

# Inequities and disparities in reproductive health: Reproductive epidemiology

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# Inequities and disparities in reproductive health: Reproductive epidemiology

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# Editorial: Inequities and disparities in reproductive health: reproductive epidemiology

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## KEYWORDS

reproductive health disparities, social determinants of health, maternal mortality and morbidity, pregnancy and postpartum care, epidemiology

## Editorial on the Research Topic

Inequities and disparities in reproductive health: reproductive epidemiology

## Introduction

According to the World Health Organization (WHO), reproductive health encompasses holistic well-being, which includes physical, mental, and social health, and is not merely based on the absence of disease (1). Further, health disparities refer to differences in health outcomes and access to care between various groups. For example, such differences can be influenced by gender, age, sexual identity, race/ethnicity, and socioeconomic status (SES), which impact access to healthcare services and quality of care among various groups (2). Health inequity goes beyond disparities and refers to unjust differences in health outcomes between different groups, rooted in economic, social, and environmental injustices that lead to unequal access to resources, opportunities, and power (3).

The WHO initiative on sexual and reproductive health aims to assess social determinants of health (SDOH) related to maternal mortality and morbidity by supporting high-quality research to strengthen research capacity in low- and -middle-income (LMIC) settings and inform the WHO of norms and standards about SDOH (4). Despite the effort to improve access and utilization of reproductive health services across the globe, reflecting WHO policy, there remain inequities and disparities in reproductive health across social determinants (2, 5), according to race/ethnicity (2, 6), SES (7), culture (8), and politically-influenced policies (9, 10). In addition, the American College of Obstetricians and Gynecologists (ACOG) stated in their committee opinion that recognizing the importance of SDOH can help healthcare providers better understand patients, effectively communicate about health-related conditions and behavior, and improve health outcomes (11).

The social determinants of adverse reproductive outcomes vary across people, place, and time; thus, what and how to measure social determinants varies across communities, societies, countries, and cultures. Therefore, interventions must be curated to the intended population. For example, in LMIC, factors that increase the risk of maternal morbidity and mortality include adolescent pregnancy, primigravidity, nutritional deficiencies, limited education levels, and refugee status (12). Sheikh et al.

have suggested some potential interventions in these communities to improve outcomes in pregnant people, such as supplementation with iron and calcium, community-based educational programs, financial incentives to obtain adequate prenatal care, and interventions directed toward the promotion of contraceptive use (12). Additionally, cultural competency among healthcare providers is an essential component of addressing disparities in reproductive health (13). Educational activities should include didactics addressing health literacy, access to health care, and unconscious bias. From the pregnant patient perspective, Brito et al. found that patients feel increased medical education on SDOH would help address factors that lead to disparities in antenatal health care.

Global programs and activities, such as the UN Millennium Development Goals (MDGs), Global Strategy for Women's, Children's, Adolescents' Health, and the WHO Global Action Plan aim to improve women's health worldwide. While some progress has been made, life expectancy for women remains lower in LMIC, and maternal mortality remains high (14). In contrast, factors impacting women's health in more economically developed countries (MEDC) include younger age, lower socioeconomic attainment, lack of connection with the social environment, and adverse life events (15).

This Special Issue covers several aspects of reproductive health, with a focus on inequities and disparities regarding (1) general reproductive health support and accessibility, (2) factors associated with pregnancy and childbirth, and (3) postpartum effects on the health of women and their children.

## General reproductive health support and accessibility

In many countries, there remains an unsolved issue of general reproductive health support, which is a fundamental human right (16). Factors such as race/ethnicity, access to infrastructure to ensure hygiene for menstruation among sex workers (Phillips-Howard et al.), access to reproductive health services among migrants (Panchenko et al.), the tendency for marginalized individuals not to receive sufficient medical education, and public health policy that often discriminates against marginalized individuals play a part in maintaining inaccessibility (2). A recent study by Panchenko et al. highlights the challenges migrants face, such as poor gynecological care, an absence of dedicated services for pregnant people, and the general lack of reporting systems as it relates to sexual violence and exploitation experienced during the migration journey. When considering the context that pregnant people are faced with, these factors can exacerbate feelings of helplessness and amplify vulnerability in accessing care, which can lead to unequal reproductive health services.

## Factors associated with pregnancy and childbirth

Inadequate sex education and access to contraception persist, which contributes to the ongoing prevalence of unintended

pregnancies; therefore, significantly younger age at first birth has been noted, especially in LMIC and in certain ethnicities within MEDC (17). Another study in this Special Issue by Kitaw and Haile found that in Ethiopia the median time to first childbirth was 18 years and that timing of childbirth is associated with educational level, knowledge of contraceptive methods, and exposure to media. The study also noted that increased education and awareness are helpful in reducing disparities in these populations (Kitaw and Haile). Disparities in accessing prenatal care can also contribute to worse outcomes. Stegman et al. have suggested that directed approaches are needed to increase participation in prenatal care, which would likely result in improved outcomes (Stegman et al.). Using the Demographic Health Survey (DHA) from 61 LMICs, Aragaw et al. showed that unintended pregnancies occur at a rate of 26.46%. Factors that were elucidated in this study included media exposure, working status, access to healthcare facilities, and paternal education (Aragaw et al.). Thus, it is critical to use multi-level interventions to support preventative measures to reduce the burden of unintended pregnancies and improve overall reproductive health outcomes.

## Postpartum effects on the health of women and their children

Postpartum education and support regarding nutrition for mothers and children are still limited in some areas, as demonstrated by low rates of breastfeeding and underweight children (18). Interventions are needed to improve nutritional knowledge, attitude, and self-efficacy and reduce the prevalence of underweight children (Chen et al.). Gizaw et al. noted that a positive deviant approach (PDA), whereby the community's strengths are utilized along with problem-solving methodology to empower the community, increased breastfeeding knowledge, attitudes, and self-efficacy.

The articles in this Special Issue demonstrate the pervasive inequities and disparities in reproductive health, underscoring their prevalence across societies worldwide. Addressing these urgent issues requires collaboration from multidisciplinary teams and consideration of location-specific factors to limit unnecessary morbidity and mortality of pregnant people, women, and children.

## Author contributions

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# “You are the first person to ask me how I’m doing sexually”: sexual and reproductive health needs and sexual behaviours among migrant people in transit through Panama

Sofya Panchenko<sup>1,2</sup>, Philippe Mayaud<sup>1</sup>, Sebastian Baranyi Nicholls<sup>3</sup>, Carolina López González<sup>4</sup>, Khatherine Michelle Ordáz<sup>5</sup>, Madeline Baird<sup>1,6</sup> and Amanda Gabster<sup>2,7,8\*</sup>

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**Background:** Unprecedented numbers of migrant people transiting through the Darién Gap at the Panama-Colombia border were recorded in 2021 and 2022. Data on sexual and reproductive health (SRH) needs and service provision among migrant people in transit is generally extremely sparse. This study aimed to collect personal accounts of sexual behaviours and SRH needs and access to services among migrant people in transit through Panama.

**Methods:** We conducted a rapid-assessment qualitative study using semi-structured interviews during June–July 2022. Participants were migrant people in transit at three locations across Panama: (i) at the Migrant Reception Station (MRS) in Darién province at the Panama-Colombia border, (ii) in the city of David near the Costa Rica–Panama border, and (iii) at the Costa Rica–Panama border. Migrant peoples (>18 years) were invited to participate using purposive sampling.

**Results:** Overall, 26 adult migrant people (16 men, 10 women) across the three sites participated in the study. We identified three overarching themes from the interviews: (1) increased need for SRH service provision, (2) experiences of sex, relationships, and transactional sex, and (3) vulnerability to exploitation and sexual violence. All accounts reported that no formal SRH care was present during the journey through the Gap and described as inconsistent at the MRS in Darién. Provision of gynaecological or genital examinations, laboratory testing for urinary tract or STI, and prenatal care were mentioned to be the most pressing needs. Participants reported a change in their sexual behaviour while travelling, whether a decline in sexual libido or preference towards short-term partners. Most female participants recounted constantly fearing sexual violence during the journey through the Gap and several respondents reported witnessing incidents of sexual and other forms of violence.



**Conclusion:** There are significant unmet needs regarding SRH care during the journey of migrant people transiting through the Darién Gap, at the MRS in the Darién province, and across Panama. Provision of antenatal care, rapid testing for HIV/STI, condom distribution, and care for victims of sexual violence would significantly reduce adverse SRH outcomes and improve the well-being of migrant people, even when in transit.

#### KEYWORDS

migrant, migrant healthcare, sexual and reproductive health (SRH), sexually transmitted infections (STI), HIV, sexual violence, Darien, Panama

## Introduction

Achieving a state of physical, emotional, mental, and social well-being in relation to sexuality and reproduction relies on the realisation of sexual and reproductive rights, based on the human rights of an individual. Thus, the definition of sexual and reproductive health has been expanded at the 1994 International Conference on Population and Development (ICPD) to address the full range of people's needs and the services required for the maintenance of sexual and reproductive health (1, 2). A comprehensive interpretation of sexual and reproductive health and rights (SRHR) includes access to sex education, safe birth control methods, abortion services, HIV/STI testing and treatment services, and appropriate pregnancy and childbirth care (3).

There are major gaps in the literature on SRHR of migrant people—most of the available information pertains to specific SRHR barriers faced by migrant people after their settlement in the destination country, while the needs and experiences of those in transit remain largely undocumented. Lack of available research may be explained by the difficulty of data collection due to the temporary nature of transit, requirement for international cooperation and research funding across multiple countries, and unreliable nature of quantitative data related to migrant people's interceptions at borders (4, 5).

The term “migrant in transit” has no universal definition and does not refer to a legal category of individual; “transit migration” is commonly viewed as a process rather than a migration status, an umbrella term for various migrant categories that includes both irregular and regular migration and that may lead to vastly different migration outcomes (4, 6). Despite the existence of international human rights instruments guaranteeing the right to SRH for migrant and refugee populations, there are health disparities affecting migrant people in transit due to inadequate access to healthcare services at border sites, in transit and after settlement; the health needs of migrant people often grow during transit due to exceedingly tough physical conditions of the migratory process, the erosion of social and financial support mechanisms, and the power imbalance between human traffickers and migrant people (7, 8).

A particular scenario has developed in Panama, where border authorities receive migrant people in transit emerging from the Darién Gap—a 66-mile region along the border between Panama and Colombia that serves as a recently established migration route for those travelling North to Mexico, United States, and Canada (9, 10). According to the National Migration Service of

Panama, less than 11,000 annual crossings were recorded from 2010 to 2020. By contrast, from January to October 2022, more than 156,000 people had traversed the Gap, with the overwhelming majority travelling from Venezuela (11, 12). The movement of people across the border is facilitated by human traffickers (known among migrant people as “guides” or “coyotes”) who transport those who wish to travel from Colombia by boat and through the Gap by foot en route to North America (9, 11, 13). The ubiquity of criminal activity within the Gap has been described by the Panamanian government, non-governmental organisations (NGOs), and the local media over the last twenty years (14–16). Government reports highlight trafficking routes throughout the region, pointing to the existence of “clientelist social relationships” between traffickers and the local residents (14).

Despite the large number of migrant people passing through Panama, access to relevant preventative and therapeutic services is extremely limited. Pre-existing SRH conditions may be exacerbated during the journey through the Gap due to delays in accessing care, malnutrition, dehydration, poor hygiene, and pervasive sexual violence (8). Timely detection and management of sexually transmitted infections (STIs), including HIV, and other genital infections can prevent related morbidity and mortality among, and transmission from, migrants travelling through Central America. Recent studies on transit migration within Latin America and the European Union (EU) have noted that improving access to primary health care, including STI and HIV testing, among migrant people in transit can significantly reduce future health consequences of untreated conditions, as well as provide direct and indirect economic advantages for the host countries (17, 18). HIV/STI transmission can occur partly due to high risk of sexual violence and abuse: 180 cases of rape within the Gap were reported to Doctors Without Borders during the period May–September 2021 (8, 16).

The risks of sexual assault and other forms of gender-based violence (GBV) are known to increase when unsafe or irregular migration routes are used; while GBV can be experienced by members of any gender, it disproportionately affects women, girls, and those of diverse gender identity or diverse sexual orientation (19, 20). Data on migration to and within the EU has highlighted that legal provisions on migrant SRHR often neglect to consider the extent of sexual violence experienced by highly vulnerable migrant sub-groups, such as adolescent girls and sex workers, in periods of protracted migration; this means that migrant people vulnerable to sexual violence often face

significant legal obstacles in realising their rights to SRH services, which is exacerbated by inadequate personal resources and administrative barriers (21–23).

Both the characterisation of migrant people's sexual and reproductive health and an increased understanding of their needs align with the goals of Panama's Ministry of Health (MINSA) and the Pan American Health Organization (PAHO) in offering better healthcare and support to people in transit through Panama. Gabster et al's team conducted a rapid epidemiological assessment of SRH needs and access among migrant people in transit through Panama, the results of which indicated a total lack of access to SRH care (8). This follow-up qualitative research sought to expand on the narrative experience of the migrant people in transit both prior to and during the journey through the Darién Gap and Panama.

The aims of this study were to obtain accounts of sexual behaviours, SRH needs and access to relevant services experienced by the population of migrant people in transit, both prior to and during the journey through Darién Gap, and throughout Panama. We focused on describing the individual, social, and institutional factors that may act as barriers to health-seeking behaviour and influence migrant people's SRH outcomes.

## Methods

We conducted a cross-sectional rapid-assessment qualitative study using semi-structured interviews at three different locations in Panama, with a sample of adult ( $\geq 18$  years) migrant people in transit across the country.

## Research setting

The study was conducted at three locations on the migrants' journey across Panama: (i) at an MRS in Darién province on the southern Panama border with Colombia; (ii) at the main bus terminal in David, Chiriquí province, near the Costa Rica border; (iii) and at the Panama-Costa Rica border, Chiriquí province. To facilitate their travels onwards, migrant people are then transported to David and the Panama-Costa Rica border following their stay in the Darién MRS. The settings were chosen due to being at opposite sides of the country, which allowed the co-authors to see if migrant people's experiences with SRH and behaviours were different after leaving the Gap but before leaving Panama.

While at the time of the study, most migrant people travelled via the same route from Darién MRS to the Panama-Costa Rica border, all three locations were utilised due to the large density of migrant people residing at and passing through the MRS, creating a more suitable environment for purposive sampling.

There is no access to healthcare within the Darién Gap due to a complete lack of infrastructure. At the Darién MRS, the only access to a health professional is provided through visits from NGOs such as the Panamanian Red Cross and Doctors Without Borders (MSF). Two health centres in the communities of Metetí and Santa Fe, Darién province, can provide health services to migrant

people in transit in case of medical emergencies. However, these care visits require authorised transport by the National Migration Service and the National Border Service of Panama (SENAFRONT) (13).

## Study population and sampling

Participants were selected using non-randomised, purposive sampling. Recruitment was undertaken based on participants' ability to communicate experiences in an expressive and reflective manner, and their availability and willingness to participate.

Purposive sampling was used to include a representative sample of men and women who were interested in speaking about their SRH experiences. Quota sampling was used to produce an approximate 60/40 percent ratio of male to female participants to represent the total number of migrant people in transit; the ratio was based on the 2021 data provided by the National Migration Service of Panama (24). Additionally, potential participants must have been  $\geq 18$  years, and to speak and read at least basic English, Portuguese, French or Russian (in order to read the consent form offered). Even if they were willing to participate in the study, individuals were not chosen if they had a planned exit from Panama within 8 h after concluding the interview in case the study team needed to refer the individual to social services.

Sampling took place in communal areas of the MRS, around the bus station and in the streets of the Panama-Costa Rica border. Co-authors approached potential participants and asked if they would be willing to hear about a study in a private location, out of earshot of others. The purpose of the study was verbally described to potential participants; those eligible and willing to participate were invited to sign a written informed consent. The interviews were undertaken in a location chosen by the participant for its privacy.

Languages used in the interviews were selected based on prior observation of these native language speakers in transit through Panama. There was no *a priori* sample size determination apart from aiming to obtain data saturation with regard to the themes and objectives of the study.

## Data collection

A semi-structured interview guide was designed to capture diverse personal experiences regarding (i) participants' journey to and through Panama, (ii) their romantic and sexual relationships, (iii) prevention, testing, and care needs related to HIV and STIs, (iv) reproductive healthcare experience, needs and access, (v) and prevention and reporting needs of experiences of violence.

Data collection was performed over 7 days, from June 30–July 7, 2022. Semi-structured interviews were conducted by trained field workers and lasted between 30 and 60 min. Participant pseudonyms and details are shown in **Table 1**. Interviews were recorded digitally, transcribed verbatim, and independently translated into English. Back translation was performed for a

TABLE 1 Characteristics of each participant.

Pseudonym	Sex	Age	Location of interview	Participant country of origin
Osei	Male	32	Darién MRS <sup>a</sup>	Ghana
Luis	Male	22	Darién MRS	Venezuela
Emmanuel	Male	50	Darién MRS	Haiti
Joseph	Male	18	Darién MRS	Congo
Mauricio	Male	26	Darién MRS	Angola
Ana	Female	23	Darién MRS	Venezuela
Hector	Male	42	Darién MRS	Cuba
Isabel	Female	18	Darién MRS	Venezuela
Gabriel	Male	26	Darién MRS	Venezuela
Beatriz	Female	40	Darién MRS	Venezuela
Maria	Female	32	Darién MRS	Venezuela
Diana	Female	22	Darién MRS	Venezuela
Gloria	Female	24	Darién MRS	Venezuela
Sonia	Female	18	Darién MRS	Venezuela
Francisco	Male	26	David bus terminal	Venezuela
Jesus	Male	37	David bus terminal	Venezuela
Simon	Male	29	David bus terminal	Colombia
Carolina	Female	29	David bus terminal	Venezuela
Robert	Male	32	David bus terminal	Venezuela
Jorge	Male	28	David bus terminal	Venezuela
Rafael	Male	44	David bus terminal	Venezuela
Angelica	Female	30	David bus terminal	Venezuela
Jaime	Male	29	David bus terminal	Venezuela
Teresa	Female	20	Costa Rica-Panama border	Venezuela
Alvaro	Male	24	Costa Rica-Panama border	Venezuela
Victor	Male	36	Costa Rica-Panama border	Venezuela

<sup>a</sup>MRS, Migrant Reception Station.

randomly selected 10% sample of interviews recorded in Spanish and French languages to ensure translation quality.

## Analysis

Interviews were analysed using a mixture of deductive and inductive approaches to thematic analysis developed by Braun and Clarke (25). Initial codes from the interview transcripts were generated using NVivo 12 (QSR International Pty Ltd. 2019). Transcripts were coded based on both the established *a priori* determined themes and any emerging ones, with the coding frame being constantly revisited to refine emerging themes.

## Ethics

Local approval was granted by the Research Bioethics Committee of the Gorgas Memorial Institute for Health Studies, Panama (ref: N221/CBI/ICGES/22). The study was also approved by the London School of Hygiene and Tropical Medicine Ethics Committee (ref: 27587). All participants signed written informed consent forms in a private location and were interviewed in a private location by a single interviewer, with a translator present where appropriate. Participants were told that if they wished to

discuss any physical violence or sexual assault committed against them on Panamanian territory, the research team would help them report it to the relevant authorities. Participants who reported the need for healthcare or social services during the interview were linked by an interviewer to an NGO National Ministry that was providing relevant care.

## Results

### Participant characteristics

Overall, 26 adults aged >18 years (16 men and 10 women) participated in this study. Their sociodemographic characteristics are summarised in Table 2. Most participants ( $n = 20$ ) originated from Venezuela. Median age of all participants was 28.5 years, ranging between 18 and 50 years old; 23 interviews were conducted in Spanish, 2 in French, and 1 in English. 14 interviews were conducted at the Darién MRS, 9 in the city of David, and 3 at the Costa Rican border.

Our analysis identified three overarching themes: (1) increased need for SRH service provision, (2) experiences of sex, relationships, and transactional sex, and (3) vulnerability to exploitation and sexual violence.

### Increased need for sexual and reproductive health (SRH) service provision

NGOs such as MSF and the Panamanian Red Cross provide general health services, including basic SRH care at the Darién MRS during day hours. Five participants (1 man, 4 women) said that they were suffering from a possible urinary tract or reproductive tract infection (UTI/RTI) at the time of interview, which they believed was acquired due to poor hygiene conditions while crossing the forest, but could not receive adequate care at the NGO stations that had been set up. Gynaecological examinations in particular were emphasised as an urgent need for migrant women as symptoms of UTIs/RTIs upon arrival to the MRS were said to be commonplace:

*“We were all sitting on the floor [of the boat] and there were a lot of children. And many women, and they all urinated there [...] And since we were all sitting like that, we felt that all of it got into our private parts [...] When we urinated, it was horrible, it burned.” Isabel, 18*

SRH service provision at the Panamanian MRS and throughout the route across Panama was highlighted as a neglected issue among the migrant peoples—being in an environment where sexual and reproductive care is consistently deprioritised in favour of issues that are deemed more immediate can lead to long-term consequences to both physical and mental health:

*“You’re the first person to ask me how I feel sexually [how my sexual health is], how everything is functioning for me. The first. And I’ve been to all the medical centres [throughout*

TABLE 2 Sociodemographic characteristics of the participants.

