref.	0.574
	1.02 (0.9–1.1)		1.01 (0.9–1.0)	
Sex				
Male	Ref.		Ref.	0.388
Female	0.89 (0.4–1.9)		0.69 (0.2–1.06)	

systems (18, 19). In Italy, regardless of citizenship and in accordance with art. 32 of the Constitution, all individuals are guaranteed access to the NHS (20). The foreigner who is regularly registered in our country is therefore equal to an Italian citizen in rights and duties if registered in the NHS. Conversely, foreigners in an irregular position, i.e., those without a regular residence permission or in any case without the required requirements, are guaranteed access to health services on a reduced basis, i.e., urgent and continuous outpatient and hospital care, support doctor regarding pregnancy, interventions to protect the health of the minor, vaccination and prophylactic interventions (21). These services are provided with the issuing of specific codes: Foreigner Temporarily Present (STP) for irregular non-EU foreigners; Non-Enrolled European (ENI) for EU citizens in poverty (22). During the COVID-19 pandemic, hundreds of thousands of people, including many migrants, found themselves excluded from protections, mitigation, and prevention programs (for example, swabs and vaccines), refreshments and, probably, also from recovery policies. Inequalities in the health sector for the migrant population must be considered "sentinel" events with respect to the effectiveness of integration policies and signal the urgency of improving the capacity to take charge of the health needs of an entire population (23).

Migration is recognized as a key determinant of health, affecting access to healthcare and interactions with healthcare workers. Furthermore, refugees and migrants face both formal barriers, complex legal rules and policy frameworks, and informal barriers, such as health literacy, low cultural competence of health workers, to achieving adequate healthcare (18). Within the questionnaire, one of the questions concerned the perception of healthcare professionals regarding the feeling of being able to meet the health needs of patients with a different cultural *background:* 60.8% of GP Trainees said they had the perception of meeting the health needs of patients with different cultural *backgrounds* "Sometimes" or "Rarely." The unique health needs of the migrant population call for specific training of health professionals. In this respect, both having carried out clinical

TABLE 7 Factors associated with usefulness of including a Global Health Course at multivariable (Adjusted OR) regression analysis. (95% CI: 95% confidence interval).

	Usefulness of including a Global Health Course (Yes vs.No)	
	Adj OR (95% CI)	*p*-value
Global Health Course in the medical training course for general practitioners		
No	Ref.	0.498
Yes	1.35 (0.5–3.2)	
Sex		
Male	Ref.	0.005
Female	3.0 (1.4–6.7)	
Clinical practice with patients with migratory background		
No	Ref.	0.136
Yes	1.8 (0.8–4.0)	
Age		
	Ref.	0.470
	1.02 (0,9–1.0)	
Feeling of attending health needs of patients with a different cultural background		
No	Ref.	0.470
Yes	1.7 (0.6–4.4)	

practice with patients with a migrant background (OR = 3.96 95%CI 1.7–9.2; $p = 0.001$) and having attended a Global Health Course (OR = 3.26 95%CI 1.1–9.2; $p = 0.026$) are positively associated with the feeling of being able to meet migrant patients' health needs. The health needs of these populations have changed over time, increasingly approaching the needs of the host countries.

The dissemination of the document "*The Refugee and Migrant Health: Global Competency Standards for Health Workers (the Standards)*" offers a contribution to the debate on the education of GP Trainees regarding global health issues both nationally and internationally (4). It is important that this debate is continuously updated with new scientific contributions so that universities can formally recognize the importance of this approach for the education of future healthcare professionals. The cultural debate in this regard has also led to the strengthening of the art. 5 of the Italian Code of Medical Ethics "Health promotion, environment and global health." The article currently states: "The doctor, in considering the living and working environment and the levels of education and social equity as fundamental determinants of individual and collective health, collaborates in the implementation of suitable educational, prevention and fight against health inequalities and promote the adoption of healthy lifestyles, providing information on the main risk factors. The doctor, based on available knowledge, works towards pertinent communication on exposure and vulnerability to environmental risk factors and promotes appropriate use of natural resources, for a balanced ecosystem that is also livable for future generations" (24).

Health professionals must be aware of the importance of the NHS and the legal frameworks that protect migrants in Italy, including their access to healthcare and what are the procedures that allow them to do so. As evidence of this, the inclusion of a Global Health Course dedicated to the management of patients with a migratory background within the Medical Training Course for General Practitioners is considered useful by the majority of respondents and significantly by female respondents (OR 3.0 95%CI 1.4–6.7; $p = 0.005$).

A study by Sørensen et al. (25) explored the essential topics and methods for a short, online course on diversity competence in healthcare. The participants rated the importance and urgency of various educational content areas and teaching methods. The consensus was that training should emphasize the health effects of migration, social determinants of health, and discrimination within the healthcare sector. Reflective practice was highly prioritized, with 'reflection on own stereotypes and prejudices' receiving significant consensus. These findings directly support the need identified by our study, targeting GPs, to enhance their cultural sensitivity and self-awareness. This alignment underscores the relevance of these findings in informing the design and implementation of targeted educational interventions to meet the specific needs identified in the Sicily pilot study.

As mentioned by Rajeshwari and Wright (26) in a study conducted in 2023, effective teaching not only prepares medical professionals to treat migrant patients but also fosters advocacy, sensitivity, empathy, and cultural competence, benefiting all underserved populations. As the first study of its kind, this study provided evidence to support integrating refugee healthcare into medical education, potentially guiding other medical schools, especially in countries hosting refugee populations.

Our research represents an initial exploration into the competencies of general practitioners in addressing the health needs of migrants and refugees. Consequently, the findings should be interpreted as preliminary conclusions. One significant limitation is that the questionnaire developed for this study, although tailored specifically to assess these competencies, has not undergone a comprehensive validation process. Therefore, the generalizability of the results is limited. There is a pressing need for further high-quality studies with larger, more diverse populations to confirm these findings and expand upon them. Comparative studies are also essential to understand how general practitioners' competencies in this area compare across different regions and healthcare systems.

5 Conclusion

Refugees and migrants may have complex health needs due to the impact of migration and displacement on physical and mental health, as well as different health needs. They experience numerous difficulties in accessing healthcare: linguistic and cultural, discrimination and the limited availability of accessible, affordable, and appropriate healthcare services. These factors influence their interactions with healthcare professionals and the healthcare system, making it necessary to develop person-centred and culturally sensitive care. Health workers caring for refugees and migrants should be aware of how experiences of migration and displacement influence individuals' health status and healthcare needs. Offering culturally sensitive care means that the healthcare provider applies their knowledge of the health of refugees and migrants, in such a way as to provide healthcare that meets individual health needs while adapting to the cultural context. Despite its limitations, our study provides important preliminary insights into the competencies of general

practitioners in addressing the health needs of migrants and refugees in Sicily.