	Women (n = 10)	Men (n = 16)
<b>Age group (years)</b>		
18–24	6	3
25–29	1	6
30–34	2	2
35–39	–	2
40–44	1	2
45–50	–	1
<b>Country of origin</b>		
South America		
Venezuela	10	10
Colombia	–	1
Caribbean		
Haiti	–	1
Cuba	–	1
Africa		
Ghana	–	1
Congo	–	1
Angola	–	1
<b>Languages spoken</b>		
Spanish	10	13
Portuguese	1	5
French	–	2
English	–	1
Other <sup>a</sup>	–	3
<b>Relationship status</b>		
Single	4	8
In relationship	6	5
Married	–	3
Divorced	–	–
Widowed	–	–
<b>Highest education level<sup>b</sup></b>		
Primary school only	–	–
Some secondary school	2	3
Secondary school diploma	3	4
Some university	3	4
Bachelor's degree	2	2
Master's degree/PhD	–	1

<sup>a</sup>Other language category included Creole, Lingala, and Hausa languages spoken by some participants in addition to either Spanish, Portuguese, English and/or French.

<sup>b</sup>Highest education level for two participants, Joseph and Jaime, could not be recovered.

*Panama], and this is the first time that anyone asked me”*  
Beatriz, 40

When asked about where the SRH services should be provided many agreed that the Darién MRS and the city of David would be the best locations since most, if not all, migrant people in transit pass through them.

### HIV/STI awareness

Being equipped with information about prevention of HIV/STI transmission and maintaining personal hygiene was considered by most as a crucial component of sexual health maintenance. Sixteen participants identified HIV as either one of, or the only, sexually transmitted infection. Human papillomavirus (HPV),

syphilis, and gonorrhoea were also commonly named. Most female participants felt that it was very important for them to know their health status regarding HIV and STIs for their own benefit and to protect others while in transit. Some, however, did not seem to worry, especially those in exclusive sexual relationships, as the way to reduce the risk of HIV/STIs was commonly believed to be “*taking care of yourself*”, being “*selective with all [sexual] partners*”, and “*using protection*”. Some participants connected their lack of worry to the fact that they “*didn’t notice anything unusual on [their] body*” (Ana, 23), i.e., being asymptomatic.

There appeared to be an increased need for health promotion surrounding HIV/STIs, which was highlighted by the use of stigmatising language among some participants, as well as general misinformation. A few interviewees demonstrated erroneous knowledge of HIV/STI transmission by saying, for instance, that HIV can be transmitted by being “*in contact with the rim [of a glass/container] that has this disease*” (Mauricio, 26) or “*through saliva*” (Gabriel, 26). In one case, language that implied personal judgement about casual sexual relationships seemed to be linked to HIV stigma:

*“That gay guy was giving us water from his pot where he drinks the water from and sticks his mouth in, and how many things did he do to the other one [sexual partner] there?”* Beatriz, 40

On the other hand, those who had a personal experience with an STI (e.g., herpes) or were friends with people living with HIV could correctly describe the routes of HIV/STI transmission when prompted to, and noted that they “*don’t discriminate against people who have this type of illness*” and “*want to learn more about these diseases*” (Jesus, 37).

### HIV prevention and contraception

Many participants used the expression “*to take care of [one]self*” in relation to using birth control methods, preventing HIV/STI acquisition, and maintaining personal hygiene. Both male and female participants were able to name a variety of contraception methods that exist, such as contraceptive injections, implant, intrauterine device (often referred to as “*T*” due to its characteristic shape), the pill, and spermicides, either from using it themselves, from their friends, or their partners. When asked to discuss their reason for using hormonal contraception at the time of the interview, female participants said that it allows them to gain more control of their reproductive health by making a conscious choice to not become pregnant during or shortly after their journey [e.g., “*enjoy my life in the US*” (Diana, 22)].

All female participants recognised the need to bring contraception with them if they wished to be protected from pregnancy during their journey due to complete lack of SRH services within the Darién. Some emphasised the need for birth control provision at Darién MRS and other health services while in transit, specifically for sexually active adolescent girls:



*"There are also many children who come here, who are 16, 14, who are not yet young ladies, but they get with someone [...] and they are not taken care of either."* Maria, 32

All respondents agreed that it was not possible to obtain condoms anywhere during the journey through the Darién Gap—many felt it was important for condoms to be provided at the MRS on Panamanian territory and at the camps within the forest, saying that *"[giving out condoms] should be a benefit to any camp"* (Carolina, 29), both for current and future use. An overwhelming number of testimonies recognised the lack of HIV/STI prevention and care services throughout the journey and the essential nature of them, as *"it never hurts to offer health [services]"* (Alvaro, 24).

One participant also gave an account of SENAFRONT personnel confiscating condoms upon arrival at the Darién MRS, making it difficult to practice safer sex:

*"A girl who was right next to me, when we arrived at the camp they check your things, and she had condoms, and [the police] took the condoms away."* Carolina, 29

### Pregnancy experience and needs during transit

Both first- and second-hand accounts of pregnancy in the Darién Gap were recorded. Most interviewees said that they saw at least one visibly pregnant woman along the journey, with one participant mentioning that pregnant women travel through the Darién Gap *"in very large quantities"* (Jesus, 37). Similar to other health service provision within the Gap, there were *"no doctors helping [pregnant] women [along the way]"* (Osei, 32). Pregnant women must bring their own medicines or supplements with them on the journey, and they often get lost, damaged or stolen along with other possessions. While the three female participants who were pregnant at the time of interview seemed to be fully conscious of the risks, they expressed feelings of acute anxiety, guilt, and the overwhelming weight of maternal responsibility.

Gabriel, 26, recounted witnessing a migrant woman give birth in the forest who received emergency help:

*"Gabriel: There was a girl who gave birth there, gave birth [...] a truck arrived and took her."*

*Interviewer: Took her where, sorry?*

*Gabriel: They took her to the hospital, to the labour ward, she had pains in the forest."*

However, Beatriz's story of seeing a pregnant woman who also started giving birth along the way showed a different angle:

*"She was pregnant, her water broke, you could see from her belly. She lifted her robe [...] and you could see the baby moving [...] Having a paramedic, someone to help her there in the jungle, there, maybe that could have saved the baby, I don't know if they saved it or not."* Beatriz, 40

This disparity may point to a potential inconsistency in emergency service response, alongside the absence of regular health service provision in the Gap. This was highlighted by Carolina's care experience at the Darién MRS:

*"I felt that I had [the fetus] very low, I couldn't close my legs and I was very worried. I talked to the people [at the Darién MRS] and there was no medical attention until 3 in the afternoon [...] I told them that I felt very poor, and they asked me 'Are you bleeding?' I told him 'No'. He responded that [the problem] doesn't count as essential."* Carolina, 29

The other two pregnant participants, Ana and Sonia, gave a somewhat positive account of their experience at the MRS—both women said they were given vitamins and folic acid at the MRS and were overall satisfied with the services. Ana mentioned that she *"wouldn't have received the same support, nor the same attention"* in Panama if it wasn't for her pregnancy.

### "Love in the mud"—sex, relationships, and transactional sex

Many participants, such as Mauricio and Jesus, believed that migrant people who have sex on their journey through the Gap have *"dirty mentalities"* and are *"unhygienic"*, saying that *"in all those places it smells of everything except love"*. Sex along the way was viewed by most as *"energy that is wasted"* (Carolina, 29) and that, even with existing partners, there is often *"no intimacy"* (Jaime, 29). However, many have also told stories of seeing couples get together in the Darién Gap:

*"There is something called 'love in the mud' here [...] There are people who meet on this journey and get into relationships. They become a couple! Man with man or woman with woman, and vice versa [...] They meet and suddenly they are together. I met a couple and I thought they've been together for ages, turns out that they met about 5 days ago [...] I was shocked, and they told me 'No, this is 'mud love'".* Jesus, 37

One of the participants recounted his own *"one-night stand"*, which happened just before entering the forest in Colombia:

*"It [one-night stand] was there, in Necocli, where I spent 4 days camping on the beach and it was good, that's where the opportunity arose [...] I only met her in those 4 days that I was there, the last two days. The girl's name was [name redacted], a very pretty little thing, she was also going, she was going there [through the Gap]."* Simon, 29

Such wide range of attitudes surrounding sexual relationships in transit through the Darién Gap suggests that individual experiences of sex and relationships, as well as the reasons for engaging in them, can be profoundly heterogeneous. While the brutal conditions of the journey can have a significant effect on mental and physical health, it would be misguided to describe all sexual and romantic relationships that are formed on the way as wholly negative. The patterns of sexual behaviour during migration, although often

significantly influenced by migration itself, appeared to reflect participant's pre-existing views on sexual norms.

### Transactional sex

Regarding sexual activity in exchange for money, participants gave direct and indirect witness accounts of migrant women providing sexual services in the Gap for food or cash to continue their journey:

*"The men offer the money. And since the girl doesn't have money to keep going and they have children, then they sacrifice themselves for the children, [...] because they need the money to, to continue the journey."* Jaime, 29

Some said that the financial power imbalance between migrant women travelling through the Gap and the men who are soliciting sex means that *"the situation lends itself"* to the exchange (Gabriel, 26).

Second-hand accounts of transactional sex within the Gap were not described by participants as sexually exploitative or non-consensual. Both male and female participants acknowledged that transactional sex is often a commonplace solution to a dire economic situation, and the need for HIV/STI prevention and testing provisions for female sex workers was highlighted:

*"They [those exchanging sex for something] also have to take care of themselves, if that is their job, if that is what they are going to live on. They have to take pills, take good care of themselves."* Isabel, 18

### Vulnerability to exploitation and sexual violence

Constant fear of sexual violence could be traced across most of the interviews with female participants. There was a shared agreement that travelling as a woman comes with perceivable risks, even where it wasn't spoken about directly. Many participants gave accounts of the *"organised armed groups"* (Jorge, 28) and *"bandits"* (Mauricio, 26) within the Darién Gap picking out women from travel groups to rape during or after the robbery.

Participants described how during the incident they were *"put together"* (Teresa, 20) as a group by the armed men and robbed, with some participants also mentioning that they *"could see what they [the armed men] were doing"*:

*"They started choosing the girls. They chose two young girls whom they've gone to rape. They came again for the two more. They raped them again. When I asked what happened before we came, [a friend] said they raped other girls before that. We couldn't see them, because they told us to turn our heads, to lie flat on our stomachs. There, they raped little girls in front of their dad, in front of their parents."* Francisco, 26

When discussing the dangers encountered on the journey, Mauricio mentioned that he chose to travel on his own instead of bringing his female partner—*"I don't want to travel here with her, because she's a woman"*. This may suggest that even though there is a shared sentiment among the participants of not

knowing *"what I was getting myself into"* (Diana, 22), the ubiquity of sexual violence in the Gap is largely recognised.

Participants who discussed incidents of sexual assault in the Gap also discussed the lack of support from the local authorities in regards to reporting cases of sexual violence. Crimes committed on Panamanian territory are the responsibility of the Public Ministry, to whom SENAFRONT typically report all cases of rape. Some participants, like Alvaro, said they felt that the opportunities to file a sexual assault report were limited:

*Interviewer: "They reported that they were raped to the police, or did you report it?"*

*Alvaro: "Yes, but they don't say anything. We told the soldiers, but they didn't tell us anything. They said "Yes, we are after them, but what can we do? The jungle is huge, so what can we do?"*

The feelings of shame, guilt, and fear were mentioned as the primary reasons for not reporting cases of rape, suggesting that women did not report *"out of fear"* and *"because of what happened to them"*. Alvaro said that women who were raped within the forest *"mostly kept it to themselves, they [were] ashamed to talk about it"*. He mentioned that when a woman in his travel group was raped *"the husband told her not to speak [about it]"*. In one case, participant Teresa talked about a woman whom she witnessed was *"reporting [the rape]"* at the Darién MRS, *"a girl who was bleeding"*, and that *"[local authorities] took her to the doctors"*.

Some participants expressed the view that emergency contraception should be provided along the journey to mitigate the unintended consequences of rape:

*"[Armed men] are raping [the women], imagine that they get pregnant, it's not their fault,"* said Mauricio. Maria said that a young woman travelling in her group *"told her mom to stay calm [about the rape], as long as she doesn't get pregnant"*. Similar to regular contraception, participants considered it necessary *"to bring stuff [emergency contraception] with you"* (Isabel, 18), although did not know how or where the contraception was acquired. This may point to the fact that women who were preparing to travel through the Darién may have been aware of the likelihood of sexual violence and so had planned to acquire the emergency contraception before the start of the journey.

## Discussion

Migrants transiting through the Darién Gap between Colombia and Panama gave accounts of their gruelling journey, which often manifested in fear, anxiety, anger, and the feeling of being at the mercy of not only the difficult conditions of the terrain but also of the individuals involved in the migratory process. Many expressed an opinion that every part of the journey, from being taken through the forest by *"coyote"* guides, to being left near



the Costa Rican border by the National Migration Service, was an inter-connected “business” between both lone and state actors. However, whilst participants knew that they were a commodity to human traffickers, they believed that travelling through the Darién was their only option to reach North America.

The resultant desperation of those wishing to emigrate can render them particularly vulnerable, making them an easy target for exploitation and violence. A sense of helplessness and vulnerability was intensified by the perceived ubiquity of sexual violence and a lack of a functional reporting system concerning sexual assault within the Gap. Among a sample of 52 men and 45 women interviewed by Gabster et al. as part of their rapid epidemiological SRH assessment, 40.4% ( $n=21$ ) of men and 54.8% ( $n=23$ ) of women felt somewhat or completely unsafe from sexual assault while traveling through the Gap (8). Garbett et al.’s systematic review of Central American data on SRHR challenges of migrant women and girls further supports the findings of our study—the absence of a coordinated multisectoral approach to the SRHR of migrant people, as well as a lack of consideration of issues surrounding their proactive agency and autonomy, negatively affect the wellbeing and health outcomes of migrant women, which can increase the incidence of GBV (26). The absence of wider social protection policies and international guidelines regarding the health and protection of migrant people often make it difficult for women to be active agents in their SRHR, instead placing an emphasis on disease transmission and perceived promiscuity. This can reinforce existing stigma regarding both migrant status and sex work or transactional sex (26, 27).

According to PAHO, migrant people are reportedly less likely to seek help from the national health systems during transit for the treatment of infectious diseases, including HIV, tuberculosis, viral hepatitis, and STIs (28). Kentikelenis et al. drew on the evidence from European economic crises to argue that migrant people can be at a disproportionately higher risk of STIs specifically related to unemployment and poverty, which create the conditions for HIV/STI transmission due to increased exposure to other risk factors. For example, changes in one’s socioeconomic environment can affect risk factors for intravenous drug use and transactional sex (29). Following the concept of “paradox of agency”, originally put forward by Garbett et al., in a context of constrained choices, many of the SRHR challenges migrant women and girls face can act as both a risk and a coping mechanism. For example, a decision to engage in transactional sex during the journey, may have short-term benefits of advancing on the migration journey by ensuring a flow of income, while simultaneously increasing longer-term health risks and making the person more vulnerable to violence. Using a contemporary paradigm supported by the Women’s Refugee Commission, those engaging in transactional sex should not be characterised by victim/saviour relationships or be viewed as rescue cases (30, 31).

In our study, participants reported poor gynaecological care for women with urinary, reproductive tract, and sexually transmitted infections, a lack of preventative SRH care, unhygienic communal bathrooms, and an absence of dedicated services for pregnant women were perceived by the participants as factors

that didn’t allow for adequate personal care for those passing through the Darién MRS. Clinical screening data collected by Toller-Erausquin et al. in early 2022 revealed that of a sample of migrant men and women screened, 58.8% ( $n=30/51$ ) of women and 5.7% ( $n=4/70$ ) of men reported a current reproductive tract or genital infection symptom, with abnormal vaginal discharge being the most common symptom among the women screened (40.0%) (8). Furthermore, SENAFRONT appeared to confiscate condoms upon arrival to the MRS, leaving people with a choice to either abstain from sexual activity or to engage in riskier sexual relationships.

Sexual behaviours are often significantly influenced by the process of migration itself, as migrant people extricate themselves from the social circles in their own countries, becoming part of different, often larger sexual networks (32, 33). Quantitative studies among migrant people in South Africa, Portugal, and Belgium have demonstrated that “risky” sexual behaviour and HIV acquisition were more prevalent among male and female migrant people compared to their local counterparts, both in transit and after re-settlement (34–39). Toller-Erausquin et al. data showed that out of a sample of migrant men and women who had a casual sexual partner in the last month, 42.9% ( $n=9/21$ ) of men and 80.0% ( $n=8/10$ ) of women reported not using a condom; whilst 32.7% ( $n=18/55$ ) of men and 18.2% ( $n=8/44$ ) of women reported never having an HIV test prior to the study (8). Lack of HIV/STI prevention methods (ie. condoms) and an absence of corresponding oral communication from the health staff contributes to an inability of making informed personal choices rooted in one’s bodily autonomy and agency. This is another instance of the potential “paradox of choice” among migrant people in transit—for a migrant woman, having short-term sexual relationships may deter sexual advances from other men and provide a feeling of safety, but in an environment where it is logistically difficult to practice safer sex, both options carry risks (26).

Tied in with reduced access to HIV/STI prevention methods, pregnancy care, and help after sexual assault and rape were conspicuously absent in this setting, which does not align with established humanitarian standards, such as the Minimum Initial Service Package (MISP) for Sexual and Reproductive Health in Crises, supported by the Woman Refugee Commission under the UNHCR (40, 41). MISP standards are to be applied to all people affected by humanitarian emergencies, including migrant people in vulnerable situations, as all individuals “have a fundamental human right to reproductive healthcare” (41). Furthermore, MISP services can be implemented without an in-depth needs assessment due to the amount of existing evidence that justifies its use, so there is currently no reason for why migrant people in transit in Panama (and elsewhere) can be denied such care. The right to reproductive care cannot be exercised without the availability of MISP services, including the management of consequences of sexual violence, prevention of excess maternal and new-born morbidity and mortality, and provision of contraceptives.

Based on the WHO data, approximately 15% of women pregnant at the time of displacement will experience obstetric

complications, including “obstructed or prolonged labour, pre-eclampsia/eclampsia, sepsis, ectopic pregnancy or complications of abortion”, many of which will not manifest in external bleeding (41, 42). Obstetric care that is not consistently available 24 h per day in humanitarian settings is shown to have a significant effect on increasing maternal and neonatal morbidity and mortality (43). There is currently no evidence of MISP provision targeted at migrant people in transit at Darién MRS or elsewhere in Panama, outside of the general health assistance provided by MSF and the Panamanian Red Cross. Furthermore, research done by Holloway et al. (44) of the Humanitarian Policy Group reiterated that SRHR of migrant peoples were not properly addressed in other Latin American countries along the route to Panama. For example, in Colombia, despite MISP implementation by PAHO/WHO, the local coordination was weak, and SRH services were not adequately integrated with HIV and GBV programmes, leading to vulnerable individuals “likely falling through the cracks” (45).

This study had a number of strengths and limitations. The use of semi-structured interviews as the main instrument for this qualitative study was a suitable approach for giving participants a voice in the collection of their experiences, feelings, and opinions. The approach enabled a more relaxed, trusting interview environment, and helped achieve data saturation. This study had three main limitations. First, an overwhelming majority ( $n = 20/26$ ) of interviewees originated from Venezuela, which limited the diversity of participant background. During participant recruitment, every effort was made to diversify the participant sample to reflect the range of personal experiences, views, and beliefs; however, the selection process was based on ascertaining the most information-rich cases and the suitability of participants based on the pre-determined inclusion/exclusion criteria— at the time of data collection, limited number of migrant people in transit from countries outside of Venezuela were deemed to fit the above conditions. Six participants who originated from countries outside of Latin America were also all male, which may have further affected representativity of the sample, however the fact that nearly all individuals originating from extracontinental countries are male; therefore, this is in line with what Toller-Erausquin et al.’s article also found. Nevertheless, participant interviews provided a sufficient range of information to reach data saturation regarding all four a-priori defined themes. Second, the externality of one of the interviewers being a white, English-speaking woman may have introduced respondent bias into participants’ responses, but was minimised by employment of well-trained, Spanish-speaking local staff where required. Thirdly, given the small participant sample of our study, the findings cannot be generalisable to all migrants in transit through Panama or Latin America; further longitudinal research across several countries is required in the future to help build a picture of SRH services needs and outcomes associated with the migrant people’s journey. Fourthly, non-response bias could have occurred; those who were at greatest risk or those who were survivors of assault may not have accepted to participate in the study.

In conclusion, this study has captured crucial insights into the experience and unmet needs regarding SRH care and access to

services within the Darién Gap, at Darién reception centre, and while travelling across Panama. Lack of appropriate risk-prevention information, reduced access to contraception, HIV/STI testing, and antenatal care pertains to the erosion of bodily autonomy and changes in sexual behaviour, both of which are intensified by the gruelling migration process. Local SRH interventions at the Panamanian reception centres and mobilisation of personnel are required to mitigate adverse health outcomes for migrant people in transit through the country. Many survivors are reluctant to report sexual and other GBV to authorities due to the bureaucracy of referral process. Therefore, integration of SRH services with GBV programmes is key—safe and confidential spaces within Panamanian MRS should be available to provide survivors with appropriate clinical care, and fast-tracked health referrals. On a larger scale, improved cooperation between governmental and non-governmental agencies, and provision of a minimal package of SRH preventative and care services throughout the migration route, are required to address the needs of highly vulnerable migrant populations.

## Data availability statement

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

## Ethics statement

Ethical approval for the study was given by the Instituto Conmemorativo Gorgas de Estudios de la Salud, Panama (ref: N221/CBI/ICGES/22) and the London School of Hygiene and Tropical Medicine Ethics Committee (ref: 27587). Written Consent for participation was given freely by each participant of the study.

## Author contributions

SP, PM, and AG conceived the research study. SP and AG conducted the literature review and designed the interview guide. SP, AG, SBN, CLG, and KMO completed data collection. AG provided contextual information to integrate quantitative and qualitative findings. SP and AG drafted the manuscript. PM assisted with manuscript editing. All authors contributed to the article and approved the submitted version.

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# Time to first childbirth and its predictors among reproductive-age women in Ethiopia: survival analysis of recent evidence from the EDHS 2019

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**Background:** Being a mother for the first time is the most significant event in a woman's life. "Age at first birth" refers to a mother's age in years when she gives birth to her first child. The age of first childbirth has physical, economic, and social implications. However, little is known about this issue in Ethiopia. Thus, this study sought to determine the time to first childbirth and its predictors at a national level.

**Methods:** Data were extracted from the 2019 Ethiopia Demographic and Health Survey using STATA version 17 software. A total of 8,885 weighted reproductive-age women (15–49 years) were included in this study. A Kaplan–Meier survivor curve was generated to estimate the time of first childbirth. A log-rank test was used to compare the difference in survival curves. Akaike information criteria and Bayesian information criteria were calculated to select the appropriate survival model for the data. The Weibull accelerated failure time model with no frailty distribution was used to identify significant predictors.

**Results:** The overall median survival time to first childbirth was 18 years. The significant predictors of time to first childbirth were the educational level of the mother [primary education ( $\phi = 1.036$ , 95% CI: 1.011, 1.063), secondary and above education ( $\phi = 1.154$ , 95% CI: 1.118, 1.191)], knowledge of any contraceptive method [know at least one ( $\phi = 1.051$ , 95% CI: 1.006, 1.101)], and media exposure ( $\phi = 1.048$ , 95% CI: 1.011, 1.086).

**Conclusion:** The median survival time to first childbirth was 18 years, which is lower than the optimal age for first childbirth (late 20 s and early 30 s). The timing of first childbirth in Ethiopia is mainly influenced by the educational level of women, knowledge of contraceptive methods, and exposure to media. Thus, exposing women to educational materials and other awareness-creation campaigns regarding the consequences of early first childbirth and strategies to improve women's knowledge of contraceptive methods is highly recommended.

## KEYWORDS

childbirth, determinants, Ethiopia, reproductive age, survival analysis, time to first

## Background

Age at first birth refers to the woman's age in years when she gives birth to her first child (1). Childbirth is the most significant event in a woman's life. It is an intense event that is physically, psychologically, socially, and culturally significant (2). The impact could be positive, both in the short and long term; however, sometimes, it could result in negative and traumatizing events (3).



Globally, nearly 16 million girls aged between 15 and 19 give birth to their first child each year (4). In developing countries, approximately one-third of women begin having children at 19 or younger, and nearly half of the first births in adolescence are from girls aged 17 or younger. Half of the girls who give birth between the ages of 15 and 17 have a second birth in adolescence, and 11 percent of girls with two births have the third birth in adolescence (5). Early pregnancy and motherhood are common in east African countries, ranging from 18% in Kenya and 29% in Malawi (6).

The socioeconomic implications of youth pregnancy and early childbearing are significant in developing nations and are linked with maternal mortality, low birth weight, poor school achievement and productivity, and, subsequently, intergenerational poverty transmission (7, 8). As the age at first birth decreases, the likelihood of maternal mortality rises. Girls who give birth under 15 and between 15 and 19 years of age are five and two times more at risk of mortality related to pregnancy and childbirth consequences, respectively, than women aged 20–24 at first birth (9, 10). Additionally, pregnancy-related consequences, such as eclampsia, obstetric fistula, and systemic infection, are linked to early age at first birth (11). Later in women's lives, early age birth is also linked to an increased risk of diabetes mellitus, hypertension, lung disease, and poor physical performance (12). In addition to having an adverse effect on the mother's health, it also has negative repercussions on their education, work prospects, and opportunities. Moreover, it is related to societal consequences such as violence, rejection, and shame (13). Additionally, early age at first birth significantly affects a country's population growth, particularly in countries where modern contraception is underutilized (11, 14). Under 5 morbidity is also greater among children born to mothers under 20 years of age (15). Additionally, the risk of newborn mortality is considerably higher for infants whose mothers are under 16 years of age (16). However, bearing a first child at an advanced age is associated with a higher risk of miscarriage, multiple pregnancies, diabetes, chromosomal abnormalities, and maternal mortality (10, 17).

The age at first birth varies across different regions. Among European Union (EU) countries the mean age of women at first childbirth ranges from 26.3 in Bulgaria to 31.3 in Italy (18). The median ages at first birth in East Asia and the Pacific (19), Bangladesh (20), Nigeria and Ghana (21, 22), Sub-Saharan Africa (23), and Uganda are 20.2, 16.34, 20, 19, and 19.2 years, respectively (24). In Ethiopia, 13% of women aged 15–19 have begun childbearing and 2% are pregnant with their first child. One in two women aged 25–49 give birth for the first time before age of 20 years (25).

Lower level educational status (26–28), rural residency (21), poor wealth index (29), unemployment (14), husband's education and occupation (30), early age at first sexual intercourse (28, 31), younger age at first marriage (32, 33), peer pressure (34), and smoking status (35) were identified as predictors for early age at first childbirth in several studies.

Delaying pregnancy and childbearing in adolescent women may result in higher academic achievement, ensuring women's economic independence and a better life. Even though promising progress has

been made so far regarding age at first birth, early childbearing remains a great challenge in Ethiopia. In 2021, Ethiopia launched a new national adolescent and youth health strategy (2021–2025) with the aim of reducing early age at first pregnancy from 13% to 7% and increasing the median age at first marriage from 17 to 18, thereby reducing early age at first birth (36). Understanding the current nationwide status of age at first birth will play an enormous role in achieving the above-stated goal.

A few related studies have been undertaken so far in Ethiopia. Most studies focused on only teenage and/or adolescent childbearing (37, 38). Furthermore, studies were limited to specific districts/areas (39). Survival analysis of time to first birth among reproductive-age women will have a paramount role in subduing those limitations and further estimating the significant impact of predictor variables at a national level. The age at which childbearing first commences will have a crucial role in estimating the overall fertility level at the country level. Furthermore, this study uses recent Ethiopia Demographic and Health Survey (EDHS, 2019) data, which is crucial in providing up-to-date information on national improvements regarding early childbearing.

## Methods

### Study setting, study period, and data source

Based on the latest census figures and projections from trading economics, the total population in Ethiopia was estimated at 115.0 million people in 2020 (40). The final report of the EDHS 2019 contained detailed information at a national level from the nine regional states and two city administrations of Ethiopia. The administration levels went from regions to zones and through woreda. A survival analysis was conducted among reproductive-age group (15–49) women in Ethiopia using the EDHS data. The EDHS was implemented by the Ethiopian Public Health Institute (EPHI) in collaboration with the Central Statistical Agency (CSA) and the Federal Ministry of Health (FMoH). The target populations were women aged 15–49 and men aged 15–59 in selected households across Ethiopia. The EDHS contains information on the background characteristics of the respondents, maternal health care, fertility, marriage and sexual activity, child feeding practices, nutritional status of women and children, and adult and childhood mortality. Data collection was carried out from March to June 2019 (41).

### Data extraction and population

We received a letter permitting us to acquire the EDHS 2019 data from the DHS program after making a reasonable request. Data extraction was carried out to select reproductive-age women. For this study, a weighted sample of 8,885 reproductive-age women was drawn. The data extraction period was from October 1, 2022 to October 15, 2022. All reproductive-age women (15–49 years) in Ethiopia were the source population, whereas all reproductive-age women (15–49 years) in Ethiopia in the selected enumeration area were the study population.



## Sampling methods

The 2019 EDHS sample was stratified and selected in two stages. Each region was stratified into urban and rural areas, yielding 21 sampling strata. In the first stage, 305 enumeration areas (EAs) (93 in urban areas and 212 in rural areas) were selected with a probability proportional to EA size. In the second stage, a fixed number of 30 households per cluster were selected with an equal probability systematic selection from the newly created household listing. Sample allocation was carried out to ensure that survey precision was comparable among regions. A total of 25 EAs were selected from eight regions (including two city administrations), and 35 EAs were selected from the three largest regions: Amhara, Oromia, and the Southern Nations, Nationalities, and Peoples' Region (SNNPR). The detailed sampling procedure is accessible in the EDHS 2019 report (41). In this study, a total of 8,885 weighted reproductive-age women (15–49 years) were included. The highlighted sampling procedure for this study is indicated in the figure below (Figure 1).

## Inclusion and exclusion criteria

All reproductive-age women (15–49 years) in the selected enumeration area were included in the study, whereas women declared infecund were excluded.

## Study variables

The dependent variable is the time (in years) at first childbirth. This study considered different explanatory variables to determine predictors of time to first childbirth (Table 1).

## Operational definition

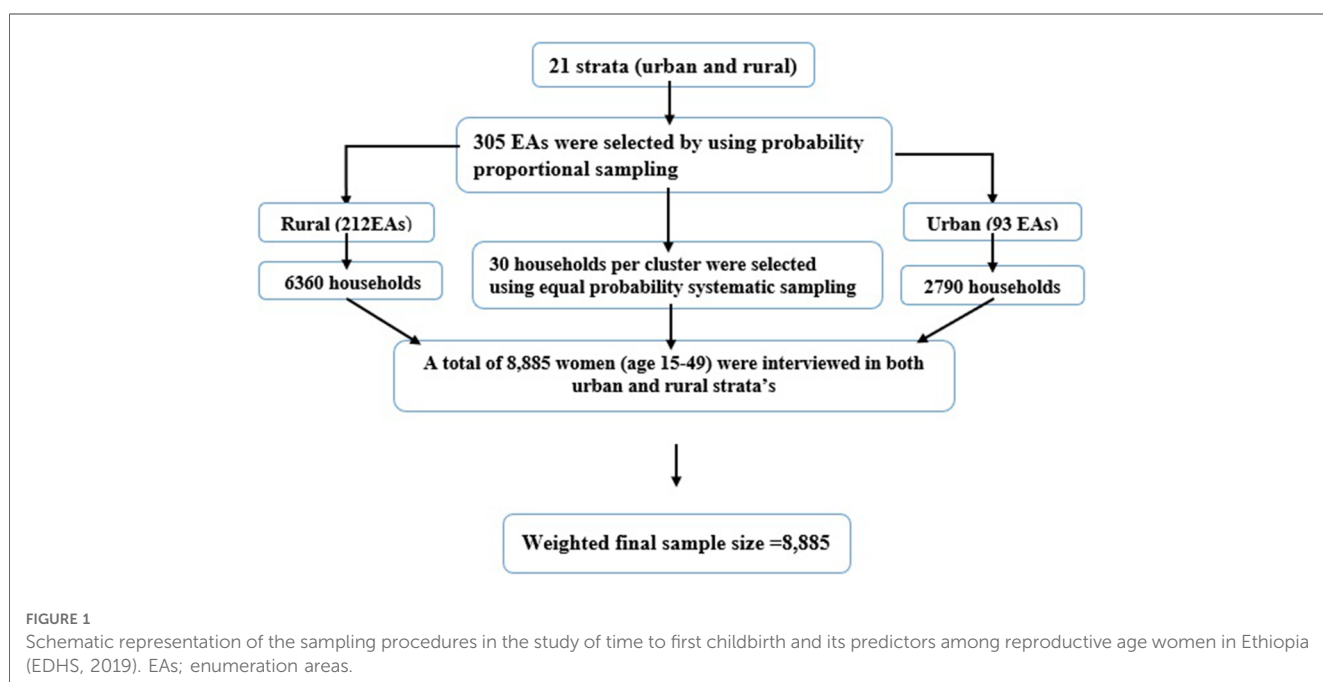
Event: mothers who first gave birth until the 2019 EDHS data collection end date. Censored: women who did not first give birth until the 2019 EDHS data collection date. Time to first birth: age of the mother in years when she first gave birth (42).

## Data processing and analysis

STATA version 17 software was used to extract data from the EDHS 2019 individual (women) record folder. The data were coded, cleaned, and edited. Listing and sorting were carried out to find any missing values. Descriptive statistics were analyzed and presented in terms of frequency and percentage. Age at first birth is calculated as the age difference between the mother and her

TABLE 1 List of explanatory variables for the assessment of time to first childbirth in Ethiopia.

	Description
Woman's age	Categorized as 15–24, 25–34, and 35–49
Residence	Categorized as urban or rural
Mother educational level	Categorized as no education, primary, secondary, or higher
Wealth index	Categorized as poor, middle, or rich
Marital status	Not married or married
Sex of household head	Categorized as male or female
Household size	Categorized as 1–4, 5–9, and 10 and more
Contraceptive use and intention	Does not intend, using traditional method and using modern method
Knowledge of any contraceptive method	Knows no method or knows at least one method
Media exposure (television)	Yes or no
Media exposure (radio)	Yes or no



oldest child. A Kaplan–Meier survivor curve was used to determine the time (years) of first childbirth. A log-rank test was computed to compare the difference in survival curves between categories of variables. A Shenfield residual was fitted and computed to test the assumption of the Cox proportional hazard. Akaike information criteria (AIC) and Bayesian information criteria (BIC) were calculated to select the appropriate survival model for the data. Multicollinearity was checked before running the selected survival model. A VIF above 4 or tolerance below 0.25 indicated that multicollinearity might exist (43). In this study, the maximum VIF was 2.30 with a mean VIF of 1.54 and the minimum tolerance value was 0.43. Thus, there was no multicollinearity between covariates. Variables with a  $p \leq 0.25$  in the bivariate analysis were fitted and included in the multivariable Weibull accelerated failure time (AFT) model. In the multivariable analysis, variables with a  $p \leq 0.05$  were considered statically significant.

## Rationale for using the survival analysis

Survival analysis is a statistical method for analyzing data in which the outcome variable of interest is the time until an event occurs. The outcome of interest in this study was the time to first childbirth, which is time to event data and do not merely depend on whether the event occurred or not but also the time at which the event occurred. Thus, it is best suited to use a survival analysis model. Furthermore, the outcome of interest contained both an event and a time. Thus, linear and logistic regressions were not appropriate. Additionally, those regression models are not well enough equipped to handle censoring events.

## Results

### Socio-demographic and reproductive health-related characteristics

A total of 8,885 weighted reproductive-age women were included for the examination on the time to first childbirth in Ethiopia; 5,855 (65.9%) of women gave birth to at least one child (event). Weighted frequency analysis showed that 6,024 (67.8%) of the respondents resided in rural areas. Regarding educational status, 3,589 (40.4%) of the respondents had no formal education. A total of 3,052 (34.4%) reproductive age women were in the poor household wealth index category. Concerning knowledge of any contraceptive method, 424 (4.8%) of the women did not know of any contraceptive method (Table 2).

### Survival time of first childbirth

The overall median survival time to first childbirth was 18 years. The total follow-up time contributed by all study participants was 107,124 person years. The survival probability of time to first childbirth beyond 14, 16, 18, and 20 years was 87.8%, 72.6%, 53.5%, and 34.4%, respectively (Figure 2).

TABLE 2 Socio-demographic and reproductive health-related characteristics of women in Ethiopia (EDHS, 2019).

Variable	Categories	Weighted frequency	First childbirth status	
			Censored (%)	Event (%)
Age	15–24	3,691	2,635 (29.5%)	1,055 (11.9%)
	25–34	2,827	325 (3.7%)	2,502 (28.2%)
	35–49	2,367	69 (0.8%)	2,298 (25.9%)
Residence	Urban	2,861	1,188 (13.4%)	1,673 (18.8%)
	Rural	6,024	1,842 (20.7%)	4,182 (47.1%)
Mother education level	No education	3,589	365 (4.1%)	3,224 (36.3%)
	Primary	3,701	1,700 (19.1%)	2,001 (22.5%)
	Secondary and above	1,595	964 (10.9%)	630 (7.1%)
Wealth index	Poor	3,052	856 (9.6%)	2,196 (24.75%)
	Middle	1,671	526 (5.9%)	1,145 (12.9%)
	Rich	4,162	1,648 (18.5%)	2,514 (28.3%)
Marital status	Not married	2,325	2,274 (25.6%)	51 (0.6%)
	Married	6,560	755 (8.5%)	5,804 (65.3%)
Household size	1–4	3,175	1,134 (12.8%)	2,040 (23.0%)
	5–9	5,180	1,662 (18.7%)	3,519 (39.3%)
	10 and more	530	234 (2.6%)	296 (3.3%)
Contraceptive use and intention	User	2,556	253 (2.9%)	2,303 (25.9%)
	Nonuser	6,329	2,777 (31.2%)	3,553 (40.0%)
Knowledge of any contraceptive method	Knows no method	424	212 (2.4%)	212 (2.4%)
	Knows at least one method	8,461	2,818 (31.7%)	5,643 (63.5%)
Media exposure (television)	No	7,027	2,274 (26.0%)	4,753 (54.4%)
	Yes	1,716	668 (7.6%)	1,048 (12.0%)
Media exposure (radio)	No	6,219	2,064 (23.6%)	4,155 (47.5%)
	Yes	2,523	877 (10.0%)	1,646 (18.8%)

The median survival time differed among the participant characteristics. The median survival time was 19 years for women who resided in an urban area and 17 years for women from a rural area. By educational status, the median survival time was 17 years for women with no formal education and 20 years for those with secondary and above education. Regarding the wealth index, the median survival times for poor, middle, and rich were 17, 18, and 19 years, respectively.

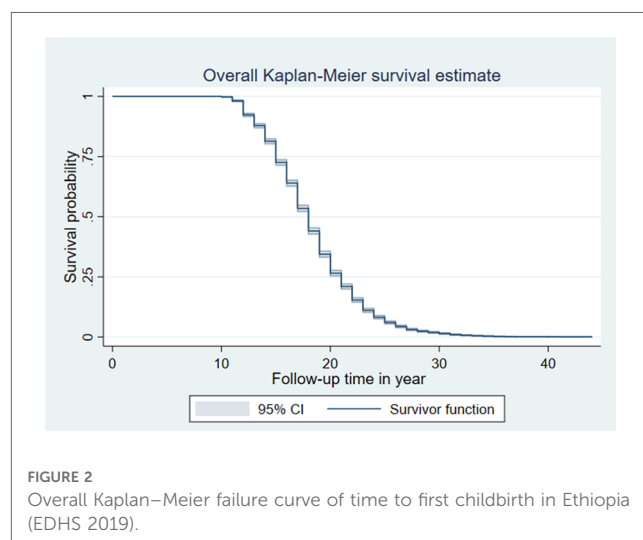


FIGURE 2 Overall Kaplan–Meier failure curve of time to first childbirth in Ethiopia (EDHS 2019).

## Comparisons of survival functions of different categorical variables

A Kaplan–Meier survival curve and log-rank test were computed to compare and estimate the survivor function among different characteristics of the respondent. In the Kaplan–Meier survival curve, one survivorship function curve located under another implies that the lower curve group has a lower survival status than the upper curve group. Furthermore, the difference is explained statistically by the log-rank test.

Generally, the Kaplan–Meier survival curve shows that women who reside in a rural area, have no formal education, and have lower wealth index categories had their first child earlier than the reverse group. Furthermore, the log-rank test  $p$ -value showed that there was a significant difference in survival experience among covariates of residence ( $p < 0.001$ ) (Figure 3), women's educational level ( $p < 0.001$ ) (Figure 4), and wealth index categories ( $p < 0.001$ ) (Figure 5).