This is a critical and important topic, especially considering the new global challenges that characterize our times, such as the lack of social cohesion, climate change and financial uncertainties that aggravate health inequalities and which will contribute to an increase in migratory phenomenon. The issues that emerge from this study are diverse. On one hand, there is a need for future specialists to be prepared to assist a growing population. For this reason, training programs should integrate courses that address the specific health needs of migrants, as well as internships in contexts involving migrants. Additionally, activities such as specific continuing education courses or collaborations with public health experts can be planned. On the other hand, it is necessary that these actions are supported by specific clinical guidelines and effective integration health policies, also through funding and economic incentives. Another fundamental element concerns research in this specific area. Policy should also create inclusion programs that make access to healthcare truly equitable, such as public education programs or awareness campaigns." Our study shows how we are still far from the standard competencies defined by the WHO that our doctors should have and how this is related to outdated training programs. Our research aims to highlight specific health needs and the necessity for adequate and updated training. From the questionnaires evaluated, it emerges that there is a need for clear information for the doctors of the future, who will increasingly deal with an expanding population with sometimes different needs. If the health of migrants and refugees is not preserved, health cannot be defined as global and, as doctors, we cannot, in good conscience, allow ourselves to define it as health.

Data availability statement

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

Author contributions

LC: Conceptualization, Data curation, Investigation, Methodology, Writing – original draft, Writing – review & editing. AP: Conceptualization, Data curation, Investigation, Methodology, Writing – original draft, Writing – review & editing. AC: Conceptualization, Methodology, Writing – review & editing, Formal analysis, Validation, Visualization. CC: Data curation, Writing – review & editing. DG: Writing – review & editing, Data curation, Investigation. NP: Conceptualization, Methodology, Writing – review & editing, Data curation, Investigation. PI: Conceptualization, Methodology, Project administration, Resources, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

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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.

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Does cardiorespiratory fitness moderate the relationship between overweight, cardiovascular risk markers and mental health among forcibly displaced individuals living in a Greek refugee camp?

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Objectives: Refugees may have an increased risk of developing overweight/obesity as they often experience a nutritional transition. Because maintaining good cardiorespiratory fitness can help reduce the negative impact of excess weight on overall health, the objective of this study was to examine whether fitness moderates the relationship between weight status and cardiovascular and mental health outcomes in forcibly displaced individuals living in a Greek refugee camp.

Methods: A sample of 142 forcibly displaced individuals were recruited. Cardiorespiratory fitness was assessed with the submaximal Åstrand-Rhyming bicycle ergometer test. Blood pressure, blood lipids, blood glucose, and hs-CRP were assessed as physical health outcomes, whereas post-traumatic stress disorder, depression and anxiety symptoms, pain, and quality of life were assessed as mental health outcomes. Main and interaction effects were tested via analyses of covariance (ANCOVAs).

Results: Almost 50% of the participants were overweight/obese, more than 60% presented with very poor fitness levels, and the percentage of participants with very poor fitness levels was particularly high among overweight/obese participants. Whereas overweight/obesity was associated with a less favorable body composition and cardiovascular risk profile, poor fitness was associated with a higher percentage of body fat and a lower percentage of muscle mass. Cardiorespiratory fitness did not moderate the relationship between overweight/obesity and most of the assessed health outcomes.

Conclusions: Only limited support was found for the applicability of the fit-but-fat concept to our population of forcibly displaced individuals. Public health services should prioritize measures to prevent overweight/obesity and associated diseases in refugee camps. Moreover, efforts are needed to improve the fitness of camp residents via exercise/sport interventions.

KEYWORDS

cardiovascular risk factors, fitness, mental health, moderation, refugees

1 Introduction

Refugees often face numerous challenges related to healthy nutrition (1), limited access to healthcare (2), and disrupted living conditions (3), which can contribute to the development of overweight and obesity (4). As highlighted by the United Nations Organization (5), safeguarding the health of refugees and migrants is a vital part of achieving sustainable development goal (SDG) 3 to ensure healthy lives and promote well-being for all at all ages. In a recent meta-analysis, the global prevalence rates of overweight and obesity in refugees were estimated to be 29% and 23%, respectively (6). However, the prevalence of overweight and obesity among refugees can vary depending on various factors such as their age, sex, region of origin, living conditions, and length of time spent in displacement (7–9).

Refugees may have an increased risk of developing overweight and obesity as they often experience a nutritional transition when they move from their home countries to a host country (10). Refugees often come from regions with different food cultures and availability (11). When they arrive in a new country, they may find a different range of foods, including those that were not commonly consumed in their home countries. This can lead to changes in their dietary habits as they adapt to the available food options (12). Refugees may also face challenges in adapting to the local food culture in their host countries. While some may try to maintain their traditional dietary practices, others may find it necessary to modify their diets due to the lack of familiar ingredients or cooking facilities (13, 14). In addition, refugees often face economic challenges upon arrival in a new country (15). Limited financial resources may restrict their access to a varied and balanced diet (11). In some cases, refugees may rely heavily on low-cost and processed foods, which can be high in calories, but lacking in essential nutrients (16). In this regard, studies have highlighted that overweight and obese individuals can still suffer from nutritional deficiencies if they consume energy-dense, nutrient-poor foods (17, 18). This can lead to an increased risk of malnutrition and related health problems (19).

As in any population (20), studies in different refugee and migrant populations have shown that overweight and obesity can have detrimental health implications (21, 22). Previous research with refugees revealed that overweight and obesity were associated with a higher risk of developing chronic diseases, including cardiovascular diseases (23), type 2 diabetes (24), and hypertension (25). Prior research has also shown that overweight and obesity can contribute to poor self-esteem (26), body image issues (27), and increased risk of mental health conditions such as depression and anxiety (28, 29). Refugees may already face high levels of psychological stress (30), and weight-related concerns can exacerbate their mental health difficulties (31). Conversely, mental distress can lead to increased food intake and contribute to weight gain (32). In addition, excess weight can strain joints, leading to musculoskeletal problems (33), including pain, arthritis, and mobility issues. Overweight and obese individuals may also encounter reduced physical mobility (34), resulting in a decreased capacity to engage in daily activities and may potentially limit their participation in social and community life within a refugee camp (including participation in physical activity, exercise, and sport) (35, 36). Finally, overweight and obese refugees may face challenges in accessing appropriate healthcare, as the healthcare systems in refugee camps may be overwhelmed, and thus lack resources to effectively address weight-related issues (37–39). It has therefore been concluded that addressing overweight and obesity should be *a priori*ty in refugees, with a focus on nutrition education, access to healthcare services, and physical activity programs (40, 41).

One advantage of promoting regular physical activity might be that it increases cardiorespiratory fitness (42, 43), which has been shown to mitigate the effects of overweight on health (44). While being overweight or obese is generally associated with an increased risk of various health conditions (as highlighted above), maintaining good cardiorespiratory fitness can help reduce the negative impact of excess weight on overall health (45). Cardiorespiratory fitness refers to the ability of the cardiovascular and respiratory systems to supply oxygen to the muscles during physical activity (46). Regular physical activity and aerobic exercise, such as brisk walking, jogging, or cycling, improve cardiorespiratory fitness (47, 48). Participation in aerobic exercise can moderate the effects of overweight on health by (a) lowering blood pressure, reducing the risk of cardiovascular disease, and improving overall cardiovascular health (49); (b) enhancing insulin sensitivity and glucose metabolism, which can help individuals with excess weight or obesity manage their blood sugar levels more effectively and reduce the risk of developing type 2 diabetes (50); (c) contributing to weight loss or weight maintenance, by increasing metabolism and promoting the preservation of lean muscle mass, which is beneficial for overweight individuals (51); (d) strengthening the respiratory muscles and enhancing lung capacity (52); and (e) reducing stress and improving mental health (53, 54). In the scientific literature, this positive effect of aerobic exercise in the overweight and obese is also known as the "fitness-fatness paradox" (55). It refers to the observation that individuals who are overweight or

obese may nevertheless exhibit signs of good cardiorespiratory fitness. Traditionally, body mass index (BMI) has been widely used as a measure of body fatness and health (56). BMI is calculated by dividing a person's weight (in kilograms) by the square of their height (in meters). However, BMI does not differentiate between fat and lean mass (muscle, bone, and organs), nor does it account for differences in body composition (57). The fitness-fatness paradox also suggests that good cardiorespiratory fitness can be achieved independent of the degree of overweight and obesity (58). Nevertheless, it is important to recognize that the fitness-fatness paradox does not imply that excess body weight is harmless. However, the paradox emphasizes the importance of not relying solely on weight or BMI as predictors of overall health, but adopting a more comprehensive and nuanced approach by also looking at participants' cardiorespiratory fitness (59).

Previous studies have shown that forcibly displaced individuals living in refugee camps often have lower fitness levels than the general population (60). During their flight or daily life in a refugee camp, refugees often face a range of challenges that can affect their cardiorespiratory fitness levels (61, 62). Such challenges include a disruption of physical activity routines (e.g., lack access to safe and appropriate spaces for physical activity, legal barriers to work), restricted access to healthcare (e.g., preventive care and treatment for chronic conditions), inadequate nutrition, mental health issues (with an indirect impact on cardiorespiratory fitness by affecting motivation, or energy levels), as well as environmental factors (e.g., exposure to poor air quality, extreme temperatures) (63, 64).

Given this background, the aims of our study were as follows: First, to assess the prevalence of overweight and obesity in a sample of forcibly displaced individuals living in a Greek refugee camp. Second, to assess participants cardiorespiratory fitness levels. Third, to examine whether and to what degree (a) normal weight and overweight/obese participants and (b) participants with low vs. higher fitness levels differ in body composition, cardiovascular risk markers, and mental health outcomes. Fourth, to examine whether participants' fitness levels moderate the relationship between their weight status and cardiovascular and mental health outcomes. The present study will make an important contribution to the existing body of research since there is limited knowledge about the cardiorespiratory fitness level of residents in refugee camps. Moreover, it is unclear so far whether the "fit but fat" concept can also be observed in forcibly displaced individuals.

2 Methods

2.1 Participants and procedures

The data come from a larger pragmatic randomized controlled trial (RCT) (blinded). In this paper, cross-sectional baseline data are presented. Ethical approval was obtained from the local ethical review boards (Greece: IEC-DPESS 1701 [Internal ethics committee of the Department of Physical Education and Sport Science, University of xxx (blinded)]; Switzerland: EKNZ AO_2020–00036 [Ethic commission of Northwestern and Central Switzerland]). The study took place in a remote area in Central Greece in a refugee camp, which is under the governance of the Ministry of Migration and Asylum. In the camp, residents live in containers (equipped with a bathroom and kitchen), either together with family members or with a maximum of four individuals of the same sex and origin. The residents spend most of their time in the camp. Due to legal barriers, they are not allowed to work. Leisure activities are scarce, and the remote location makes it difficult to escape the camp's daily routine.

Participants were eligible if they met the following inclusion criteria: (a) living in the selected refugee camp, (b) 16–59 years old, (c) able to read in English, Arabic, Farsi, or French, and (d) provided written informed consent. We decided not to include children and younger adolescents to ensure that participants have the cognitive capacity to understand the questions included in the questionnaires. For pragmatic reasons, we also decided not to include older adults (≥60 years) to reduce the heterogeneity in the sample. Including children/younger adolescents and older adults would have required us to offer more exercise and sport activities that meet the specific preferences/needs of these target populations. Parental/guardian informed consent for minors (16–18 years) was not needed in the present project, because according to Swiss laws (Federal Act on Research involving Human Beings, HRA, Art. 23, 1a), legal representatives only need to provide written informed consent for their adolescent child (aged 14–17 years) if a project entails more than minimal risks and burdens (which was not the case for the present study). A screening was performed with potentially eligible households to draw a random sample stratified by sex. For the RCT, the minimal estimated sample size to demonstrate an intervention effect on post-traumatic stress disorder (PTSD) symptoms (the primary outcome of this RCT) was 136 participants (65).

The screening, recruitment, and data assessment took place in May 2021 by the research team together with 10 trained research assistants who were familiar with the residents' cultural background and the camp's contextual setting. Both written and verbal information were given to the participants in their native languages, and participants provided written informed consent before the first data assessment. All participants were assured that participation is voluntary, and that withdrawal is possible at any time without any disadvantages, particularly with regard to the asylum process. Data assessment was carried out at the nearby Department of Physical Education and Sport Science of the University of Thessaly (65). Participants received information about their results after completion of the assessment and were referred to a specialist in case of a potential health risk. As further incentives, participants received a meal and some sport equipment.