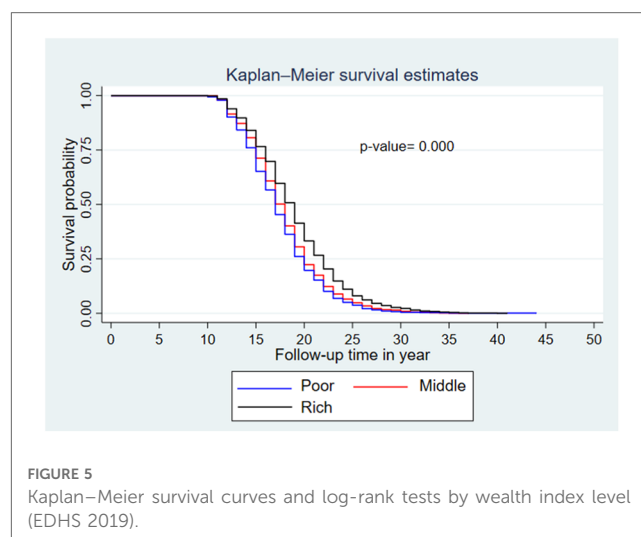
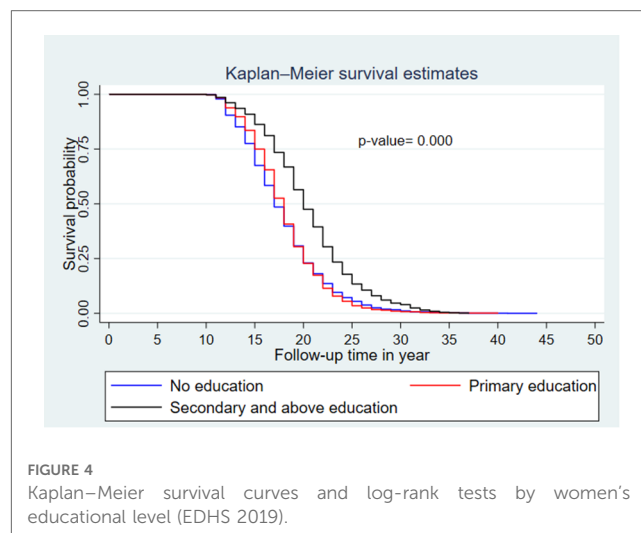
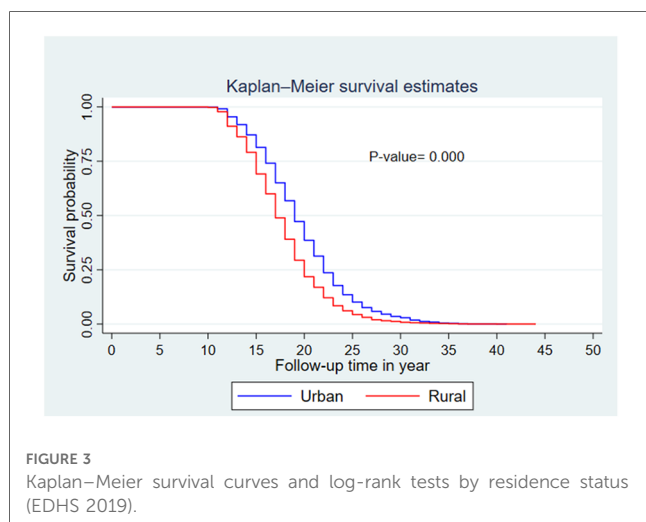
## Model selection

### Proportional hazard assumption test by schoenfeld residual

The rho statistic  $p$ -value of all covariates and the global test  $p$ -value in the Schoenfeld residual was below 0.05. Therefore, the proportional hazard assumption was not fulfilled. Thus, the accelerated failure time model was considered.

### Accelerated failure time model test

The model with the smallest  $AIC$  and  $BIC$  values was considered to be the best survival model for the given data. The Weibull accelerated failure time (AFT) model with no frailty was found to have the smallest  $AIC$  and  $BIC$  values (299.23 and 225.82). Thus, the Weibull accelerated failure time (AFT) model



with no frailty was the best model for the data to describe the status of women towards time to first childbirth and its predictors (Table 3).

## Predictors of time to first childbirth

In the bivariable Weibull AFT model, age, residence, mother education level, wealth index, sex of household head, knowledge of any contraceptive method, media exposure (television), and media exposure (radio) were found to be significant, with a  $p \leq 0.25$ . Additionally, in this model, mother educational level, knowledge of any contraceptive method, and media exposure (television) were predictors of time to first childbirth.

The acceleration factor for time to first childbirth among mothers who had secondary and above education level was 1.154 ( $\phi = 1.154$ , 95% CI: 1.118, 1.191) compared with an uneducated mother. Additionally, the acceleration factor for time to first childbirth in mothers with only primary education was 1.036 ( $\phi = 1.036$ , 95% CI: 1.011, 1.063) compared with the reference

TABLE 3 Comparison of akaike information criteria and Bayesian information criteria among different accelerated failure time model and frailty distributions.

Information criteria	Models	Frailty distributions		
		No frailty	Gamma frailty	Inverse Gaussian frailty
AIC	EXPONENTIAL	11,996	11,998	11,998
	WEIBULL	<b>299.23</b>	966.86	808.86
	LOG-LOGISTIC	946.89	944.89	944.89
	LOG-NORMAL	1,054.49	1,052.49	1,052.49
	GENERALIZED GAMMA	1,052.69	910.81	967.50
BIC	EXPONENTIAL	12,062.73	12,071.4	12,071.4
	WEIBULL	<b>225.82</b>	886.78	728.78
	LOG-LOGISTIC	873.49	864.81	864.81
	LOG-NORMAL	981.09	972.41	972.41
	GENERALIZED GAMMA	972.61	824.06	914.12

Bold value indicates the lowest Akaike information criteria and Bayesian information criteria value.

group (no education). This shows that uneducated women gave birth to their first child earlier than educated mothers.

Regarding knowledge towards contraceptive methods, the acceleration factor of time to first birth for women who know of at least one contraceptive method was 1.051 ( $\phi = 1.051$ , 95% CI: 1.006, 1.101). This implies that women with knowledge of at least one contraceptive method have a delayed age at first birth compared to women without knowledge of contraceptive methods. In another way, women without knowledge of any contraceptive methods had their first child earlier than their counterparts. Women with media exposure (television) have a 1.048 times acceleration factor for time to first childbirth compared with the reverse group. ( $\phi = 1.048$ , 95% CI: 1.011, 1.086) (Table 4).

## Discussion

Time to first childbirth and its predictors were determined by using data from the recent 2019 Ethiopian Demographic Health Survey. Mother education level, knowledge of any contraceptive

method, and media exposure (television) were found to be predictors of time to first childbirth.

The overall median survival time (age) to first childbirth was 18 years. This finding is in line with a study carried out in Gambia (18 years) (44). This result is lower than the that from a study undertaken in several regions, such as the USA (26.9 years) (45), Ghana (19.91 years) (22), Uganda (19.2 years) (24), Nigeria (20 years) (33), and Kenya (20.3 years) (46). The awareness of women about the consequence of having babies at an early age and contraceptive access and utilization plays a paramount role in delaying age at first childbirth in developed countries (47). In developing countries like Ethiopia, women's autonomy regarding reproductive health decisions is low. This might lead to poor reproductive health care seeking behaviors, such as low contraceptive utilization, thereby resulting in early first childbearing (48, 49). In addition, the variation could be attributed to different factors such as age at first marriage, age at first sexual experience, and contraceptive usage, which were listed as factors that shortened the survival time of onset of first childbirth in different studies (22, 28, 50). For instance, the median ages at first marriage in Ethiopia and Kenya

TABLE 4 Bivariable and multivariable weibull accelerated failure time (AFT) model analysis for predictors of time to first childbirth in Ethiopia [EDHS 2019 ( $n = 8,885$ )].

Variable	Categories	Coef.	Acceleration factor ( $\phi$ )	95% CI for $\phi$	p-value
Residence	Urban	1	1	1	1
	Rural	-0.0097	0.990	(0.953, 1.029)	0.618
Mother educational level	No education	1	1	1	1
	Primary	0.0358	1.036	(1.011, 1.063)	<b>0.006</b>
	Secondary and above	0.1432	1.154	(1.118, 1.191)	<b>0.000</b>
Wealth index	Poor	1	1	1	1
	Middle	-0.0161	0.984	(0.957, 1.012)	0.264
	Rich	-0.0231	0.977	(0.948, 1.007)	0.136
Sex of household head	Male	1	1	1	1
	Female	0.0209	1.021	(0.992, 1.051)	0.153
Knowledge of any contraceptive method	Knows no method	1	1	1	<b>1</b>
	knows at least one method	0.0509	1.052	(1.006, 1.101)	<b>0.028</b>
Media exposure (television)	No	1	1	1	<b>1</b>
	Yes	0.0467	1.048	(1.011, 1.086)	<b>0.011</b>
Media exposure (radio)	No	1	1	1	1
	Yes	-0.0152	0.985	(0.957, 1.013)	0.295

Bold value indicates variables having a p-value of  $\leq 0.05$ .

were 17.2 years (51) and 19 years (52), respectively. In addition, contraceptive use is quite different; the prevalence of contraceptive use in Kenya is 39% (53), whereas as in Ethiopia it is 20.42% (54).

On the contrary, the finding of this study is higher than the study conducted in Bangladesh (17.92 years) (55). This variation could be attributed to differences in religious beliefs. In Bangladesh, most of the population has a Muslim affiliation. A Muslim religious affiliation is closely linked with the early age of the mother at first birth (14). In addition, in Bangladesh, many people are unaware of the consequences of early marriage and early pregnancy (56).

This study revealed that women's educational level is a predictor of time to first childbirth. Women who attend primary, secondary, and higher education delayed their first childbirth more than those who did not have any education. This finding is consistent with a study carried out in Kenya (57), which concluded that the probability of giving birth at an earlier age decreases as the educational level increases. Similarly, a study carried out in Ghana revealed that the higher the woman's educational level, the longer the waiting time for her first birth: 73% of postsecondary level women had yet to give birth before the age of 30 (22). Furthermore, a study conducted in Bangladesh also found pretty consistent findings that women with higher levels of education have a lower risk of having an early first birth (42).

The possible explanation might be that uneducated women might not know the optimal age at which giving childbirth has the minimum risk. Education level and contraceptive utilization is directly proportional. The higher the education level, the higher the use of contraception (58). Thus, the low contraceptive use of uneducated mothers leads to early first childbirth. Therefore, enrolling women in at least primary education will reduce the incidence of early first childbirth and the related consequences.

This finding indicates a positive interaction between women's knowledge of contraceptive methods and delaying the time of first childbirth. This finding is supported by a study carried out in East Asia and the Pacific (19) that found that there is a high incidence of early first childbirth among women without any knowledge of contraceptive methods. Likewise, a study conducted in Tanzania (59) also revealed that contraceptive knowledge is considerably high among women who delay their first childbirth.

This might be because the likelihood of contraceptive use was high among women who know about contraceptives (60). Women might delay early-age maternity as long as she uses contraceptive methods. Thus, policymakers should emphasize improving women's knowledge of different types of contraceptives by providing access to information about contraceptives through healthcare providers, online resources, and community organizations. Furthermore, it is recommended that open dialogue about contraception is encouraged between women and their partners, family members, and healthcare providers. Thus, increasing women's knowledge of contraceptive methods can delay early maternity, preventing unintended adolescent pregnancy and early pregnancy-related mortality and morbidity.

Media exposure has also been found to be a predictor of time to first birth. Women who have access to media are less likely to give birth to their first child at an early age than those who did not have access. This result is in agreement with a study carried out in Bangladesh (61) that indicated that women exposed to media on a

regular basis were less likely to give birth to their first child at an early age than those who are not exposed (44.8% vs. 70.2%).

This finding points to the fact that women who do not have access to media might be unaware of the complications associated with early age at first childbirth. In addition, maternal healthcare utilization, including family planning services, is significantly higher among women exposed to mass media, which delays early maternity (62). Furthermore, those who were not exposed to media were more likely to get married earlier and have earlier sexual experiences, resulting in early first childbirth. Thus, advertisements and educational programs through mass media targeting the consequences of early first childbirth on maternal and child health are highly recommended.

The strength of this study is that it uses nationally representative data and can be generalizable to all Ethiopian reproductive-age women. Owing to the self-reported nature of the data, there might be recall bias. As the data source is secondary, it is difficult to quantify other potential predictors of time to first childbirth. A lack of trend analysis is also a limitation of this study.

## Conclusion

In this study, the median survival time to first childbirth was 18 years, which is lower than the optimal age for first childbirth, between the late 20 s and 30 s (63, 64). This is the ideal age for education. In addition to having implications on her social, physical, and mental health, being a mother at this age may prevent the woman from attending school. The timing of first childbirth in Ethiopia is mainly influenced by women's level of educational, knowledge of contraceptive methods, and access to media. Interventions could involve raising women's educational levels by exposing them to educational materials and other awareness-creation efforts regarding the consequences of early first childbirth. In addition, expanding adolescent and youth-friendly services in the country might increase women's knowledge of contraceptive methods. Furthermore, including sexual and reproductive health education programs in the educational curriculum also contributes to reducing early marriage and sexual initiation, thereby decreasing early first childbirth. Furthermore, policymakers and other non-governmental organizations should continuously invest resources in transmitting messages through mass media (television), such as advertisements and other programs, regarding the impact of early childbirth. In conclusion, a prospective follow-up study that includes other potential predictors is recommended.

## Data availability statement

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

## Author contributions

TAK: conception, proposal development, data acquisition, analysis, data interpretation, and article drafting. RNH:



Participated equally in design, data management, analyses, interpretation, and manuscript write up. All authors contributed to the article and approved the submitted version.

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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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## Supplementary material

The Supplementary Material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/frph.2023.1165204/full#supplementary-material>.



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# Magnitude of unintended pregnancy and its determinants among childbearing age women in low and middle-income countries: evidence from 61 low and middle income countries

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**Background:** Unintended pregnancy is one of the most serious health issues in low and Middle-Income Countries (LMICs), posing significant health, economic, and psychosocial costs to individuals and communities. However, there is limited evidence on the prevalence of unintended pregnancies and their determinants in LMICs. Hence, this study aimed to assess the prevalence of unintended pregnancy and its associated factors among childbearing-age women in LMICs.

**Method:** Data for the study were drawn from a recent 61 Demographic and Health Surveys (DHS) conducted in LMICs. A total sample of 187,347 mothers who gave birth in the five years preceding the survey was included. STATA version 16 was used to clean and analyze the data. Multilevel multivariable logistic regression was employed to identify individual and community-level factors of unintended pregnancy in LMICs. In the multivariable analysis, an adjusted odds ratio with a 95% confidence level was reported to indicate statistical association.

**Results:** The pooled magnitude of unintended pregnancy in LMICs was 26.46% (95% CI: 25.30%, 27.62%), ranging from 19.25% in Egypt to 61.71% in Bolivia. Working status (AOR = 1.03; 95% CI: 1.01, 1.06), having a husband with no education (AOR = 1.07; 95% CI: 1.00, 1.15), and primary education (AOR = 1.05; 95% CI: 1.01, 1.11), women from male-headed households (AOR = 1.04; 95% CI: 1.00, 1.08), media exposure (AOR = 1.05; 95% CI: 1.02, 1.08), unmet need for contraception (AOR = 1.05; 95% CI: 1.02, 1.08), distance from a health facility (AOR = 1.03; 95% CI: 1.00, 1.06) were significantly associated with unintended pregnancy.

## Abbreviations

AOR, adjusted odds ratio; CI, confidence interval; DHS, demographic and health survey; ICC, intra-class correlation coefficient; LMICs, low and middle-income countries; PCV, proportional change in variance.

**Conclusion:** Unintended pregnancy rates remain high in LMICs. Women whose husband has no education and primary education, women with media exposure, working status, women who live in a household headed by male, women with unmet need for contraception, and women with a big problem of distance to health facilities were variables that were significant predictors of unintended pregnancy. When attempting to minimize unintended pregnancy in LMICs, these factors need to be considered. Furthermore, most of these attempts should be driven by government entities in low and middle-income countries.

#### KEYWORDS

unintended pregnancy, multilevel analysis, low and middle-income countries, child bearing age, women

## Background

Unintended pregnancies are pregnancies that are unwanted and/or mistimed at the time of conception (1, 2). Because of the consequences associated with both the mother's and child's social and health outcomes, unintended pregnancy is a major public health concern in both high-income countries and Middle-Income countries (LMICs) (3–5). It is estimated that 208 million pregnancies occur worldwide each year, with 46% of them becoming unintended (6). Annually, more than 14 million unintended pregnancies were reported in Sub-Saharan Africa (7). Although the global trend of unintended pregnancy has decreased over time, it remains high with significant regional variations (6, 8–11).

Although it is a problem in both high-income countries and LMICs, unintended pregnancy has decreased in high-income countries compared to LMICs (7). In some areas, unintended pregnancy accounts for more than half of all pregnancies (12). In low-income countries, the rate of unintended pregnancy varies between 7.2 and 59.6 per 100 person-years of follow-up (11).

Maternal and neonatal mortality remain unresolved public health problems (12–15). Unintended pregnancy causes maternal morbidity and mortality as a result of the complications of unsafe abortion, miscarriage, and unplanned births (16–18). Unintended pregnancy has serious consequences for women's and children's health and well-being (19). Abortions occur in more than half of unintended pregnancies (12, 20). Unintended pregnancies can lower the use of maternal (21–24), and neonatal (25) health services utilization, and worsen maternal health outcomes (2, 26–28). Moreover, unintended pregnancy is associated with malnutrition, mental illness, and vertical transmission of the Human immunodeficiency virus (HIV) to children (29, 30).

Maternal health issues are the first key research area in sexual and reproductive health till 2030 (31). Unintended pregnancy is one of the most serious public health problems that impose major health, economic, and psychosocial costs on individuals and communities, as well as significant emotional damage to women, families, and society (32–34). Besides, unintended pregnancy is associated with preeclampsia, obstetric bleeding, stigma, and socioeconomic inequalities (2, 27, 35, 36).

Different variables such as maternal age (37–39), marital status (37, 39, 40), wealth status (7, 38, 41), having an occupation (42),

educational status of women (1, 19, 41–43), media exposure (37, 44), parity (37, 38, 45), family size (37, 45), contraceptive use (38, 42), being victims of sexual violence (46–48) were found predictors of unintended pregnancy.

Tackling unintended pregnancy is one way to reduce the high rates of maternal and neonatal mortality (20, 24–26, 49, 50). To the best of our knowledge, no studies have been conducted to investigate the magnitude of unintended pregnancy in LMICs. Because the majority of unintended pregnancies occur in low- and middle-income countries, there is a critical need to explore the underlying causes of unintended pregnancies among women in these countries. Hence, the primary goals of this study were to determine the prevalence of unintended pregnancy and to assess the effects of potential underlying factors on unintended pregnancy among women aged 15–49 in LMICs.

## Methods

### Study population and data sources

This study used the Demographic Health Survey (DHS) data from 61 low and middle-income countries collected between 2008 and 2020. By measuring key indicators deemed important, a DHS survey allows countries to generate data that can be used to inform policy and practice. Each country's survey includes a variety of datasets such as men, women, children, birth, and household datasets. For this study, we used individual record (IR) data. To select study participants, the DHS employs a two-stage stratified sampling technique.

This study only included women between the ages of 15 and 49 who had given birth within the previous five years of the survey. As a result, the total sample size was 187,347, with respondents from each country ranging from 607 in Guyana to 9,534 in Nigeria. A detailed description of the survey year, sample size, and sample characteristics is presented in [Table 1](#).

### Study variables and measurements

The outcome variable was unintended pregnancy, which is composed of both pregnancies that are wanted no more

TABLE 1 Sample size determination in the study of the magnitude of unintended pregnancy among pregnant women, LMICS, DHS, 2008–2020.

Country	Year of survey	Sample size	Country	Year of survey	Sample size
Afghanistan	2015	9,065	Liberia	2019/20	1,817
Albania	2017/18	995	Lesotho	2014	1,177
Armenia	2015/16	598	Madagascar	2008/2009	3,921
Angola	2015/16	3,953	Chad	2014/15	5,169
Bangladesh	2017/18	2,333	Mali	2018	3,055
Burkina Faso	2010	4,785	Myanmar	2015/16	1,691
Benin	2017/18	4,168	Maldives	2016/17	1,102
Bolivia	2008	2,669	Malawi	2015/16	6,190
Burundi	2016/17	4,147	Mozambique	2011	3,621
Central Democratic Congo	2013/14	5,041	Nigeria	2018	9,534
Congo	2011/12	2,583	Niger	2012	3,681
Cote more	2011/12	2,430	Namibia	2013	1,847
Cameroon	2018	3,010	Nepal	2016	1,917
Colombia	2015	3,445	Papua New Guinea	2016/18	3,008
Dominican Republic	2013	1,054	Philippines	2017	3,142
Egypt	2014	6,505	Pakistan	2017/18	3,109
Ethiopia	2016	3,567	Rwanda	2019/20	2,998
Gabon	2012	1,659	Sierra Leone	2019	3,340
Ghana	2014	1,855	Senegal	2010	3,454
The Gambia	2019/20	2,478	Sao tome & Principe	2008/2009	610
Guinea	2018	2,570	Togo	2013	2,281
Guatemala	2014/15	4,399	Tajikistan	2017	2,003
Haiti	2016/17	4,268	Timor Leste	2016	4,804
Guyana	2009	607	Turkey	2013	924
Honduras	2011/12	3,609	Tanzania	2015/16	3,277
Indonesia	2017	5,951	Ukraine	2007	514
Jordan	2017/18	3,175	Uganda	2016	4,631
Kenya	2014	5,772	South Africa	2016	1,443
Cambodia	2014	2,780	Zambia	2018	3,406
Comoros	2012	972	Zimbabwe	2015	2,366
Kyrgyz Republic	2012	1,401			

or wanted later (mistimed). It was a binary variable, women with mistimed pregnancies or unwanted pregnancies were recorded as “unintended pregnancies”, while those who needed pregnancy then were recorded as ‘intended pregnancy’ (13). The study included individual-level independent variables such as the age of women (15–19, 20–24, 25–29, 30–34, 35–39, 40–44, and 45–49 years), educational status of women (no education, primary, secondary, and higher), educational status of the husband (no education, primary, secondary, and higher), media exposure (yes or no), working status (working or not working), terminated pregnancy (yes or no), household wealth status (poorest, poorer, middle, richer, or richest), household members ( $\leq 5$ , 6–10 or  $>10$ ), and sex of household head (male or female), intention to use contraceptive (yes or no), and unmet need for contraceptive (yes or no). Community-level factors such as place of residence (rural or urban) and distance to health facilities (big problem and not a big problem) were also included.