2.2 Measures

Due to space constraints, only a concise description of the applied instruments is given here. More detailed information can be found in the published study protocol (65).

Body weight and body composition were assessed with a digital weighing scale (BC-545, Tanita, USA) that also allowed bioelectrical impedance analysis to measure the percentage of body fat and muscle mass. Body height was assessed with a stadiometer. Blood pressure was assessed three times (with a 2-min interval) with an Omron® digital blood pressure monitor after participants had rested for 5 min in a seated position (66). Finger prick methodology was applied to obtain capillary blood samples. Total cholesterol, low- (LDL) and high-density (HDL) lipoprotein cholesterol, triglycerides, and blood glucose levels (HbA1c) were analysed via Afinion 2 analysers (Abbott, Wädenswil, Switzerland). Afinion 2 point-of-care (PAC) analyser results correspond well with laboratory tests for both lipid levels and HbA1c (67, 68). In addition, 20 µm blood were collected with a Minivette® POCT EDTA (Sarstedt AG, Nümbrecht, Germany) to assess high-sensitivity C-reactive protein (hs-CRP). Analyses were done in a Cube-S Eurolyser device (Eurolyser Diagnostica GmbH, Salzburg, Austria) (69).

We applied the Åstrand-Rhyming Indirect Test of Maximal Oxygen Uptake (70), a submaximal bicycle ergometer test, to measure participants' cardiorespiratory fitness. Based on sex, a correction factor for age, body weight, mean steady state, and power output, oxygen uptake as peak VO_2max (ml/kg/min) was calculated (71). This test has been used previously in studies on refugees (62).

All psychological measures were assessed with instruments that have been previously employed in studies involving forcibly displaced adults (62, 72–74). Given that many participants had limited English skills, the questionnaires were available in English, Arabic, Farsi, and French language, and translators supported the data assessment process. All instruments have been previously validated in English, Arabic, Farsi, and French (65), and the scales had acceptable or good internal consistency (Cronbach's alpha >0.7) in our pilot study (61). PTSD symptoms were measured with the 22-item Impact of Event Scale-Revised (IES-R) (75), which refers to DSM-5 (76) and ICD-10 (77) criteria of PTSD. Answers were given on a five-point Likert scale from 0 (not at all) to 4 (extremely), resulting in an overall score between 0 and 88 points. Depressive symptoms were measured with the 9-item Patient Health Questionnaire (PHQ-9) (78), which refers to DSM-5 criteria for major depression (76). Answers were given on a four-point Likert scale from 0 (not at all) to 3 (nearly every day), with overall scores varying between 0 and 27. Anxiety symptoms were measured with the 7-item General Anxiety Disorder scale (GAD-7) (79), which refers to DSM-5 criteria for generalized anxiety disorder (76). Answers were given on a four-point Likert scale from 0 (not at all) to 3 (nearly every day), with overall scores ranging between 0 and 21. Pain was measured with the 5-item Visual Analogue Scale for Pain (VAS) (80), which asked for pain over the last week in the head, back, chest, stomach, and extremities (arms, legs, hands, feet). Item scores ranged from 0 (no pain) to 100 (pain as bad as it could be) and the average was calculated, to build a total index ranging from 0 to 100. Quality of life was measured with the 5-item World Health Organization (WHO) Index (81). Answers were given on a Likert scale ranging from 0 (at no time) to 5 (all the time). The individual item scores were summed, yielding an overall score between 0 and 25 (82).

2.3 Statistical analyses

Descriptive statistics (*n*, %, *M*, *SD*, *Min*, *Max*, *Skew*, *Kurt*) are presented to describe the characteristics of the sample and distribution of the study variables. Before carrying out the main analyses, data were screened for univariate outliers (>3.5 *SD* above the mean). Univariate outliers were excluded from all further analyses. If substantial deviations from normality (defined as *Skew* >2 and/or *Kurt* >7) (83) were observed after exclusion of univariate outliers, these variables were log-transformed before carrying out any further analyses. For mental health outcomes, the internal consistency was tested via Cronbach's alpha, which was expected to be ≥.70. Chi^2-tests (χ^2) and one-way analyses of covariance (ANCOVAs) were used to test differences between participants classified as normal weight and overweight/obese (due to the limited sample size, overweight and obese participants were combined in one group). Participants were classified as overweight if their BMI was ≥25 kg/m^2 and as obese if their BMI was ≥30 BMI kg/m^2. One-way ANCOVAs were applied to test differences between participants with different fitness levels. Classification of fitness levels are based on standards of the American College of Sports Medicine, adjusted for participants' age and sex (84). Finally, a series of two-way ANCOVAs was used to test the interaction (moderator effect) between weight and fitness status. In these analyses, weight status and cardiorespiratory fitness were used as fixed factors (including an interaction term). Age, sex, education, time away from home country and time living in the refugee camp were considered as potential confounders. All analyses were carried out with SPSS version 28 for Mac (IBM Corporation, Armonk, USA), and the level of significance was set at $p < 0.05$ across all analyses. Effect sizes were interpreted as follows: small: $\eta^2 \geq .01$, medium: $\eta^2 \geq .06$, and large: $\eta^2 \geq .138$ (85).

3 Results

3.1 Sample characteristics

In total, 150 participants (76 men, 74 women) presented with valid BMI values. Of these participants, 56.7% ($n = 85$) completed the questionnaire in Farsi, 22.7% ($n = 34$) in Arabic, 14.7% ($n = 22$) in French, and 6.0% ($n = 9$) in English. The majority of the participants came from Afghanistan ($n = 73$), Somalia ($n = 22$), Congo ($n = 18$), or Syria ($n = 12$). Other reported home countries were Iran ($n = 8$), Iraq ($n = 3$), Sierra Leone ($n = 2$), Turkey ($n = 2$), Cameroon ($n = 1$), Guinea ($n = 1$), and Pakistan ($n = 1$) (7 participants did not answer this question). Concerning educational background, 37 participants reported not having any formal education, 51 completed primary school, 34 high school, and 20 completed higher education (university) (8 participants did not answer this question). Given the low number of underweight participants, we decided to exclude these

participants from all further comparisons, resulting in a final sample of $n = 144$ participants (73 men, 71 women).

3.2 Descriptive results

With regard to weight status, 4.0% were classified as underweight ($n = 6$; 3 women, 3 men), 48.0% were normal weight ($n = 72$, 45 men, 27 women), 29.3% were overweight ($n = 44$, 22 men, 22 women), and 18.7% were obese ($n = 28$, 6 men, 22 women). With regard to cardiorespiratory fitness (estimated VO_2max), 62.1% ($n = 72$) of the participants presented with very low fitness levels (1–19 percentile), 15.5% ($n = 18$) with poor levels (20–39 percentile), 9.5% ($n = 11$) with fair levels (40–59 percentile), 5.2% ($n = 6$) with good levels (60–79 percentiles), 4.3% ($n = 5$) with excellent levels (80–94 percentiles), and 3.4% ($n = 4$) with superior levels (≥95 percentile). Since more than six out of ten participants were classified in the lowest fitness category, in all subsequent analyses, we compared this group to their counterparts with higher fitness levels.

Means, standard deviations, minimal and maximal scores, skewness and kurtosis are reported in Table 1 for all study variables. For HbA1c and hsCRP, 3 and 7 cases were identified as univariate outliers, respectively. Because HbA1c and hsCRP still showed major deviations from normality after exclusion of outliers, these variables were log-transformed. As shown in Table 1, internal consistency (Cronbach's alpha) was satisfactory for all mental health outcomes.

3.3 Association of weight status and cardiorespiratory fitness with covariates

Compared to men (38.4%, $n = 28$), women were more likely to be overweight/obese (62.0%, $n = 44$), $\chi^2(1,144) = 8.03$, $p < 0.01$. No significant association was found for education ($p > 0.05$). Overweight/obese participants were older ($M = 32.77 \pm 9.75$ years) than their normal weight counterparts ($M = 25.93 \pm 7.42$ years), $F(1,137) = 21.51$, $p < 0.001$, $\eta^2 = 0.137$, but did not differ in time away from their home country or time living in the Koutsochero refugee camp ($p > 0.05$).

Compared to men (53.1%, $n = 34$), women (73.1%, $n = 38$) were overrepresented among participants with very low fitness levels, $\chi^2(1,116) = 4.85$, $p < 0.05$. By contrast, no significant associations

TABLE 1 Descriptive statistics.

	N[a]	M	SD	Min	Max	α[b]	Skew	Kurt
Sociodemographic background								
Age (years)	138	29.35	9.29	16	58	—	0.96	0.64
Months away from home country	125	33.72	35.28	2	300	—	4.79	29.72
Months in Koutsochero refugee camp	133	14.59	10.23	0	48	—	0.71	−0.13
Fitness								
Estimated VO_2max (ml/kg/min)	116	32.08	68.87	9.05	68.87	—	0.35	0.25
Body composition								
Height (m)	144	1.64	0.10	1.41	1.93	—	0.21	−0.26
Weight (kg)	144	70.20	14.49	40.0	117.8	—	0.52	0.40
Waist (cm)	144	88.14	14.74	48	131	—	−0.16	0.03
Body mass index (kg/m^2)	144	26.10	5.02	18.71	42.44	—	0.99	0.84
Fat mass (%)	143	29.10	11.07	9.30	56.60	—	0.33	−0.83
Muscle mass (%)	137	66.98	10.61	41.23	86.12	—	−0.27	−0.87
Cardiovascular risk markers								
Systolic blood pressure (mm HG)	143	120.43	12.97	89	156	—	0.33	0.06
Diastolic blood pressure (mm HG)	143	81.82	8.50	59.67	107.67	—	0.43	0.30
Total cholesterol (mmol/L)	129	4.11	0.92	1.92	6.61	—	0.39	−0.06
LDL cholesterol (mmol/L)	128	2.21	0.73	0.53	4.29	—	0.29	−0.28
HDL cholesterol (mmol/L)	129	1.18	0.31	0.51	1.95	—	0.42	−0.25
Triglycerides (mmol/L)	129	1.66	0.82	0.56	5.18	—	1.24	2.12
HbA1c (%)	135	5.41	0.38	4.70	7.40	—	2.53	10.47
hsCRP (mg/L)	129	1.71	1.58	0.60	9.17	—	2.20	10.47
Mental health								
PTSD symptoms (IES-R)	142	35.11	22.20	0	79	.94	0.09	−1.07
Depressive symptoms (PHQ-9)	143	10.67	7.27	0	26	.86	0.07	-1.08
Anxiety symptoms (GAD-7)	134	9.24	6.51	0	21	.90	0.18	-1.15
Pain (VAS)	132	26.47	21.73	0	95	.77	0.86	0.29
Quality of life (WHO-5)	142	13.73	7.11	0	25	.88	−1.00	−1.03

VO_2max, maximal oxygen uptake; LDL, low density lipoprotein; HDL, high density lipoprotein; HbA1c, glycated hemoglobin A1c; hsCRP, high-sensitivity C-reactive protein; IES-R, 22-item impact of Event Scale—revised; PHQ-9, 9-item depression scale of the patient health questionnaire; GAD-7, 7-item general anxiety disorder scale; VAS, 5-item visual analogue scale; WHO-5, 5-item quality of life index of the World Health Organization.

[a]Variations in *N* due to different number of missings for varying outcomes.

[b]Cronbach's alpha.

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were found between cardiorespiratory fitness and education, age, months away from home country, and months living in the Koutsochero refugee camp (all $p > 0.05$).

3.4 Differences in health outcomes based on participants' weight status

Table 2 shows that after controlling for age and sex, normal weight and overweight/obese participants differed in several of the assessed variables. While differences were observed in cardiorespiratory fitness, body composition, and most of the cardiovascular risk markers, no differences were found for any of the mental health outcomes. More specifically, overweight/obese participants had lower estimated VO_2max (small effect), higher fat mass (large effect), lower muscle mass (large effect), higher systolic and diastolic blood pressure (small effect), higher total cholesterol (medium effect), higher LDL cholesterol (medium effect), higher HbA1c (small effect) and higher hsCRP (small effect). For anxiety and pain, initially significant group differences between normal weight and overweight/obese participants disappeared after controlling for covariates.

TABLE 2 One-way analyses of covariance (controlled for age and sex) with weight status as fixed factor, and cardiorespiratory fitness, body composition, cardiovascular risk markers, and mental health as outcome variables.