Media exposure was created by asking women about the frequency of radio, television, and newspapers. It is classified as “yes” if women had at least one type of media exposure, such as radio, newspaper, or television, and “no” otherwise.

## Data processing and analysis

We appended the data from 61 LMICs after extracting the variables based on existing literature. Before any statistical analysis, the data were weighted using sampling weight to restore the survey’s representativeness. The data was cleaned and statistical analyses were carried out using STATA version 16. Frequencies and percentages were used to describe the background characteristics of the study participants. We conducted a multilevel logistic regression analysis, assuming that each community has a different intercept and fixed coefficient, with a random effect applied at the cluster level. Factors with a  $p$ -value  $\leq 0.2$  in crude odds ratio (COR) were selected as candidates for the adjusted model, finally, the adjusted odds Ratio (AOR) with 95% CI was reported, and variables with  $p$ -values less than 0.05 were declared to be significant predictors of unintended pregnancy in the multivariable analysis.

## Parameter estimation method and model building

The fixed effects method was utilized to estimate the relationship between unintended pregnancy and independent

variables, which was expressed as an odds ratio with a 95% confidence interval and a  $p$ -value of 0.05. The random effects, which are measures of variation of unintended pregnancy across communities or clusters, were expressed in terms of the Intra-Class Correlation (ICC), the median odds ratio (MOR), and the proportional change in variance (PCV). The ICC shows the differences between clusters in unintended pregnancy among reproductive-aged women. The ICC is calculated as  $ICC = \frac{VA}{VA+3.29} \times 100$ , Where; VA represents the area-level variance (51–53). The MOR indicates the central value of the odd ratio between the highest and the lowest risk regions when two clusters are chosen at random. The MOR is calculated as  $MOR = e^{0.95\sqrt{VA}}$ , where VA donates the area level variance (54, 55).

The PCV measures the proportion of total observed individual variation that can be attributed to differences between clusters. The PCV is calculated as;  $\frac{V_{null}-VA}{V_{null}} \times 100$ , whereas;  $V_{null}$  represents the variance of the initial model, while VA represents the variance of the model with more terms (54, 55).

Four models were fitted to select the best-fit model for the data using deviance: the null model (model without independent variables), model I (model with individual-level variables), model II (models including community-level variables), and model III (model with both individual and community-level variables). Deviance information criteria (DIC) ( $-2 \times \log$ -likelihood value) were used to assess the goodness of fit. The Variance Inflation Factor (VIF) was used to test for multicollinearity among the selected independent variables.

## Ethical considerations

The data set was obtained from the DHS website after a formal request and permission from the major DHS. All methods were performed following the Demographic and Health Surveys (DHS) program's relevant guidelines and regulations. The dataset was not allowed to be shared with other organizations and has remained confidential.

## Results

### Background characteristics of study participants

Majority of the participants are in the age group of 25–29 [49,946(26.66%)]. Single women had a greater proportion of unintended pregnancies (27.75%), while the least proportion was recorded among married women (25.90%). Women who are from urban areas had a greater proportion of unintended pregnancies (26.57%) than women from rural areas (25.80%). Women who are from the poorest households have a higher proportion of unintended pregnancies (26.65%) compared to women from the richest household (25.80%) (Table 2).

### The pooled prevalence of unintended pregnancies

The overall prevalence rate of unintended pregnancy in LMICs was 26.08% (95% CI: 26.00%, 26.41%). The highest prevalence of unintended pregnancy was reported in Bolivia at 61.71% (95% CI: 61.69%, 61.73%), and the lowest proportion of unintended pregnancy was recorded in Egypt at 19.25% (95% CI: 19.24%, 19.26%) (Figure 1).

### Factors associated with unintended pregnancy

Based on the final model (Model III, which includes both individual and community-level variables), occupation, husband's education, unmet need for contraceptive, and media exposure, and distance to health facilities were variables statistically associated with unintended pregnancy.

Women whose husbands have no education and primary education were 1.07 (AOR=1.07; 95% CI: 1.00, 1.15), and 1.09 (AOR=1.09; 95% CI: 1.02, 1.17) times higher odds of experiencing unintended pregnancies respectively than women who have higher education. The odds of unintended pregnancy in those who are currently working are 1.03 (AOR= 1.03; 95% CI: 1.00, 1.06) times higher than that of women who are not working. The risk of unintended pregnancy among women who live in a household with a male head was 1.04 (AOR=1.04; 95% CI: 1.00, 1.08) times higher as compared to women who live in a household with a female head. Women who are exposed to media have 1.05 (AOR= 1.05; 95% CI: 1.02, 1.08) times higher odds of having an unintended pregnancy than those women who have not been exposed to media. The odds of experiencing unintended pregnancy among those women who had an unmet need for contraception were 1.05 (AOR=1.05; 95% CI: 1.02, 1.08) times higher compared to those without an unmet need for contraception. Mothers who perceive distance from the health facility as a big problem had 1.03 (AOR=1.03; 95% CI: 1.00, 1.06) times higher odds of having an unintended pregnancy compared to their counterparts (Table 3).

### Random effects model and model fitness

The random effects results are shown in Table 3. It was found that in the empty model (Model 0), there are substantial variations in unintended pregnancies among LMICs. The ICC in the null model showed that about 2.1% (0.021) of the total variance was attributable to the community where the women live. Model III, which includes both individual and community-level variables, was chosen due to its low deviance (116,427). Therefore, Model III, the complete model with both the selected individual and household/community factors, was the best.



## Discussion

The pooled magnitude of unintended pregnancy in LMICs was 26.46% (95% CI: 25.30%, 27.62%). The finding is higher than a study done in Six Asian countries (19.1%) (56) and lower than a study done in SSA (29.0%) (13). It is critical to recognize that, while unintended pregnancies are common in LMICS, some variations still exist across countries. The possible reason for this variation might be the difference in the health system of each country. According to our findings, unintended pregnancy rates in low- and middle-income countries range from 19.25% in Egypt to 61.71% in Bolivia.

In a multivariable multilevel logistic regression analysis, paternal education, working status, median exposure, household wealth index, residence, and distance to health facilities were significantly associated with unintended pregnancy in low and middle-income countries.

Women whose husbands have no education and primary education have higher odds of unintended pregnancy compared to women whose husbands have higher education (57, 58). Partners who have no formal education or a lower level of education are less likely to encourage their wives to use modern contraceptives and a woman's pregnancy intentions and parenting decisions are influenced by her partner's attitude (59). Improving the male partner's educational status is critical

TABLE 2 Relationship between individual and community level variables and unintended pregnancy among pregnant women, LMICS, DHS, 2008–2020.

Variables	Categories	Unintended pregnancy		Total weighted frequency (%)
		Yes	No (%)	
Age of women	15–19	3,282 (26.09)	9,295 (73.91)	12,577 (6.71)
	20–24	11,079 (26.16)	31,264 (73.84)	42,343 (22.60)
	25–29	13,082 (26.19)	36,863 (73.81)	49,946 (26.66)
	30–34	10,218 (26.19)	28,804 (73.81)	39,022 (20.83)
	35–39	6,950 (25.74)	20,055 (74.26)	27,005 (14.41)
	40–44	3,215 (25.69)	9,300 (74.31)	12,515 (6.68)
	45–49	1,031 (26.19)	2,906 (73.81)	3,937 (2.10)
Women education status	No education	14,657 (25.04)	43,867 (74.96)	58,525 (31.24)
	Primary	15,351 (26.81)	41,918 (73.19)	57,269 (30.57)
	Secondary	14,876 (26.17)	41,959 (73.83)	56,835 (30.34)
	Higher	3,974 (27.00)	10,744 (73.00)	14,718 (7.86)
Husband education status	No education	12,277 (25.24)	36,358 (74.76)	48,635 (29.44)
	Primary	12,097 (26.36)	33,796 (73.64)	45,894 (27.78)
	Secondary	14,006 (25.79)	40,304 (74.21)	54,311 (32.88)
	Higher	4,144 (25.36)	12,200 (74.64)	16,344 (9.89)
Marital status	Single	2,859 (27.75)	7,446 (72.25)	10,306 (5.50)
	Married	42,654 (25.90)	122,036 (74.10)	164,690 (87.91)
	Separated/divorced/widowed	3,342 (27.07)	9,006 (72.93)	12,349 (6.59)
Wealth index	Poorest	10,730 (26.65)	29,052 (74.07)	40,261 (21.49)
	Poorer	10,171 (25.93)	28,435 (74.36)	39,224 (20.94)
	Middle	9,806 (25.64)	27,226 (73.83)	38,241 (20.41)
	Richer	9,652 (26.17)	27,226 (73.83)	36,878 (19.68)
	Richest	8,497 (25.95)	24,243 (74.05)	32,740 (17.48)
Occupation of women	Not working	22,729 (25.73)	65,611 (74.27)	88,341 (48.07)
	Working	25,161 (26.36)	70,286 (73.64)	95,448 (51.93)
Household size	1–5	22,609 (26.26)	63,479 (73.74)	86,088 (45.95)
	6–10	20,661 (26.01)	58,766 (73.99)	79,428 (42.40)
	>10	5,586 (25.59)	16,243 (74.41)	21,830 (11.65)
Sex of household head	Male	39,548 (26.05)	112,262 (73.95)	151,811 (81.03)
	Female	9,309 (26.20)	26,226 (73.80)	35,536 (18.97)
Media exposure	No	12,727 (25.26)	37,649 (74.74)	50,375 (26.89)
	Yes	36,130 (26.38)	100,840 (73.62)	136,970 (73.11)
Unmet need for contraception	Yes	11,403 (26.33)	31,907 (73.67)	43,310 (23.12)
	No	37,454 (74.00)	106,582 (26.00)	144,036 (76.88)
Intention to use contraception	Yes	14,812 (26.26)	41,597 (73.74)	56,410 (50.16)
	No	14,176 (25.29)	41,881 (74.71)	56,057 (49.84)
Community level variables				
Residence	Urban	17,784 (26.57)	491,445 (73.43)	66,929 (35.72)
	Rural	31,073 (25.80)	89,344 (74.20)	120,417 (64.28)
Distance to the health facility	Big problem	17,939 (25.99)	51,095 (74.01)	69,034 (36.85)
	Not big problem	30,918 (26.13)	87,393 (73.87)	118,313 (63.15)



because the male partner has a strong influence on most household decisions, including the timing of pregnancy and the number of children desired (58).

Women who have media exposure have higher odds of unintended pregnancy compared to women who have no media exposure. This finding is contradictory to a study done in Ethiopia (44, 60), Nepal (61), and Pakistan (62). The possible justification might be even though media exposure creates awareness, that women having exposure to media may have an increased chance of social networks that may expose them to unintended pregnancy.

Women who are currently working have higher odds of unintended pregnancy compared to women who are not currently working. This finding is consistent with a study done in Ethiopia (63, 64) This finding is contradictory to a study done in Ethiopia (65) and Cambodia (66). The possible reason might be women with occupations may have a high level of social interaction and the nature of their work, which may lead to casual sex followed by unwanted pregnancy (63).

The likelihood of unintended pregnancy was higher among women who lived in a household with a male head

than among women who lived in a household with a female head. The finding is similar to previous findings (67). Women living in male-headed households may not have the opportunity to actively participate in family planning decisions, resulting in an unmet need for family planning and unintended pregnancy (68).

Women with unmet family planning needs were more likely to experience unintended pregnancy than those with met needs. The finding is consistent with previous studies (69–73). The possible justification for this could be that the unmet need for contraception has exposed women to the risks of unplanned pregnancy. Addressing the challenges and unmet need for contraception should be a priority for reducing unintended pregnancies in low- and middle-income countries.

Women with a big problem with distance to health facilities have higher odds of having unintended pregnancies than women who do have not a big problem. The finding is consistent with a study done in Ethiopia (74–76). The possible reason might be that women facing a big problem of distance to health facilities may have a problem accessing health care such as contraception (77).

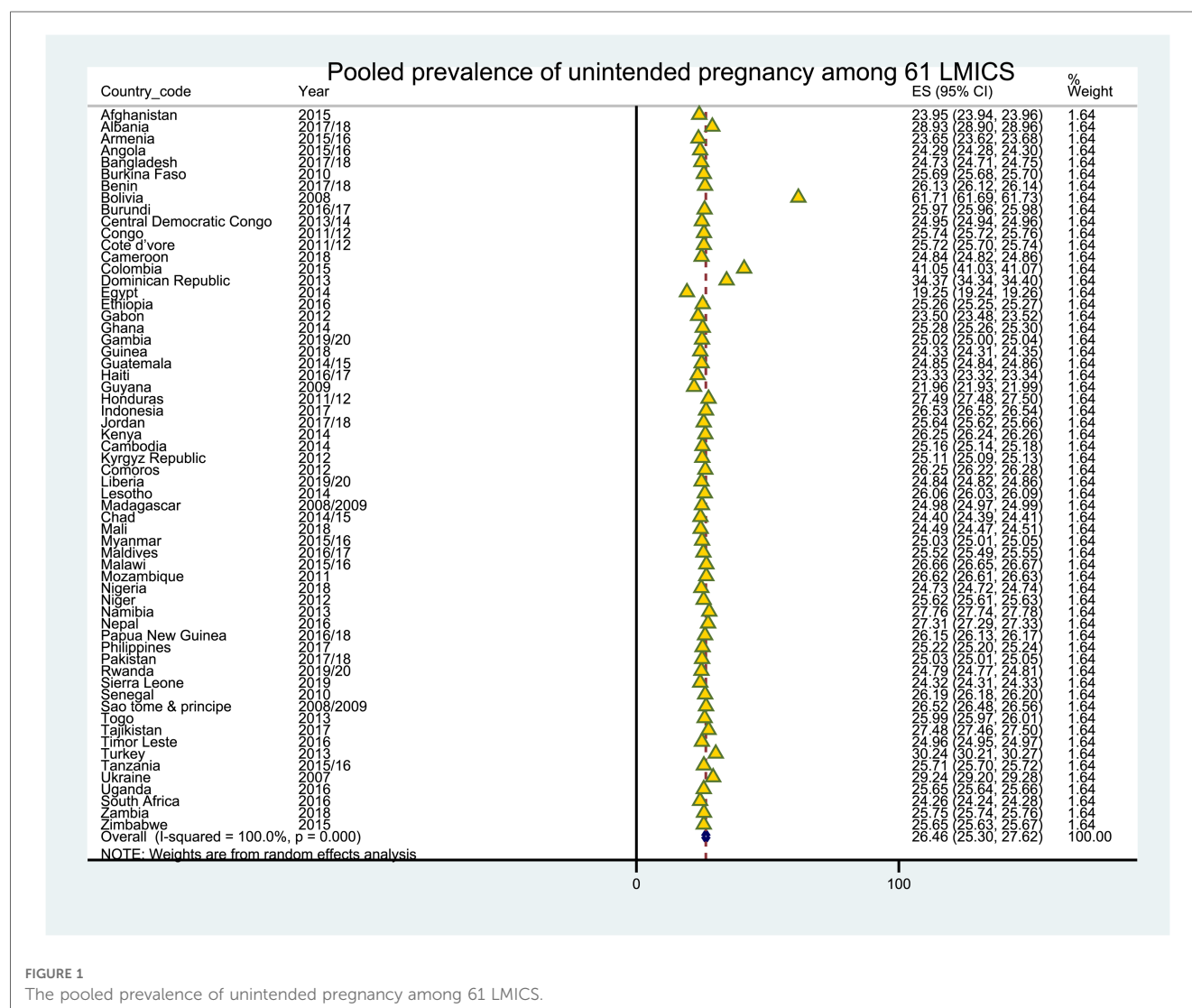


FIGURE 1

The pooled prevalence of unintended pregnancy among 61 LMICS.

TABLE 3 Multilevel multivariable analysis of factors associated with unintended pregnancy among women in LMICs, DHS 2008–2020.

Variables	categories	Null model	Model I	Model II	Model III
			AOR [95% CI]	AOR [95% CI]	AOR [95% CI]
Age of women	15–19		1.03 [0.97, 1.19]		1.03 [0.97, 1.11]
	20–24		0.99 [0.94, 1.04]		0.99 [0.94, 1.04]
	25–29		1.00 [0.96, 1.05]		1.00 [0.96, 1.05]
	30–34		0.99 [0.95, 1.04]		0.99 [0.95, 1.04]
	35–39		1.00		1.00
	40–44		0.98 [0.91, 1.04]		0.98 [0.91, 1.04]
	45–49		0.99 [0.90, 1.08]		0.99 [0.90, 1.09]
Women education status	No education		0.99 [0.91, 1.08]		0.99 [0.91, 1.07]
	Primary		1.05 [0.96, 1.14]		1.04 [0.96, 1.13]
	Secondary		1.02 [0.95, 1.12]		1.02 [0.94, 1.12]
	Higher		1.00		1.00
Husband education status	No education		1.07 [1.00, 1.15]*		1.07 [1.00, 1.15]*
	Primary		1.09 [1.02, 1.17]*		1.09 [1.02, 1.17]*
	Secondary		1.03 [0.97, 1.10]		1.03 [0.97, 1.10]
	Higher		1.00		1.00
Occupation of women	Not working		1.00		1.00
	Working		1.03 [1.00, 1.06]**		1.03 [1.00, 1.06]**
Household size	1–5		1.01 [0.97, 1.06]		1.01 [0.97, 1.06]
	6–10		0.99 [0.95, 1.03]		0.99 [0.95, 1.03]
	>10		1.00		1.00
Terminated pregnancy	No		1.00		1.00
	Yes		1.00 [0.96, 1.04]		1.00 [0.96, 1.04]
Sex of household head	Male		1.04 [1.00, 1.08]*		1.04 [1.00, 1.08]*
	Female		1.00		1.00
Wealth index	Poorest		1.00		1.00
	Poorer		0.99 [0.95, 1.03]		0.99 [0.95, 1.03]
	Middle		1.00 [0.96, 1.05]		1.00 [0.96, 1.05]
	Richer		1.00 [0.96, 1.05]		1.00 [0.96, 1.05]
	Richest		0.96 [0.92, 1.02]		0.96 [0.91, 1.02]
Knowledge of the ovulatory cycle	Yes		1.00		1.00
Media exposure	No		1.00		1.00
	Yes		1.05 [1.01, 1.08]*		1.05 [1.01, 1.08]***
	No		0.98 [0.95, 1.02]		0.98 [0.95, 1.02]
Intention to use contraceptive	Yes		1.00		1.00
	No		0.98 [0.96, 1.01]		0.95 [0.98, 1.01]
Unmet need for contraception	Yes		1.00		1.00
	No		1.05 [1.02, 1.08]*		1.05 [1.02, 1.08]***
Community level variables					
Residence	Rural			1.00	1.00
	Urban			1.04 [1.01, 1.06]*	1.01 [0.97, 1.05]
Distance to the health facility	Not big problem			1.00	1.00
	Big problem			1.01 [0.99, 1.03]	1.03 [1.00, 1.06]***
Random effect					
	VA	0.072	0.012	0.07	0.012
	ICC	0.021	0.003	0.02	0.003
	MOR	0.69	0.28	0.68	0.28
	PCV (%)	Reference	83%	2%	83%
Model comparison					
	Deviance	218,505	116,433	218,492	116,427

AOR, adjusted odds ratio; CI, confidence interval; ICC, inter cluster correlation coefficient; MOR, median odds ratio; PCV, proportional change in variance; VA, area level variance.

\**p* value <0.05.

\*\**p* value <0.01.

\*\*\**p* value <0.001.

## Strengths and limitations of the study

The use of weighted, nationally representative large datasets of low and middle-income countries, with advanced statistical analysis techniques that account for the nature of DHS data for better parameter estimation was a strength of this study. However, due to the cross-sectional type of data, uncovering the causality between dependent and independent variables is challenging. The data was obtained through self-reports from women five years before the survey, which could be a cause of recall bias. Moreover, because it depends on the factors available in the DHS data set, the most significant explanatory factors such as medical-related factors, and the quality of maternal health services may be missed.

## Conclusion

Unintended pregnancy rates remain high in LMICs. Women whose husband has no education and primary education, women with media exposure, working status, women who live in a household headed by a male, women with unmet need for contraception, and women with a big problem of distance to health facilities were variables that were significant predictors of unintended pregnancy. When attempting to minimize unintended pregnancy in LMICs, these factors need to be considered. Furthermore, most of these attempts should be driven by government entities in low and middle-income countries.

## Data availability statement

Publicly available datasets were analyzed in this study. This data can be found here: [www.dhsprogram.com](http://www.dhsprogram.com).

## Ethics statement

The data set was obtained from the DHS website after a formal request and permission from the major DHS. All methods were

performed following the Demographic and Health Surveys (DHS) program's relevant guidelines and regulations. The dataset was not allowed to be shared with other organizations and has remained confidential. The patients/participants provided their written informed consent to participate in this study.

## Author contributions

FMA originates the research concept. FMA, AZA, RET, TA, and BAT wrote the main manuscript text. All authors contributed to the article and approved the submitted version.