	Normal weight ($n = 72$)		Overweight/ Obese ($n = 72$)			
	M	*SD*	*M*	*SD*	*F*	η^2
Cardiorespiratory fitness						
Estimated VO_2max (ml/kg/min)	35.89	10.68	17.71	9.91	4.75*	.041
Body composition						
Fat mass (%)	22.52	8.09	35.94	9.93	82.97***	.384
Muscle mass (%)	73.40	8.01	60.84	9.47	77.94***	.380
Cardiovascular risk markers						
Systolic blood pressure (mm HG)	118.98	13.06	121.52	13.18	4.48*	.033
Diastolic blood pressure (mm HG)	79.72	7.64	83.38	8.81	6.20*	.045
Total cholesterol (mmol/L)	3.81	0.84	4.37	0.89	9.02***	.070
LDL cholesterol (mmol/L)	2.02	0.59	2.38	0.77	8.30**	.066
HDL cholesterol (mmol/L)	1.21	0.30	1.17	0.34	2.30	.019
Triglycerides (mmol/L)	1.46	0.74	1.82	0.82	2.96	.024
HbA1c (%)	5.29	0.22	5.52	0.47	6.08*	.046
hsCRP (mg/L)	1.36	1.55	2.07	1.60	5.22*	.042
Mental health						
PTSD symptoms (IES-R)	33.60	21.31	37.02	22.67	0.18	.001
Depressive symptoms (PHQ-9)	9.81	7.00	11.61	7.51	0.03	.000
Anxiety symptoms (GAD-7)	8.22	6.04	10.54	6.85	0.01	.000
Pain (VAS)	22.69	21.17	31.36	21.08	0.23	.002
Quality of life (WHO-5)	13.82	7.13	13.58	7.13	0.34	.003

VO_2max, maximal oxygen uptake; LDL, low density lipoprotein; HDL, high density lipoprotein; HbA1c, glycated hemoglobin A1c; hsCRP, high-sensitivity C-reactive protein. IES-R, 22-item impact of event scale—revised; PHQ-9, 9-item depression scale of the patient health questionnaire; GAD-7, 7-item general anxiety disorder scale; VAS, 5-item visual analogue scale; WHO-5, 5-item quality of life index of the World Health Organization.
*$p < 0.05$.
**$p < 0.01$.
***$p < 0.001$.

3.5 Differences in health outcomes based on participants' fitness levels

As mentioned above, 62.1% ($n = 72$) of the participants presented with very low fitness levels (1–19 percentile). When these participants were compared to their fitter counterparts, differences were found in body composition and hsCRP (Table 3). More specifically, participants with very poor fitness levels had higher BMI (medium effect), higher fat mass (large effect), lower muscle mass (large effect), and higher hsCRP (medium effect). No significant differences were found in the remaining cardiovascular parameters and in any mental health outcomes.

TABLE 3 One-way analyses of variance (controlled for age and sex) with fitness status as fixed factor, and fitness, body composition, cardiovascular risk markers, and mental health as outcome variables.

	Very poor fitness ($n = 72$)		Higher fitness ($n = 44$)			
	M	*SD*	*M*	*SD*	*F*	η^2
Cardiorespiratory fitness						
Estimated VO_2max (ml/kg/min)	25.63	7.22	42.64	7.62	155.77***	.582
Body composition						
Body mass index (kg/m^2)	26.79	5.07	23.46	3.09	8.87**	.073
Fat mass (%)	31.34	10.89	22.14	9.00	17.99***	.138
Muscle mass (%)	64.88	10.46	73.67	8.82	19.29***	.154
Cardiovascular risk markers						
Systolic blood pressure (mm HG)	119.63	13.66	121.58	12.14	0.11	.001
Diastolic blood pressure (mm HG)	82.07	8.38	79.97	8.05	2.63	.023
Total cholesterol (mmol/L)	4.06	0.88	4.00	0.82	0.08	.001
LDL cholesterol (mmol/L)	2.26	0.69	2.10	0.62	0.43	.004
HDL cholesterol (mmol/L)	1.18	0.32	1.20	0.30	1.29	.013
Triglycerides (mmol/L)	1.49	0.68	1.66	0.84	0.86	.008
HbA1c (%)	5.39	0.32	5.30	0.21	1.86	.017
hsCRP (mg/L)	1.82	1.73	1.06	0.61	8.58**	.080
Mental health						
PTSD symptoms (IES-R)	35.24	23.35	32.84	20.74	0.03	.000
Depressive symptoms (PHQ-9)	10.93	7.79	9.79	6.73	0.01	.000
Anxiety symptoms (GAD-7)	8.93	6.90	8.55	6.33	0.43	.004
Pain (VAS)	25.61	19.43	24.76	22.05	0.30	.003
Quality of life (WHO-5)	12.92	7.23	15.09	6.54	1.51	.013

$N = 116$, because 28 participants had missing data for VO_2max. VO_2max, maximal oxygen uptake; LDL, low density lipoprotein.; HDL, high density lipoprotein; HbA1c, glycated hemoglobin A1c; hsCRP, high-sensitivity C-reactive protein; IES-R, 22-item impact of event scale—revised; PHQ-9, 9-item depression scale of the patient health questionnaire; GAD-7, 7-item general anxiety disorder scale; VAS, 5-item visual analogue scale; WHO-5, 5-item quality of life index of the World Health Organization. *$p < 0.05$.
**$p < 0.01$.
***$p < 0.001$.

3.6 Fitness as a moderator of the relationship between participants' weight status and health outcomes

As shown in Table 4, compared to normal weight counterparts (46.8%, $n = 29$), participants with overweight/obesity were more likely to have very low fitness levels (79.6%, $n = 43$), $\chi^2(1,116) = 13.23$, $p < 0.001$. Approximately one in 10 participants (9.5%, 11 of 116) was overweight/obese, but was not classified in the lowest fitness category, whereas the portion of overweight/obese participants with "good" or higher fitness was 5.6% (3 of 54). Against our expectations, only one significant interaction effect was found between weight status and fitness level. *Post-hoc* tests with Bonferroni correction showed that overweight/obese participants with very low fitness levels perceived more pain ($p < .05$) than normal weight participants with very low fitness levels. No statistically significant differences were found between the other groups.

4 Discussion

The key findings of the present study can be summarized as follows: First, in a sample of forcibly displaced individuals living in a Greek refugee camp, almost half of the participants (48.0%) were overweight or obese. Second, approximately six out of 10 participants (62.1%) presented with very poor fitness levels, and the percentage of participants with very poor fitness levels was particularly high among overweight/obese participants (79.6%). Third, overweight/obesity was associated with a less favorable body composition and cardiovascular risk profile, whereas poor fitness was associated with a higher percentage of body fat and a lower percentage of muscle mass. Fourth, overweight/obese participants reported a particularly high pain level if they were unfit.

This study addressed four distinct research questions, which will now be discussed in turn. Our first goal was to assess the prevalence of overweight and obesity in a sample of forcibly displaced individuals living in a Greek refugee camp. Our findings show that a large percentage of the participants were overweight or obese (48.0%), whereas underweight was a less prevalent issue (4.0%). This contrasts with prior research among Western Sahara refugees, where a high double burden of both over- and undernutrition was observed (86). Hence, in our study, overweight and obesity were similarly prevalent in forcibly displaced individuals as in the Greek adult population, in which the prevalence of overweight and obesity has been estimated to be 47.5% percent (87). Given the negative health consequences of overweight/obesity (88), this finding is concerning and underscores the importance of learning more about the causes of overweight/obesity in this specific population and making

TABLE 4 Two-way analyses of covariance (controlled for age and sex) with weight and fitness status as fixed factors, and body composition, cardiovascular risk markers, and mental health as outcome variables.

	Normal weight				Overweight/Obese									
	Very poor fitness (n = 29)		Higher fitness (n = 33)		Very poor fitness (n = 43)		Higher fitness (n = 11)		Weight status		Fitness level		Weight status* fitness level	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*	η^2	*F*	η^2	*F*	η^2
Body composition														
Fat mass (%)	24.20	8.03	19.24	6.51	36.15	9.92	30.82	10.09	49.85***	.312	9.83**	.082	0.73	.007
Muscle mass (%)	71.86	8.07	76.60	6.50	60.66	9.48	65.68	9.61	44.87***	.301	10.53**	.092	0.62	.006
Cardiovascular risk markers														
Systolic blood pressure (mm HG)	117.89	13.85	121.77	12.05	120.80	13.56	121.03	12.96	3.81	.033	0.02	.000	0.15	.001
Diastolic blood pressure (mm HG)	80.10	70.03	79.94	8.54	83.40	9.01	80.06	6.72	1.85	.017	1.58	.014	0.31	.003
Total cholesterol (mmol/L)	3.59	0.69	3.93	0.89	4.42	0.86	4.20	0.57	6.86**	.065	0.36	.004	2.55	.025
LDL cholesterol (mmol/L)	1.97	0.47	2.05	0.62	2.48	0.74	2.24	0.63	4.30*	.042	0.12	.001	1.24	.013
HDL cholesterol (mmol/L)	1.17	0.22	1.19	0.32	1.19	0.37	1.23	0.27	0.13	.001	0.94	.010	0.01	.000
Triglycerides (mmol/L)	1.26	0.56	1.66	0.89	1.66	0.71	1.66	0.70	1.55	.016	0.94	.010	0.98	.010
HbA1c (%)	5.27	0.26	5.30	0.20	5.46	0.33	5.32	0.26	3.19	.030	1.24	.012	1.48	.014
hsCRP (mg/L)	1.54	2.04	1.05	0.61	2.01	1.49	1.10	0.65	1.16	.017	6.15*	.060	0.56	.006
Mental health														
PTSD symptoms (IES-R)	31.40	21.89	32.78	21.95	37.65	24.16	33.03	17.57	0.01	.000	0.00	.000	0.17	.002
Depressive symptoms (PHQ-9)	8.36	6.78	10.12	6.98	12.59	8.01	8.82	6.13	0.04	.000	0.11	.001	2.47	.022
Anxiety symptoms (GAD-7)	6.97	6.08	8.60	6.17	10.21	7.17	8.40	7.18	0.00	.000	0.14	.001	1.09	.010
Pain (VAS)	16.12	13.77	26.45	24.26	32.10	20.20	19.20	11.53	0.06	.001	0.00	.000	6.83**	.063
Quality of life (WHO-5)	13.29	7.62	14.45	6.76	12.69	7.05	17.00	5.67	1.16	.011	2.62	.023	0.96	.009

VO_2max, maximal oxygen uptake; LDL, low density lipoprotein; HDL, high density lipoprotein; HbA1c, glycated hemoglobin A1c; hsCRP, high-sensitivity C-reactive protein; IES-R, 22-item impact of event scale—revised; PHQ-9, 9-item depression scale of the patient health questionnaire; GAD-7, 7-item general anxiety disorder scale; VAS, 5-item visual analogue scale; WHO-5, 5-item quality of life index of the World Health Organization.

*$p < 0.05$.

**$p < 0.01$.

***$p < 0.001$.

overweight/obesity prevention a key target for health interventions in refugee and migrant populations (41, 89). There are several effective measures to prevent overweight/obesity, including the promotion of healthy eating (e.g., reduction of sugary drinks, snacks, and fatty foods, increase of consumption of fruit and vegetables) and regular physical activity (41, 90). Programs focusing on physical activity should encourage different forms of activities, including sports, exercise, play, and physical activity in everyday life (65). Promoting healthy lifestyles could also focus on the family as a whole in order to increase physical activity or increase healthy eating (91).

Our second goal was to estimate participants cardiorespiratory fitness levels. In this regard, it was surprising that based on age and sex-adjusted norms, almost two thirds of the participants (62.1%) had very poor fitness levels. According to the reference data of the American College of Sports Medicine (84), participants with such fitness levels fall into the lowest fitness category (percentile 1–19). This is critical as previous studies have shown that low cardiorespiratory fitness levels are associated with impaired health and increased risks for both all-cause and disease-specific mortality (92, 93). In future research, it would be interesting to learn more about the underlying reasons for the low fitness level. For instance, gathering longitudinal data could help to find out whether fitness levels decline as a function of time residing in a refugee camp, as there might be little opportunity to be or become physically active.

Our third goal was to examine whether and to what degree normal weight and overweight/obese participants differ in body composition, cardiovascular risk markers, and major mental health outcomes. In agreement with the extensive body of available literature, we found that overweight/obesity was associated with lower estimated VO_2max (94), higher percentage body fat (95), lower relative muscle mass (96), higher blood pressure (97), higher cholesterol levels (particularly LDL cholesterol) (98), higher HbA1c (99) and higher hsCRP (100). These health parameters are well known to contribute to the development of cardiovascular and other chronic diseases (101). Our study also reinforces previous evidence that BMI is sufficiently (>38% of explained variance) associated with participants' body composition (95), and may thus serve as a screening tool in a refugee camp setting (102). Opposite to the evidence reported in the international literature (28, 29), no differences were found in the present study between normal weight and overweight individuals in mental health outcomes. One explanation might be that overweight is seen more positively in some cultures (103). This could particularly be true for forcibly displaced individuals who have had an arduous flight, faced many deprivations, and currently live in an environment characterized by resource poverty (104). Such an attitude can represent an important challenge in efforts to prevent overweight and obesity in this specific population. With regard to differences between participants with the poorest vs. higher fitness levels, we found only statistically significant differences in body composition and hsCRP. While this concurs well with existing research (105, 106), the lack of significant associations between fitness level and the other health outcomes might be due to a floor effect associated with the generally low fitness levels in this sample, with only 12.9% reporting "good" (or higher) fitness levels.