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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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# Disparities in high risk prenatal care adherence along racial and ethnic lines

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The term “high-risk pregnancy” describes a pregnancy at increased risk for complications due to various maternal or fetal medical, surgical, and/or anatomic issues. In order to best protect the pregnant patient and the fetus, frequent prenatal visits and monitoring are often recommended. Unfortunately, some patients are unable to attend these appointments for various reasons. Moreover, it has been documented that patients from ethnically and racially diverse backgrounds are more likely to miss medical appointments than are Caucasian patients. For instance, a case-control study retrospectively identified the race/ethnicity of patients who no-showed for mammography visits in 2018. Women who no-showed were more likely to be African American than patients who kept their appointments, with an odds ratio of 2.64 (4). Several other studies from several other primary care and specialty disciplines have shown similar results. However, the current research on high-risk obstetric no-shows has focused primarily on *why* patients miss their appointments rather than *which patients* are missing appointments. This is an area of opportunity for further research. Given disparities in health outcomes among underrepresented racial/ethnic groups and the importance of prenatal care, especially in high-risk populations, targeted attempts to increase patient participation in prenatal care may improve maternal and infant morbidity/mortality in these populations.

## KEYWORDS

obstetrics, ethnicity, race, no-show, minority, maternal fetal medicine, prenatal care

## Introduction

Approximately 6%–8% of all pregnancies in the United States are considered high-risk pregnancies (1). The term “high-risk pregnancy” describes a pregnancy in which the pregnant patient and the fetus are at an increased risk for complications. Risk factors include chronic health conditions such as diabetes or hypertension, obesity, multiple births, and young or old maternal age (2). While some of these conditions can be resolved prior to pregnancy, others cannot and must be monitored and treated during pregnancy. In order to best protect the pregnant patient and the fetus, the patient should be seen frequently for prenatal care and monitoring.

Unfortunately, for various reasons, regularly attending these prenatal appointments can be challenging for many patients, and the no-show rate reflects this. While there has been research into the reasons for no-shows in high-risk obstetric clinics, there has not been research to identify which patient populations are at an increased risk for no-shows. Knowing that racial and ethnic minorities have higher rates of no-shows in other specialties, it seems likely that racial and ethnic minorities also have higher rates of no-

shows in high-risk obstetric clinics. Because there is no data on racial and ethnic disparities of no-show rates in general obstetrics or in high-risk obstetric clinics, this review will explore the existing literature relevant to racial and ethnic disparities of no-show rates in various other specialties. Additionally, this review will explore the existing literature on no-show rates in high-risk obstetric clinics.

## Methods

A literature search utilizing PubMed was conducted to identify sources relevant to either racial and/or ethnic disparities of no-show rates or high-risk obstetrical no-show rates. There was no restriction on publication date. The search terms used were race, ethnicity, disparities, differences, high-risk obstetrics, high-risk pregnancy, no-show, and missed appointments. Studies that were not relevant to either topic or were written in a language other than English were excluded. The reference sections of the included sources were used to identify other relevant literature.

## Race and ethnicity in no-shows

It has been documented that patients from ethnically and racially diverse backgrounds are more likely to miss medical appointments. A cross-sectional study done in 2016 sought to determine the relationship between race and ethnicity and missed appointments. It was known that missed appointments are associated with factors such as lower socioeconomic status and medical complexity, but an association between race/ethnicity had not been established. As such, this study aimed to fill that research gap. The chart review found that the overall no-show rate between 44 specialty and primary care clinics was 23%, ranging from 0% to 58%. This rate was significantly higher for all patients who were non-White. Rates of missed appointments were 1.8 times higher for African Americans, 2 times higher for American Indian/Alaskan Natives, and 2 times higher for Latino/Hispanic patients when compared to non-White non-Hispanic patients (3).

Several other studies have found a similar association between race/ethnicity and increased no-show rates. These studies were specialty-specific and are broken down by specialty in this review.

## Mammography

A case-control study retrospectively identified the race/ethnicity of patients who no-showed for mammography visits in 2018. Between January and March of 2018, 5,060 patients were scheduled for screening mammograms, and 6.2% were no-shows. Race/ethnicity was recorded in the electronic medical record as non-Hispanic white, Hispanic, Black, Asian, or unknown. Data was reported as non-White Hispanic, African American, or Other. Women who no-showed were more likely to be African American than patients who kept their appointments, with an odds ratio of 2.64. There was no discussion on the likelihood of missing appointments for other races/ethnicities (4).

## Primary care

A retrospective study aimed to determine which patients were no-showing to their primary care appointments and why. This study was done in a primary care clinic that primarily served Latino, immigrant, and low-income patients. The no-show rate was above average at this clinic. Over a five-month period, 7,508 patients were scheduled, and 5,604 were included in the analysis. 16% of these were no-shows. Patient demographics were categorized as Black, Hispanic, White, Asian, and Other. Patients who no-showed were more likely to be Black or Hispanic when compared to White patients. There was no discussion on no-show rates for Asian or Other (5).

## Neurology

A retrospective study aimed to identify predictors of no-shows to neurology clinics. Between July 2013 and September 2018, 71,178 patients were scheduled, and 16% were no-shows. Race was categorized as American Indian/Alaskan Native, Asian, Black/African American, Native Hawaiian/Other Pacific Islander, Other, Unknown, and White. Black/African American patients were more likely to no-show than White/Caucasian patients, with an odds ratio of 1.4712. Asian and American Indian/Alaskan Native patients were less likely to no-show compared to White/Caucasian patients, with an odds ratio of 0.6871. There was no difference in no-show rate odds for Native Hawaiian/Other Pacific Islander (6).

## Pediatrics

Several retrospective studies examined the association between race/ethnicity and pediatric no-show rates. One study quantified the no-show rate across 14 subspecialty pediatric clinics and identified patient characteristics associated with missed appointments. Between January 2013 and December 2018, there were 128,117 appointments, and 18.1% were no-shows. Black race/ethnicity was strongly associated with missed appointments (7).

A study published in 2015 aimed to describe the frequency of missed appointments in pediatric patients with type 1 diabetes and evaluate the relationship between disease control and missed appointments. Over 43 months, 1,002 patients had two or more appointments scheduled. Of these patients, 68% missed no appointments, 17% missed one appointment, and 15% missed two appointments. Patients who were a member of a racial/ethnic minority group were more likely to miss their appointment (8).

Another study aimed to quantify no-show disparities in outpatient surgical care. Among the 10,162 patients between 2017 and 2019, 16% had at least one no-show. Race was categorized as White, Black, Hispanic, or Other. Black race was associated with having at least one no-show, with an adjusted odds ratio of 3.3. (9)

A study published in 2021 examined socioeconomic and imaging exam factors associated with missed pediatric radiology visits. Over a 12-month period, data from the EMR was retrospectively analyzed for 7,275 patients. Patients of the African

American race were more likely to miss appointments, with an odds ratio of 1.9 (10).

A survey study published in 2015 aimed to determine factors associated with missing pediatric primary care appointments. 1,537 patients were called, and 386 patients completed the survey. Patients with high no-show rates were placed in one group and compared against the rest. The no-show group had more African American patients (11).

## Orthopedics

A retrospective study examined the association between no-show rates and patient appointment time, and provider characteristics in an orthopedic clinic. In the calendar year of 2016, there were 25,381 appointments scheduled, and 11.5% of these were no-shows. Patients were asked to identify as either White, Black, multiple, or other. Black patients had higher no-show rates than White patients, with an odds ratio of 1.96. Patients who reported other or multiple did not have higher no-show rates (12).

## Ophthalmology

A retrospective case-control study aimed to identify demographic, medical, and socioeconomic characteristics that increase the odds of no-shows for patients with chronic eye conditions in an ophthalmology practice. Between January 2013 to December 2018, there were 106,652 visits. 12.4% were no-shows. Race was divided into White, Black, Asian, American Indian, Native Hawaiian, and Other. Ethnicity was Hispanic or non-Hispanic. Black race and Hispanic ethnicity were found to increase the odds of no-show, with odds ratios of 1.75 and 1.6, respectively. White and Asian races were found to decrease the odds of no-show, with odds ratios of 0.55 and 0.82 (13).

## GI endoscopy

A retrospective observational cohort study evaluated predictors of no-shows in a gastrointestinal clinic. During a 17-month study period, 6,157 patients were scheduled for Gastrointestinal procedures. Of those, 29% were no-shows. African-American race had the highest rate of no-shows when compared to other races. This rate was 32% (14).

## High risk-obstetric no-shows

The current research on high-risk obstetric no-shows primarily focuses on why patients miss their appointments rather than which patients are missing appointments. One study from 1994 was conducted to determine the reasons for missed appointments and the impact of knowledge of diagnosis and the perception of this diagnosis on appointment attendance. 506 women at a high-risk obstetric clinic were called and surveyed after missing their

appointment. 118 responses were analyzed. Many women who missed appointments did not know why they were being seen and did not perceive the care as useful (15). With a similar goal, a 2008 study surveyed patients at a high-risk pregnancy clinic regarding reasons for missed appointments. This clinic had a 28% no-show rate, and the study was interested in understanding why. Of the 261 patients included in the study, 41% were reached by telephone. Patients reported difficulty with transportation, scheduling problems, oversleeping, forgetting, and lack of care for their child or sick relative as reasons. Campbell et al. suggested that there may be a socioeconomic link to missed appointments but did not explore this idea further (16).

One study was interested in who was missing the appointments rather than why. A survey study published in 1996 aimed to determine if physicians could predict which patients are missing their high-risk obstetric visits. Feierabend et al. stated that creating interventions to decrease no-shows would be most effective if directed toward the patients who are at greater risk of missing their appointments. Physicians completed surveys at each patient's initial visit, predicting if the patient would have a no-show at their next appointment. It was found that this could not be predicted by the physicians (17). There was no further research to determine if there was a better method for identifying patients at increased risk of missing their high-risk obstetric visits.

## Discussion

This review highlights the need for research on high-risk obstetric no-show rates in racially and ethnically diverse patients. Significant research shows that racial and ethnic minorities are at increased risk of missing medical appointments. Several studies show that African American patients are at increased likelihood of missing appointments across various specialties. Some of these studies also show that Hispanic/Latino patients are also at an increased likelihood and Asian and Pacific Islander patients are at a decreased likelihood when compared to non-Hispanic White patients. It is important to note that there were differences in the categorization of race across the various studies. Some included Native Hawaiian, Pacific Islander, and Native American, while others only offered "other" in addition to African American/Black, White, Asian and Hispanic. Despite collecting the data, several studies did not discuss the results of races other than African American and White. One study grouped Asian and Hispanic as one race due to a lack of data. Therefore, while the majority of conclusions from the studies show increased risk only for the African American race, this could be due to a lack of representation of other races in the study analyses.

These studies have covered the demographics of missed appointments in family medicine, pediatrics, orthopedics, ophthalmology, neurology, and gastroenterology clinics, but not obstetrics and gynecology clinics. Obstetrics and gynecology research has only focused on other aspects of missed appointments thus far, including reasons for missed appointments and the impact of knowledge of the diagnosis and perceived threat. Patients were missing their appointments for reasons such

as transportation difficulties, scheduling problems, oversleeping, forgetting, and lack of care for their child or sick relative. Many patients who missed appointments did not know why they were being seen and did not perceive their diagnosis as a threat. If there is a race/ethnicity relation in high-risk obstetric missed appointments, like there is with other specialties, targeted attempts to increase patient participation in prenatal care may improve maternal and infant morbidity/mortality in these populations.

Research that attempted to predict which patients would miss appointments was unsuccessful. This research was published in 1990, and there has not been another attempt to identify patients at increased risk for missing high-risk obstetric visits since.

With these research gaps in mind, there is a need to identify whether racial and ethnic minorities are at an increased risk of missing their high-risk obstetric visits. This would expand on the existing research on the relationship between race/ethnicity and no-show rate and potentially increase high-risk obstetric visit attendance. It is important to note that there are multiple social determinants of health, trust issues, and cultural factors that likely play a larger role in missing appointments than do genetic differences between people of different races and ethnicities. Future research could focus on the interplay of these factors for a truer understanding of barriers to care.

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## Author contributions

MS; performing background literature search, writing of paper. EL-B; writing of paper, review manuscript. SU; edit manuscript, writing mentorship. All authors contributed to the article and approved the submitted version.

## 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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# Factors associated with exclusive breastfeeding during postpartum in Lanzhou city, China: a cross-sectional study

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**Aim:** Breastfeeding generates short-term and long-term benefits for both mother and child. Exclusive breastfeeding (EBF) is promoted in China for years, but its practice still lags far behind the international average, even among low- and middle-income countries. This study aimed to investigate factors associated with EBF during postpartum.

**Methods:** This study was conducted in a tertiary referral hospital in Gansu Province, Northwest China from October 2019 to April 2020. 3,738 postnatal women were finally included and each of them completed an elaborately designed questionnaire. Infant feeding patterns (EBF or not) and reasons for NEBF (non-exclusive breastfeeding) were collected. The feeding knowledge score was based on 17 questions in relation to breastfeeding. The total score ranges from 0 to 17. Higher score means better understanding about breastfeeding knowledge. Multivariate logistic regression models were used to determine associated factors of EBF during postpartum. A subgroup analysis was conducted to investigate the association between feeding knowledge score and exclusive breastfeeding.

**Results:** Six weeks after childbirth, 1891 mothers (50.6%) maintained EBF. Among the NEBF mothers, 57.01% ( $n = 1,053$ ) of them stopped exclusive breastfeeding due to self-perceived lack of breast milk production. Factors associated with NEBF were higher maternal age, ethnic minorities and cesarean section. Protective factors of EBF included multipara, positive feeding attitude and high breastfeeding knowledge score. In subgroup analysis, we found the breastfeeding knowledge score had a significant impact on the mothers of Han nationality, underwent cesarean or natural delivery, both primiparous and multiparous, and those with positive attitude towards breastfeeding ( $p < 0.05$ ).

**Conclusion:** We need a comprehensive and individualized framework of strategies to support children, mothers and their families. During puerperium, improving maternal knowledge of breastfeeding is beneficial to EBF practice. However, for ethnic minorities and those with less active breastfeeding attitudes, breastfeeding knowledge is of limited use, more researches are needed to explore the uncovered reasons, so that more personalized interventions could be developed for them.

## KEYWORDS

exclusive breastfeeding, risk factors, breastfeeding knowledge, China, postpartum



## 1. Introduction

Breastfeeding is able to benefit both mother and child creating a win-win situation. For mothers, it helps to regain weight, reduce the risk of breast cancer, ovarian cancer and postpartum depression etc. For babies, 6 months of exclusive breastfeeding generates short-term and long-term benefits (1, 2), reducing the prevalence of respiratory diseases, diarrhea, cutting down the mortality of preterm infants, helping intellectual development, immunity construction, impacting their adaptability, and language ability in a positive way later in life (3).

Of 101 countries with valid data, 32 have reached the WHA (World Health Assembly) target, i.e., 6 months' EBFR (Exclusive Breast-Feeding Rate) should achieve 50% by 2025 (4, 5). Despite of all the benefits, the EBFR in China is still unsatisfactory and lags far behind the international average. In low- or middle-income countries, about 37% of infants were breastfed exclusively (4, 6) while in China that number was barely 21% by 2013 (7). Even by 2019, China still suffers from a low EBFR for the first 6 month ranging from 20 to 36% in both urban and rural areas (4, 7). A previous study showed that the EBFR in China at the end of the first, third, and sixth month after childbirth were 81.94, 68.52 and 31.94%, respectively (8).

Based on previous studies in Southeast Asia and the Pacific Area (9–12), Middle East (13–15), Europe (16–18) and the North and South Americas (19–21), we found a wide range of factors at individual, cultural, health facility, and socioeconomic levels. However, the effects of some factors sometimes reached contradictory conclusions (2). Aside from that, a majority of the previous studies have examined the risk factors of exclusive breastfeeding focusing on 6 months after childbirth, few have yet focused on puerperium period. Notably, the puerperium is a critical point, which provides clinicians opportunity to intervene in a face-to-face way, since postpartum women visit the hospital for routine maternal checkups 6 weeks after delivery. However, few studies have focused on factors influencing exclusive breastfeeding during this period of time. To provide theoretical support to healthcare professionals, we surveyed 3,738 women who underwent postpartum checkups in the obstetrics department of Gansu Provincial Maternity and Childcare Hospital from October 2019 to April 2020, and used subgroup analysis to help healthcare professionals develop targeted and individualized interventions.

## 2. Methods

### 2.1. Study design

The cross-sectional survey was conducted at Gansu Provincial Maternity and Childcare Hospital in Lanzhou, Gansu Province, in Northwest China from October 2019 to April 2020.

### 2.2. Participants

The target population were puerperal women who visited the obstetrics department of this hospital on their sixth week after childbirth and met the following criteria (a) willing to participate, (b) aged over 19 and under 49, (c) capable of Chinese reading and writing, and (d) gave birth to a single child this time.

A total of 4,170 postnatal women completed an elaborately designed questionnaire, and according to the inclusion criteria, we excluded those who gave birth to twins or three children this time and those lack of valid data, 3,738 postnatal women were finally included. 1847 mothers adopted bottle feeding or mixed feeding were categorized into NEBF group (Non-exclusive breastfeeding), while 1891 mothers adopted exclusive breastfeeding were categorized into EBF group (Exclusive breastfeeding). This study was approved by the Ethics Committee of The First Affiliated Hospital of Chongqing Medical University on October 22, 2018 with approval number 2018-131. All participants in this study provided informed consent.

### 2.3. Sample size

The study was a cross-sectional survey and the outcome indicators were dichotomous outcomes, so we calculated the sample size by the formula  $n = Z_{\alpha}^2 * p * (1 - p) / \delta^2$ . Previous literature lacks the rate of EBF at 42 days postpartum, a study showed that the EBFR in China at the end of the first, third month after childbirth were 81.94 and 68.52%, respectively, Duan et al. (7). We chose  $p = 0.685$  to ensure an adequate sample size. For a confidence level of 95%,  $\alpha$  is 0.05 and  $Z1 - \alpha/2 = 1.96$ . The required sample size  $N = 2073$ . If we anticipate a 10 ~ 20% of the inefficiency, we may want to increase the sample size and total sample size  $n$  as 2,280 ~ 2,487.

### 2.4. Definition of terms

Nationality was categorized into Han and Minority while residence included urban and rural area. Educational level was divided into three degrees including low (junior high school and below), median (senior high school) and high (undergraduate, graduate and above). Delivery mode included natural vaginal delivery and cesarean section. Parity was either primipara or multipara. Moreover, we recoded family monthly income as low (<¥4,500), medium (¥4,500–9,000) and high (>¥9,000). Breast or nipple abnormalities included mastitis, breast engorgement, and cracked nipples. Feeding attitude reflected mothers' subjective standpoints towards exclusive breastfeeding (willing/ neutral or unwilling).

Edinburgh Postnatal Depression Scale (EPDS) is a widely preformed self-report scale used among postnatal women 6 weeks after childbirth to screen Postnatal Depression. This scale consists of 10 items and the score of each item ranges from 0 to 4 describing women's subjective feelings. The total score is ranging from 0 to 30, and  $\geq 13$  can be defined as PPD (Postpartum Depression).

The feeding knowledge score was based on 17 questions in relation to breastfeeding. Mothers were asked to read the questions such as "The sooner you start breastfeeding, the better" and identify true or false (gain 1 point for correct answer, and account 0 point for both no knowledge and wrong answer). The total score ranges from 0 to 17. Higher score means better understanding about breastfeeding knowledge (Breastfeeding knowledge content see [Supplementary materials](#)).

Five categories addressing the main reasons for cessation of EBF were developed based on previous studies. These were: (1) "Perceived low milk quantity" defined as mother's self-reported perception that the infant was not getting enough milk and showing signs of hunger,

(2) “Return to work” meant the mother returned to work or planned to do so, (3) “Worry about body shape” defined as mother’s decision to stop breastfeeding due to considering body shape, (4) “Mother’s medical condition” which included medical conditions related to breastfeeding as well as the advice of a doctor or healthcare professional, and (5) “Others” defined as EBF cessation with no further explanation.

## 2.5. Statistical analysis

Analyses were completed using SPSS version 25 (SPSS Inc., Chicago, IL, United States). Visualization in subgroup analysis were accomplished by R (version 3.6.3) and ggplot2 (version 3.3.3) R package. Frequency and percentage were used to describe the categorical variables while mean  $\pm$  standard deviation was applied for continuous variables. The relationship between outcome variable and continuous, normally distributed independent variables (age, feeding knowledge score and BMI) were evaluated by *t*-test. Other categorical variables were correspondingly analyzed by Chi-square test. In order to investigate the possible associated factors of exclusive breastfeeding during puerperium, binary logistic regression was calculated. Variables with  $p < 0.1$  were included in the regression model to control confounding. For the feeding knowledge score, we did subgroup analyses by age ( $<35$  versus  $\geq 35$ ), nationality, delivery mode, parity and feeding attitude. In all statistical tests, a value of  $p < 0.05$  (double-sided) was considered significant.

## 3. Results

### 3.1. Socio-demographic characteristics of sample participants

A total of 3,738 participants were recruited, demographic, and clinical characteristics of them were described in Table 1. The mean age was 30.23 years (SD = 3.83). Up to 6 weeks after delivery, 50.6% of mothers maintained EBF. The majority of them were of Han nationality, achieved high educational level and lived in urban areas.

### 3.2. Reasons for breastfeeding cessation

In Figure 1, we observed 32.54% ( $n = 601$ ) of the participants did not give their answers. Among available date, we found the most frequent reasons given for breastfeeding cessation during puerperium were perceived low milk quantity ( $n = 1,053$ , 57.01%), medical condition in mother ( $n = 74$ , 4.01%) and others ( $n = 106$ , 5.74%).

### 3.3. Univariate analysis of influential factors of EBF

Univariate analyses of all variables (i.e., sociodemographic factors, BMI, delivery mode, parity, postnatal depression, breast or nipple abnormalities, premature birth, feeding knowledge score, and feeding attitude) that could possibly be associated with EBF at 42 days postpartum are shown in Table 2.

TABLE 1 Socio-demographic characteristics of sample participants.

Variables		Mean (SD) or N (%)
Total		3,738
Age		30.23 (3.83)
BMI		21.26 (3.00)
Nationality	Han	3,462 (92.6)
	Minority	276 (7.4)
Residence	Urban	3,394 (90.8)
	Rural	344 (9.2)
Educational level	Low	418 (11.2)
	Median	232 (6.2)
	High	3,088 (82.6)
Parity	Primipara	2,592 (69.3)
	Multipara	1,146 (30.7)
Delivery	Natural delivery	2,492 (66.7)
	Cesarean section	1,246 (33.3)
Feeding attitude	Neutral or unwilling	167 (4.47)
	Willing	3,574 (95.61)
Feeding mode	NEBF (Non-exclusive breastfeeding)	1847 (49.4)
	EBF (Exclusive breastfeeding)	1891 (50.6)

Chi-square test, independent *t*-test. \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ . NEF, non-exclusive breast feeding (bottle feeding or mixed feeding); EF, exclusive breast feeding.

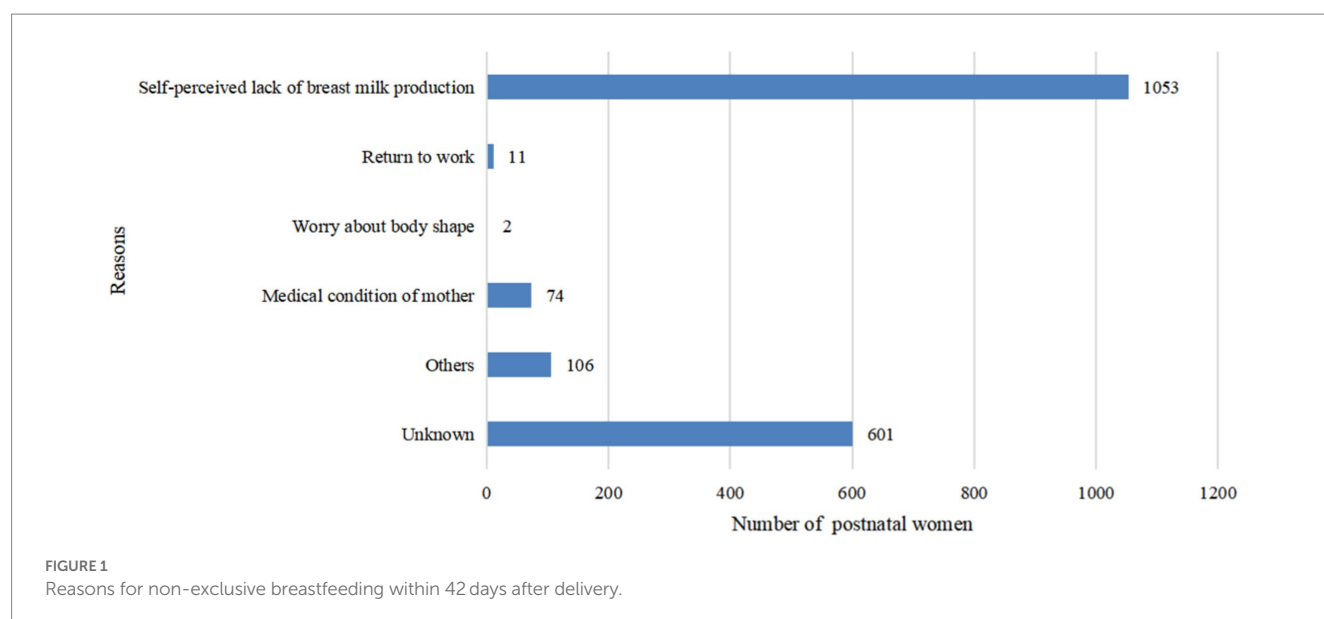
Factors related to the cessation of EBF at 42 days were higher maternal age ( $30.42 \pm 4.03$  vs.  $30.07 \pm 3.61$   $p = 0.004$ ), minority groups (8.5% vs. 6.1%  $p = 0.004$ ), having lower educational level (12.2% vs. 10.1%  $p = 0.023$ ), underwent cesarean (36.6% vs. 30.2%  $p < 0.001$ ), preterm birth (6.7% vs. 5.3%  $p = 0.048$ ), lower feeding knowledge score ( $9.99 \pm 2.83$  vs.  $10.23 \pm 2.78$ ,  $p = 0.009$ ), subjectively feel unwilling or neutral to adopt EBF (7.7% vs. 1.2%  $p < 0.001$ ).

Besides, in univariate analysis, we found no significant differences in parity, family monthly income, breast or nipple abnormalities and the prevalence of PPD.

### 3.4. Bivariate logistic regression analysis of influential factors of EBF after delivery

Bivariate logistic regression analysis was conducted to investigate the potential associated factors of EBF in Table 3. Feeding mode (EBF or NEBF) during the 42 days after childbirth was settled as outcome variable. Variables showed association in bivariate analysis at  $p$ -value  $\leq 0.10$  were taken into the model to control confounders. These variables were age, nationality, residence, BMI, educational level, delivery mode, parity, premature birth, feeding attitude, and feeding knowledge score.

Factors related to EBF at 42 days postpartum in regression analysis were as follow: Every single year increased in age, 4% less likely to adopt EBF (OR = 0.96, 95%CI 0.94–0.98,  $p < 0.001$ ). Compared with Han, Ethnic minority women were 32% less likely to breastfeed



exclusively (OR = 0.68, 95%CI 0.53–0.88,  $p = 0.003$ ). Mothers went through cesarean section were 24% less likely to adopt EBF in relation to natural vaginal delivery (OR = 0.76, 95%CI 0.66–0.88,  $p < 0.001$ ). And multiparas were 32% more likely to breastfeed exclusively than primiparas (OR = 1.32, 95%CI 1.13–1.55,  $p = 0.001$ ). Women who were subjectively willing to breastfeeding were significantly more likely to adopt EBF (6.69, 95%CI 4.23–10.57,  $p < 0.001$ ). Aside from this, every single point rise in feeding knowledge score, 8% more likely for mothers to adopt EBF (OR = 1.08, 95%CI 1.06–1.11,  $p < 0.001$ ).

### 3.5. Subgroup analysis of feeding knowledge score and EBF

To investigate the association between feeding knowledge score and exclusive breastfeeding, we conduct subgroup analysis by age (< 35 vs.  $\geq 35$  years), nationality, delivery mode, parity and feeding attitude. Each analysis adjusted for variables with  $p < 0.1$  in univariate analysis.

According to Figure 2 we can find that the results of the subgroup analysis are relatively robust. Except for ethnic minorities and those with less positive attitudes towards breastfeeding, breastfeeding knowledge scores had a positive effect on mothers' exclusive breastfeeding behavior ( $p < 0.05$ ). If the breastfeeding knowledge score get improved, the rates of EBF may follow suit (OR > 1).

### 3.6. Correct rate of breastfeeding knowledge

We illustrated the correct rate of each item of breastfeeding knowledge in Figure 3. For the following basic knowledge, the overall correct rates of all mothers are above 80%, such as:

1. The sooner you start breastfeeding, the better. (✓)
2. Breastfeeding should be exclusive up to 6 months of age. (✓)
3. Breastfeeding is good for the health of the mother. (✓)

11. Smoking and drinking alcohol can have adverse effects on the offspring. (✓)
  12. Thawed breast milk should not be refrozen. (✓)
- However, the mothers had poor knowledge about the following items, with overall correct rates less than 30%:
8. Calcium supplements are not needed for exclusively breastfed infants. (✓)
  13. Sucking out milk and bottle-feeding makes it easy to judge the infant's intake. (×)
  14. To reduce the risk of infection in infants, it is necessary to sterilize the mother's nipples before breastfeeding. (×)
  17. Newborns can be fed with formula milk temporarily after birth and wait for milk production. (×)

## 4. Discussion

The 42nd day after delivery is a critical point for mothers and health care workers. Firstly, a great majority of the postnatal women would come back to the hospital at this time, which provides doctors opportunity to talk to them face to face. With a high probability, the doctors are whom mothers have already met during pregnancy, so mothers would feel a sense of familiarity and trust. Therefore, this kind of interference would be more effective than any other sources. Secondly, those who plan to give up EBF due to exhaustion or other reasons can be found at a relatively early time. With professional support and suggestions, it would be conducive for mothers to continue breastfeeding. Therefore, timely detection of mothers' feeding difficulties contributes to timely interventions, benefiting EBF practice.

To the best of our knowledge, this is the first study to investigate the associated factors for EBF at the 42nd day postpartum in China. According to a survey conducted in Japan, more than 90% of pregnant women hope to breastfeed their children. Nevertheless, only 50% of mothers are able to continue EBF with their children up to 3 months postpartum (12). We had similar findings, our study showed that the overwhelming majority of mothers were willing to breastfeed

TABLE 2 Univariate analysis of influential factors of EBF.

Variables		NEBF N = 1847	EBF N = 1891	<i>t</i> / $\chi^2$	<i>p</i> -value
Age [mean (SD)]		30.42 (4.03)	30.07 (3.61)	2.85	0.004**
BMI		21.34 (3.08)	21.18 (2.88)	1.67	0.096
Feeding knowledge score		9.99 (2.83)	10.23 (2.78)	−2.60	0.009**
Nationality (%)	Han	1,690 (91.5)	1776 (93.9)	8.10	0.004**
	Minority	157 (8.5)	115 (6.1)		
Residence (%)	Urban	1,662 (90)	1736 (91.8)	3.74	0.053
	Rural	185 (10)	155 (8.2)		
Educational level (%)	Low	226 (12.2)	191 (10.1)	7.57	0.023*
	Median	126 (6.8)	105 (5.6)		
	High	1,495 (80.9)	1,595 (84.3)		
Delivery (%)	Natural delivery	1,171 (63.4)	1,319 (69.8)	16.95	<0.001***
	Cesarean section	676 (36.6)	572 (30.2)		
Parity (%)	Primipara	1,306 (70.7)	1,286 (68)	3.21	0.073
	Multipara	541 (29.3)	605 (32)		
Breast or nipple abnormalities (%)	No	1,693 (91.7)	1719 (90.9)	0.67	0.412
	Yes	154 (8.3)	172 (9.1)		
PPD (%)	No	1,333 (72.2)	1,407 (74.4)	2.38	0.123
	Yes	514 (27.8)	484 (25.6)		
Premature birth (%)	No	1723 (93.3)	1793 (94.8)	3.92	0.048*
	Yes	124 (6.7)	98 (5.2)		
Feeding attitude (%)	Neutral or unwilling	142 (7.7)	22 (1.2)	94.83	<0.001***
	Willing	1705 (92.3)	1869 (98.8)		
Income (%)	Low	492 (26.6)	475 (24.5)	1.23	0.542
	Median	653 (35.4)	691 (38)		
	High	702 (38)	725 (37.5)		

Chi-square test, independent *t*-test. \**p* < 0.05, \*\**p* < 0.01, \*\*\**p* < 0.001. NEF, non-exclusive breast feeding (bottle feeding or mixed feeding); EF, exclusive breast feeding.

(*n* = 3,574 95.6%), but only 50.6% were able to adopt EBF up to 42 days postpartum.

Although this study is not completely nationally representative, the results do indicate that the EBFR in China needs to be improved. And we have some main advantages. First, we adopted stricter inclusion criteria, only mothers gave birth to a single child this time were included, the influence of double or multiple births was excluded. Second, a subgroup analysis of the effect of breastfeeding knowledge score and EBF was carried out, proving the robustness and making the range of benefited population more precise. Moreover, the variables (psychological factor and BMI) that had failed to be considered in previous studies (22, 23) were taken into account by the present study.

## 4.1. Factors associated with lower EBFR

### 4.1.1. Cesarean section

It is consistent with previous studies which showed lower EBFR after cesarean delivery than after vaginal delivery (14). To a certain

extent, the pain after cesarean section can affect patients' sleep quality and bring limitation to mothers' position. On the other hand, recovery would take a longer time, together with other negative effects such as dietary restrictions, pain of the incision, and anxiety etc., leading to adverse impact on the secretion of milk. A study in Japan showed that anesthesia during cesarean delivery is not conducive to EBF (12). Therefore, early essential care needs to be improved for C-section mothers and newborns in China.

### 4.1.2. Higher maternal age

According to some previous researches and the present investigation, higher maternal age is associated with lower EBFR (12, 22). Young women are more likely to EBF with their child, probably because they have more access to breastfeeding knowledge, while middle-aged and older adult women are more likely to have complications during pregnancy and postpartum. However, there was also a study found no relationship between maternal age and EBF (24). Moreover, a study in Brazil showed that mother under the age of 20 tend to introduce complementary food earlier in baby's life. Therefore,

TABLE 3 Bivariate logistic regression analysis of influential factors of EBF within 42 d after delivery.

Variables		<i>b</i>	SE	Wald $\chi^2$	OR	95%CI	<i>p</i> -value
Age		−0.045	0.01	20.91	0.96	0.94–0.98	<0.001***
Feeding knowledge score		0.08	0.11	45.701	1.08	1.06–1.11	<0.001***
Nationality	Han						
	Minority	−0.38	0.13	8.73	0.68	0.53–0.88	0.003**
Delivery	Natural vaginal delivery						
	Cesarean section	−0.27	0.07	14.36	0.76	0.66–0.88	<0.001***
Parity	Primipara						
	Multipara	0.28	0.08	11.87	1.32	1.13–1.55	0.001**
Feeding attitude	Neutral or unwilling						
	Willing	1.90	0.23	66.23	6.69	4.23–10.57	<0.001***

\* $p < 0.05$ ; \*\* $p < 0.01$ ; \*\*\* $p < 0.001$ . NEF, non-exclusive breast feeding (bottle feeding or mixed feeding); EF, exclusive breast feeding. Adjusted for residence, BMI, educational level, and premature birth.

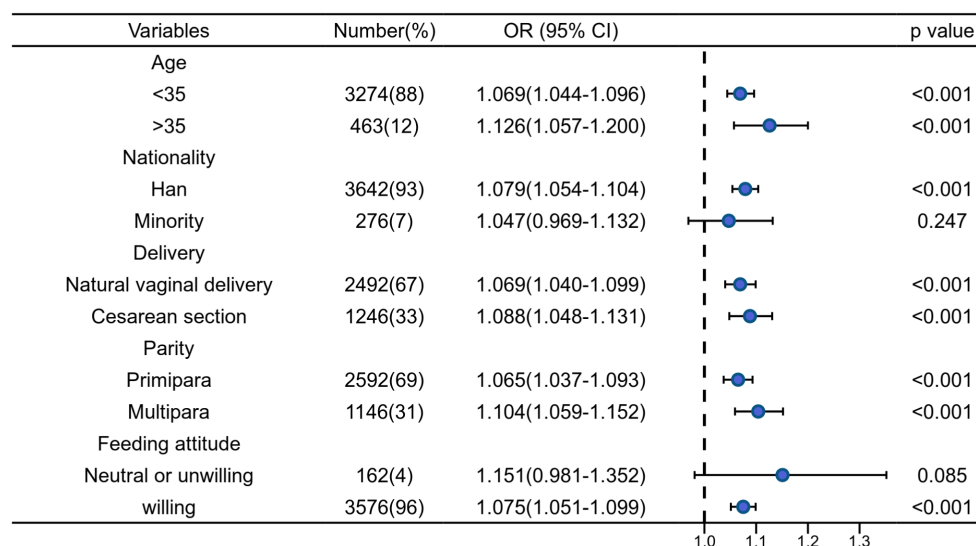


FIGURE 2

Bivariate logistic regression analysis of association between the feeding knowledge score and EBF stratified by selected factors.

adolescent mothers were less likely to EBF with their children (25). And a 2017 study in China suggested that older women were more likely to have a second child, with more feeding skills and experience, generating higher rates of EBF and longer duration (26).

#### 4.1.3. Premature birth

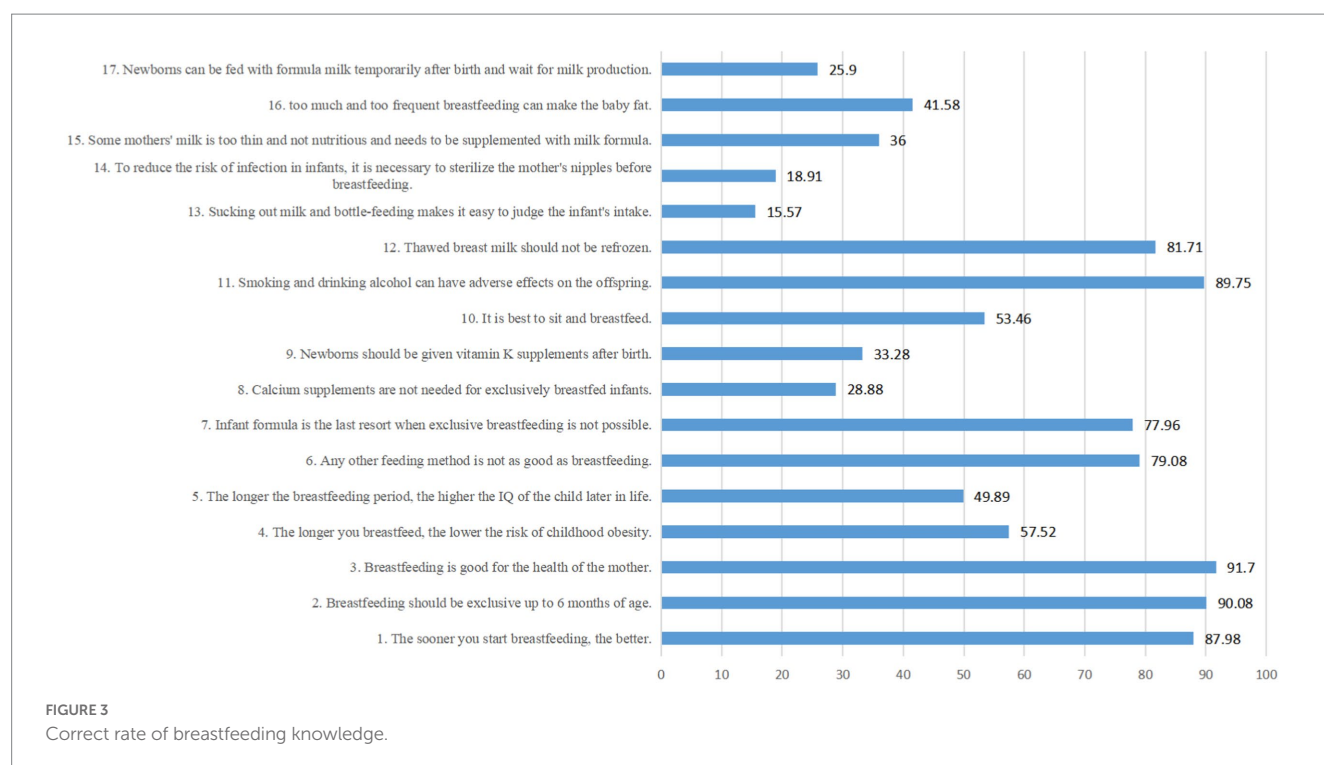
Furthermore, a study conducted by Inano et al. (12) has shown that full-term babies are more likely to be breastfed (12). Preterm infants may need to be transferred to the pediatric department for observation and treated with an incubator. Long time of separation for mother and infant results in the absence of sucking stimulation, leading to the delay of lactation. Therefore, some mothers may suffer from mastitis due to milk retention, increasing the difficulty of EBF further. In our study, univariate analysis showed an association between gestational age at birth and EBF, but multivariate adjusted analysis found no statistical association.

#### 4.1.4. PPD

Current researches come to an agreement in term of the negative impacts of PPD on EBF, studies believe that mothers suffering from postpartum depression may delay the onset time of lactation, resulting in the reduction of milk secretion, and would have negative impacts on EBF and the duration (27). However, our study found no significant difference of the PPD incidence between EBF and NEBF groups, and the proportion of EBF was even slightly higher among women having PPD. Firstly, it might be that respondents sometime were unwilling to give us their true thoughts due to social expectations or mental stress, leading to inaccurate results. Secondly, what we performed was a correlation analysis and did not indicate causality, so the results need to be treated with caution.