Finally, only limited evidence was found that among forcibly displaced individuals living in a Greek refugee camp, participants' fitness is able to moderate the relationship between weight status and cardiovascular and mental health. This is contrary to the literature on the fitness-fatness paradox (45, 55, 59), suggesting that having adequate cardiorespiratory fitness can mitigate the adverse effects of overweight/obesity on cardiovascular health (107). To a certain degree, our study also questions the notion that cardiorespiratory fitness can be achieved independent of body weight. In our study population, among 54 overweight/obese participants with valid fitness data, only 3 (5.5%) achieved "good" (or higher) fitness levels, which is similar to what has been reported in previous studies (59). The only significant interaction between participants' weight status and fitness was found for pain, showing that overweight/obese participants with poorest fitness perceived higher pain levels than the other study participants. This is an important finding, as chronic pain is associated with reduced quality of life (108) and increased mental health issues (109). Nevertheless, the results of the present study should be considered preliminary until data are available from studies with larger samples in which there is more variation in cardiorespiratory fitness. With other words, the fact that most participants had very low fitness levels might have complicated the detection of statistically significant interaction effects.

The strengths of the present study are that we examined the association between overweight/obesity and cardiovascular and mental health outcomes in an under-researched population. So far, few studies have assessed cardiorespiratory fitness in forcibly displaced individuals. While this is the first study that examined the fitness-fatness concept in refugees, it should be noted that the group of overweight/obese participants with higher fitness levels consisted of a comparably small number of participants. Moreover, the cross-sectional nature of our data precludes causal interpretation of the relationships. Finally, the results of this study cannot be generalized to the general population of forcibly displaced individuals because this group is characterized by high diversity and also includes individuals who have been granted asylum in the host countries. Furthermore, the living conditions in refugee camps as well as the composition of the resident populations can largely differ within and between countries. Finally, it should be noted that we did not include children, younger adolescents, or elderly people, although overweight and obesity constitutes an issue in these populations, as well.

4.1 Conclusions

Our study shows that overweight and obesity are prevalent among residents living in a refugee camp in Greece, posing potential risks to their cardiovascular health. Consequently, public health services should prioritize preventive measures and be well-prepared to address associated diseases. We have also noticed that cardiorespiratory fitness is relatively poor in this sample of forcibly displaced individuals. While efforts are needed

to improve the fitness of camp residents, the evidence regarding the feasibility and effectiveness of exercise and sport interventions in refugee settings is still in its infancy. Research efforts in this area should be intensified in order to gain relevant insights and to convince political stakeholders of the importance of this issue.

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.

Ethics statement

The studies involving humans were approved by the Ethical commission of Northwestern and Central Switzerland (EKZN, Switzerland) and the Ethical review board of the Department of Physical Education and Sport Sciences, University of Thessaly (Greece). The studies were conducted in accordance with the local legislation and institutional requirements. Written informed consent for participation was not required from the participants' legal guardians/next of kin because according to Swiss laws (Federal Act on Research involving Human Beings, HRA, Art. 23, 1a), legal representatives only need to provide written informed consent for their adolescent child (aged 14 to 17 years) if a project entails more than minimal risks and burdens (which was not the case for the present study). For more information see: https://www.fedlex.admin.ch/eli/cc/2013/617/en.

Author contributions

MG: Conceptualization, Data curation, Formal Analysis, Funding acquisition, Methodology, Project administration, Resources, Supervision, Writing – original draft, Writing – review & editing. KF: Conceptualization, Data curation, Methodology, Project administration, Writing – review & editing. FK: Conceptualization, Data curation, Methodology, Project administration, Writing – review & editing. IM: Conceptualization, Data curation, Funding acquisition, Methodology, Project administration, Supervision, Writing – review & editing. ET: Conceptualization, Data curation, Project administration, Writing – review & editing. EH: Conceptualization, Data curation, Project administration, Writing – review & editing. HS: Conceptualization, Funding acquisition, Methodology, Writing – review & editing. FC: Conceptualization, Funding acquisition, Writing – review & editing. SL: Conceptualization, Funding acquisition, Methodology, Writing – review & editing. MM: Conceptualization, Funding acquisition, Methodology, Writing – review & editing. YT: Conceptualization, Funding acquisition, Methodology, Writing – review & editing. RK: Conceptualization, Funding acquisition, Methodology, Writing – review & editing. UP: Conceptualization, Funding acquisition, Methodology, Writing – review & editing. AH: Conceptualization, Data curation, Funding acquisition, Methodology, Project administration, Resources, Supervision, Writing – review & editing.

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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

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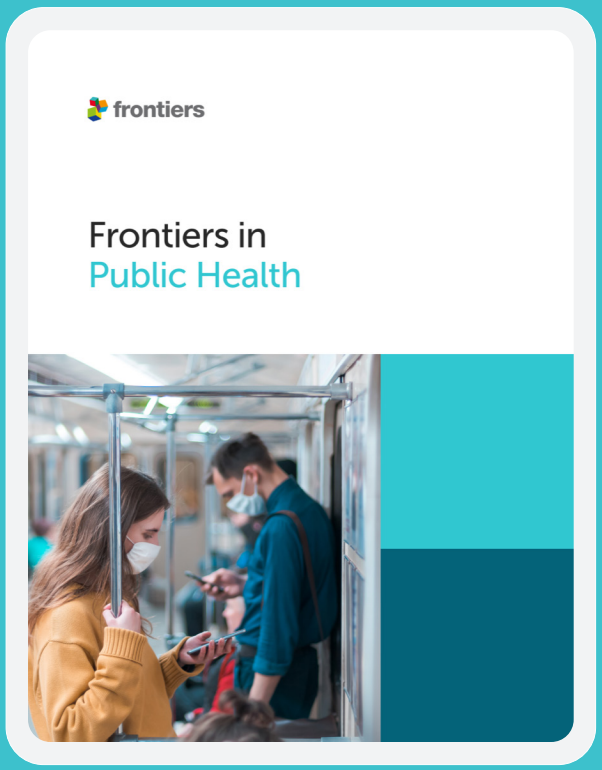

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