A Canadian study showed that the score of EPDS (Edinburgh Postnatal Depression Scale)  $\geq 10$  is a predictor of low EBF (28). Surveys conducted by different teams subsequently with large





sample data showed that PPD could reduce EBFR, and the differences were significant (29–31). However, whether EBF would reduce the incidence of PPD remains unclear. Some studies answered in the affirmative. A multicenter survey conducted by Hatton et al. found that breastfeeding mothers had fewer depressive symptoms (32). A 2016 Malaysian prospective cohort study concluded that EBF was negatively associated with PPD (33). In 2017, Korean researchers published a survey with data derived from 81,447 women during 2002 to 2013. Compared with women who continued breastfeeding, those who stopped within 12 weeks after childbirth had a significantly higher incidence of PPD (34). However, there were also some studies showed no correlation between breastfeeding and PPD. A 2015 prospective cohort study conducted by Sukhee Ahn in Korea showed no significant difference in the incidence of PPD among 119 postnatal women from 7 days to 6 months postpartum (35). In a 2016 survey by Carley J.P, the regression analysis showed no association between breastfeeding duration and PPD at 5 to 7 months postpartum (36).

At present, researchers at home and abroad have agreed on the adverse impacts of PPD on EBF, but if breastfeeding can help prevent PPD remains controversial. More surveys are needed to determine whether women who stop breastfeeding early have a higher risk of PPD, and whether lower EBFR is associated with higher rates of PPD.

#### 4.1.5. Insufficient milk

Moreover, insufficient milk is an important reason for breastfeeding cessation in the present study, which is consistent with the results of previous studies (16, 37, 38). Plenty of studies showed the important role of nutritional factors played in EBF, and problems with low milk quantity usually occur within the first 2 weeks postpartum (39). In a study by Shi et al., nearly two-thirds of mothers stated they stopped EBF before 6 months postpartum because they did not think they had enough milk (23). Lewallen and colleagues found

that around 30% of the mothers stopped EBF before 8 weeks postpartum, and the most common reason was the perception of insufficient milk supply. Therefore, they are prone to stop EBF and choose formula supplementation (37). Clinicians can carry out interventions, such as informing mothers the normal frequency of breastfeeding, and the flexibility of time and amount, which may be helpful to improve EBFR.

## 4.2. Factors associated with higher EBFR

### 4.2.1. Higher educational level

Univariate analysis of this study showed the association between educational level and EBF, which is consistent with other studies (22, 40), but multivariate adjusted analysis found no statistical association.

Well educated women may obtain more breastfeeding knowledge and are more likely to insist on what they think is right. Moreover, women with higher educational level may have better control over their daily life as well as the work environment, contributing to longer periods of breastfeeding. However, a study in China (41) showed the EBFR is lower among women with higher educational level. It may be that well-educated women are more likely to afford formula, and higher educational level women are employed and need to return to work earlier after maternity leave, with no enough time and no suitable places for breastfeeding.

### 4.2.2. Multipara

Univariate analysis in our study showed no association between parity and EBF, but multivariate adjusted analysis found multiparas were significantly more likely to EBF. In a previous study (42), they also found lower breastfeeding rates in primiparas due to inadequate parenting experience. However, results on breastfeeding and parity varied from study to study. A study conducted in China showed that

women gave birth more than once do not have better EBFR than primiparas due to higher pressure of caring for more than one child, even though they had more parenting experience (26).

### 4.2.3. High breastfeeding knowledge score and positive feeding attitude

According to the TPB (Theory of Planned Behavior), knowledge was the largest factor associated with behavior, followed by subjective norms, practice control, and attitudes (43). Our study also found that the higher the maternal breastfeeding knowledge score was, the more likely mothers were to breastfeed their infants exclusively within 42 days postpartum. This is also illustrated in a research by Ishak et al., which showed that having a higher level of education and good perception towards breastfeeding was more likely to result in the mothers being highly motivated and confident to exclusively breastfeed (44). Shafaei et al. also stated in their study that providing mothers, particularly those who previously had problems in breastfeeding, with counseling in healthcare centers or through online media during postpartum period, might help to improve EBFR (45). Furthermore, the breastfeeding knowledge informed by medical staffs would produce a higher degree of trust and generate better compliance among mothers. Thus, health care workers should reinforce the education about breastfeeding during pregnancy, hospitalization and rechecks, timely help postnatal women solve the difficulties encountered in breastfeeding.

In subgroup analysis, there was no significant association between breastfeeding knowledge score and EBF among ethnic minorities and people with negative attitudes towards breastfeeding.

Ethnic minorities ( $n = 276$ , 7%) and feel neutral or unwilling to breastfeed ( $n = 162$ , 4%) are groups with a small number of people, it is difficult to draw significant results. Additionally, many women are less positive to breastfeeding because they would feel embarrassed and humiliated when families, friends and doctors watch them breastfeed. Therefore, for mothers with a negative attitude, improving breastfeeding knowledge may not be the optimal solution.

### 4.3. Limitations of the study

Some limitations must be taken into account when interpreting these results. First, this was a single center retrospective study conducted in Northwest China, and only evaluated breastfeeding status up to 42 days postpartum. Therefore, our results may lack of national representative and cannot be compared to other studies with longer periods of breastfeeding duration. Second, this study covered potential associated factors of EBF among multiple levels, but some variables in relation to environmental management and policy had failed to be measured. Third, the reasons for EBF cessation were based on mother's subjective judgements and some others reason have not been considered, such as "mother/infant separation; breastfeeding skills were not effective; inconvenience/fatigue due to breastfeeding; baby's medical condition" (39, 46). Finally, respondents tend to choose answers that meet social expectations rather than their true thoughts and behaviors, which may lead to inaccurate results. Thus, social desirability bias should also be taken into consideration.

### 4.4. Future outlook

Perceiving insufficient breast milk of mothers is the most common reason for stopping EBF. Therefore, difficulties encountered in the process of breastfeeding should be solved in a timely manner, mothers' confidence in breastfeeding can be improved by offering them more knowledge and counseling. Aside from this, for those of ethnic minority or those refused to breastfeed, more researches are needed to explore the uncovered reasons, therefore more personalized interventions could be made.

We need future studies to continuously monitor the trend of EBFR, explore effective interventions and develop a comprehensive and individualized framework of strategies to support children, mothers and their families. And we devoutly suggest that health institutions should control the rates of cesarean section, and supportive environments for postpartum mothers to breastfeeding should be ensured in public and the workplace. Moreover, the government should provide support to improve EBFR, including raising the social and cultural acceptance of breastfeeding among public, providing special rooms for breastfeeding in public places, ensuring equity and welfare in women's employment, and providing adequate paid maternity leave for mothers.

## 5. Conclusion

In this study, higher age, ethnic minorities and cesarean section were associated with the cessation of EBF. However, protective factors of EBF included multipara, positive feeding attitude and high breastfeeding knowledge score. According to the TPB (Theory of Planned Behavior), knowledge was the biggest factor associated with exclusive breastfeeding behavior (43). Therefore, we conducted a subgroup analysis to determine the target groups for future intervention. We found that the breastfeeding knowledge score had a significant impact on a majority of puerperium women, except for those of ethnic minority and of those with less active breastfeeding attitudes. For most mothers, we should focus on breastfeeding education and provide them with more related programs to popularize the breastfeeding related knowledge. However, for the other small population, among whom breastfeeding knowledge is of limited use, more researches are needed to uncover the underlying reasons so that individualized strategies can be developed for them.

Although the vast majority of mothers had strong motivation and intention to breastfeed, many factors (sociodemographic characteristics of mother and child, physical and mental health, socio-cultural and environmental factors) may still affect the successful implementation of postpartum EBF. Thus, we believe we need a comprehensive and individualized framework of strategies to help improve the EBFR in China.

### Data availability statement

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

## Ethics statement

The studies involving human participants were reviewed and approved by Ethics Committee of The First Affiliated Hospital of Chongqing Medical University with approval number 2018-131. The patients/participants provided their written informed consent to participate in this study.

## Author contributions

LW and YZ contributed to the study conception and design. Questionnaires were provided by WW, HJ, and FW. YZ and YC gave statistics support. LW provided clinical support. The first draft of the manuscript was written by YC. YC, YZ, WW, FW, HJ, and LW commented on previous versions of manuscript. All authors contributed to the article and approved the submitted version.

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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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## Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpubh.2023.1089764/full#supplementary-material>

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# Effectiveness of a positive deviance approach to improve mother's nutritional knowledge, attitude, self-efficacy, and child's nutritional status in Maji District, West Omo Zone, South West region, Ethiopia: a cluster randomized control trial

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**Background:** Achieving appropriate feeding for infants and young children continues to be a struggle. These impediments are not only due to limited food availability but also inadequate knowledge, unfavorable attitudes, and low self-efficacy. A positive deviant approach (PDA) addressing positive and possible solutions inherent in a community focusing on problems is applied in Africa and particularly to Ethiopia. Therefore, this trial is aimed at evaluating the effectiveness of PDA in improving mothers' nutritional knowledge, attitudes, self-efficacy, and children's nutritional status.

**Method:** This was a cluster randomized control trial in which 516 mothers were randomly assigned to either an intervention or control group after collecting baseline data. The trial participants in the intervention cluster received a positive deviant intervention for 6 months, whereas those in the control group received only the usual care. Trained positive deviant mothers (PDM) delivered the intervention. A pretested, structured, interviewer-administered questionnaire was used for data collection. Generalized estimating equation regression analysis adjusted for baseline covariates and clustering was used to test the intervention effect.

**Result:** The results showed that PDA improved breastfeeding outcomes in the intervention groups compared to their counterparts. A mean difference (MD) of breastfeeding (BF) knowledge (MD = 6.47; 95% CI: 6.45–6.49), BF attitude (MD = 12.68; 95% CI: 11.96–13.40), and BF self-efficacy (MD = 3.13; 95% CI: 3.05–3.21) was observed favoring the intervention. The intervention group showed better improvement in complementary feeding (CF) knowledge, attitude, and self-efficacy among mothers compared to the control group. A mean difference in CF knowledge (MD = 4.53, 95% CI: 4.31–4.75), CF attitude (MD = 9.14, 95% CI: 8.52–9.75), and CF self-efficacy (MD = 11.64, 95% CI: 11.16–12.12) were observed favoring the intervention. At the end of the 6-month follow-up, children in the intervention group showed a lower prevalence of underweight (18.23%) (95% CI: 4.55, 22.54%;  $p = 0.004$ ) compared with the control group.



**Conclusion:** PDA was effective in improving mothers' nutritional knowledge, attitude, and self-efficacy and reducing children's underweight in the intervention area.

**Clinical trial registration:** [ClinicalTrials.gov](https://clinicaltrials.gov), identifier PACTR202108880303760.

#### KEYWORDS

breastfeeding, complementary feeding, CRCT, IYCF, PDA, West Omo Zone, rural Ethiopia

## Introduction

Around the world, a total of 156 million children experienced stunted growth, and 50 million were wasted. It has been found that only about 43% of infants are exclusively breastfed, while the majority of children do not receive sufficient and safe complementary foods. Additionally, in numerous countries, less than a quarter of infants aged 6–24 months meet the required standards for dietary diversity and feeding frequency that are appropriate for their age (1, 2). Ethiopia is making efforts to implement a comprehensive nutrition plan but faces challenges in promoting optimal infant and young child feeding practices. A national survey revealed that almost half of infants under 6 months aren't exclusively breastfed, one in four receive pre-lacteal feeds, and only half are breastfed within an hour after birth. Additionally, less than 10% of children under 24 months achieve minimum dietary diversity, and only 6% meet the criteria for a minimum acceptable diet (3). The growth of children is influenced by multiple factors, such as their economic status, childrearing practices, health, and nutritional status. Eating behavior directly affects nutritional status and development (4).

The Positive Deviance Approach (PDA) in the field of health refers to the phenomenon where certain individuals achieve positive outcomes despite challenging circumstances. In the international health community, the PDA has primarily been used to study children who display exceptional growth despite living in impoverished environments (5). The PDA focuses on the strengths of a community, uses a problem-solving methodology, and empowers the community to lead the change. It is founded on a discovery over three decades ago that some individuals in a community who operate in a comparable socioeconomic context as their peers are achieving superior nutritional outcomes due to their special behaviors or strategies (6). Since the 1970s, maternal and child health programs have been employing this approach to tackle childhood malnutrition. Instead of fixating on what is not working, they focus on learning from and expanding upon what is already effective (7). Initially, PD was conceived in nutrition research and then put into practice to enhance nutrition outcomes in Vietnam. The triumph achieved in nutrition led to its subsequent implementation in more than 40 countries across the globe (8, 9).

Currently, positive deviance is being more utilized in international development activities as a way to incorporate locally tested solutions into problem-solving. It also serves as a method to encourage local engagement in addressing these issues (10). Individuals in the community who show exceptional behavior (uncommon behavior) enable them to achieve the best possible outcomes compared to their

neighbors with the same resources (11, 12). 'One approach to leveraging health-promoting parenting practices that persist in the face of stressful circumstances is by focusing on 'Positive Deviance' (13).

PD improved dietary intake, rapid weight gains in severely malnourished children, exclusive breastfeeding, and reduced morbidity in the intervention communities compared with non-intervention communities (14, 15). Positive results have been observed worldwide through the use of PDA. For instance, a study conducted in India utilized PDA to improve complementary feeding (16), in Mozambique and Burundi, PDA was applied to tackling undernutrition (10, 17), and in Ghana, household food security promotion and diet and growth trials (18) showed the application and contribution of PDA in different areas of public health (19).

In Ethiopia, there have been limited studies on the relationship between malnutrition and a positive deviance approach (PDA). PDA is a unique practice that provides an advantage to those who practice it compared with the rest of the community. This behavior is likely to be feasible, acceptable, and sustainable since it is already prevalent among at-risk populations, does not contradict local culture and traditions, and is effective. Therefore, this study aimed to assess the effectiveness of a community-based intervention using the PDA in enhancing mothers' nutritional knowledge, attitudes, and self-efficacy and improving their children's nutrition outcomes in rural Ethiopia.

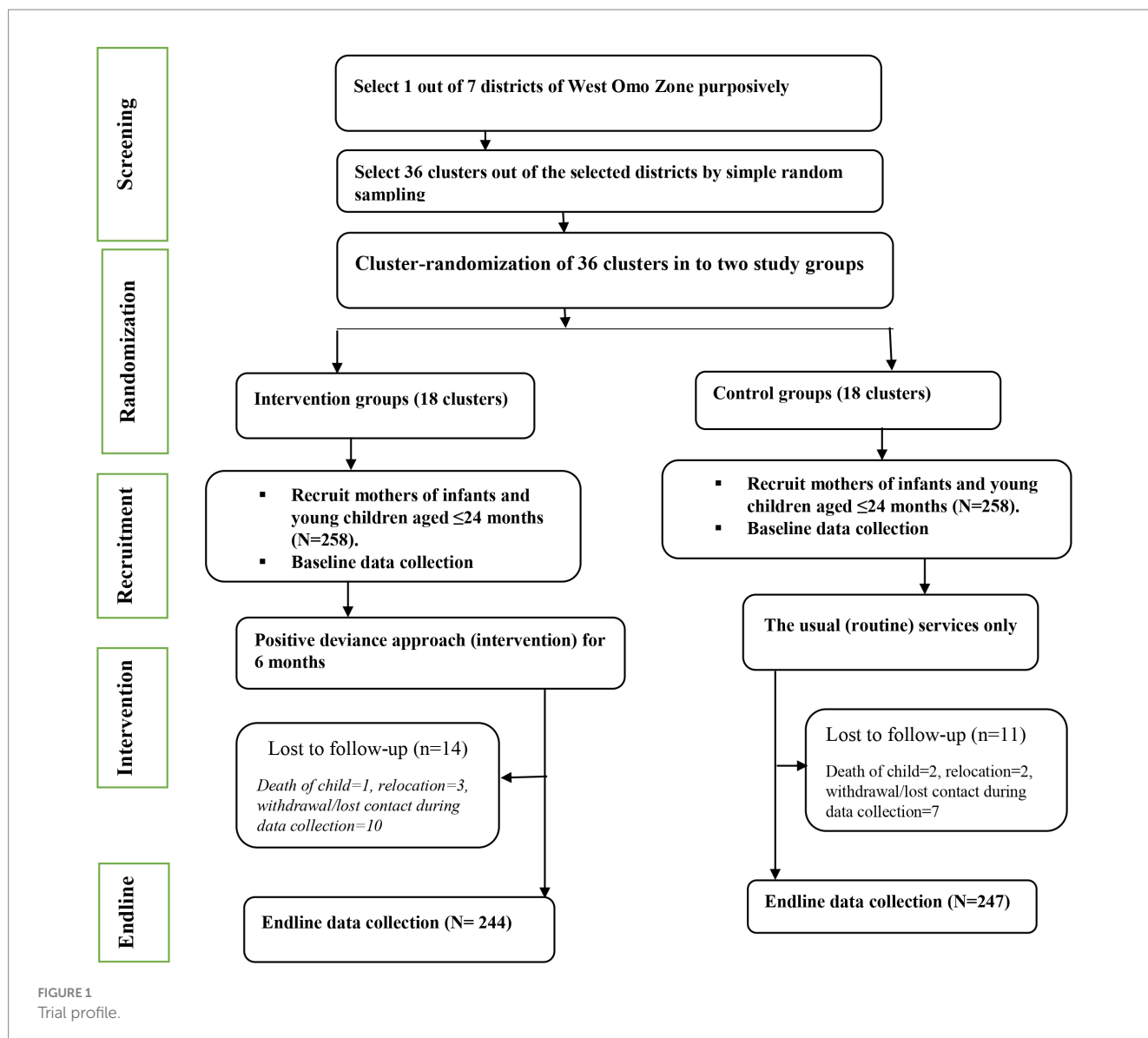
## Materials and methods

### Study setting and period

This study was conducted in Maji Woreda, a rural setting, from April 15 to October 19, 2022. The details of the study setting have been described in a study published elsewhere (18).

### Study design and population

A parallel-group, single-blinded, cluster-randomized, two-arm trial was designed to investigate the effectiveness of a positive deviant approach (PDA) for improving mothers' nutritional knowledge, attitude, and self-efficacy and children's nutritional status. The trial followed the CONSORT recommendations for cluster randomized control trials (Campbell et al.). The intervention was conducted in an environment that promoted collective participation. Clusters were used as randomization units to prevent intervention contamination



and improve logistical convenience. Clusters are the lowest administrative units, known as zones, in the kebele. Each kebele is divided into many small zones.

Mothers who consented and had resided in the study area for at least 6 months before the study were enrolled. Participants who were unable to communicate due to illness were excluded (Figure 1). This study used a similar population as a study published elsewhere (20).

## Sample size determination

The sample size was calculated using statcalc (STATA software version 14) with the following assumptions: to detect an increase in appropriate feeding from 7 to 14% (3), with 95% CIs and 80% power, assuming an intra-class correlation coefficient of 0.03 (21). The total sample size was 516 mother–child pairs (258 from the intervention arm and 258 from the control arm). The details of the sample size determination have been described in a study published elsewhere (20).

## Sampling and randomization

We used a multistage sampling technique followed by a systematic random sampling technique to identify mothers with index infants and young children. In the first step, one woreda (district) was selected by simple random sampling (the lottery method). Second, lists of all kebeles (clusters) in the selected districts were compiled from the district administrative offices. A total of 36 non-adjacent clusters geographically accessible from 88 zones (small administrative units) were purposefully selected by listing them in alphabetical order, and a list of random numbers was generated in Microsoft Excel 2016 and fixed by being copied as “value” next to the alphabetical list of zones. According to the production, random numbers were placed in an ascending order. The last 18 zones were chosen as control clusters, and the first 18 served as intervention clusters. Third, 516 mothers were recruited using health extension workers’ family registration books to find mothers who had infants and children less than 24 months of age. An Excel sheet was formed from the logbook, and the households were selected using simple random sampling techniques.

Mothers within the zones served as the unit of observation, and zones in the kebeles served as the unit of randomization for the trials. We assigned the zones by simple randomization with a 1:1 allocation to either the control or intervention groups. The intervention assignment was concealed from the interviewers who collected the outcome data. Because of the nature of the intervention, mothers cannot be blind. All mothers, health extension workers, members of the women's health army, and community volunteers were blind to the study's hypothesis. The general objectives of the study were described in the agreement for data collection.

## Positive deviance approach

The researchers, village leaders, women representatives, health development army leaders (HDALs), and health extension workers (HEWs) collaborated on design artifacts, workflows, and work environments. Through repeated discussions, they were able to deepen and refine their understanding of the activities. This method allows researchers to comprehend the implicit and tacit knowledge that mothers possess but cannot express in words. This knowledge is holistic and extensive, and mothers possess a rich background of experiences that cannot be fully articulated. To better understand this knowledge, the team used positive deviant queries to identify and examine exemplary practices in specific settings. Six essential steps are carried out by a researcher, village leader, woman representative,

HDAL, and HEW in the process (12). The details of the steps are presented in Figure 2.

## Intervention activities

### Part 1: training of selected positive deviant mothers

Village leaders, women's representatives, and health development army leaders suggested a total of 31 eligible PD mothers. Among them, 22 fulfill the requirement both at the mother's and child's sides. A two-week comprehensive training was provided to the mother based on the manual prepared for the training. The purpose of the training was to enrich the tacit knowledge they have about the recommended infant and young child feeding practices (IYCFP). PD plays a vital role in their communities by serving as counselors for infant and young child feeding (IYCF) and supporting group leaders. Equipped with practical knowledge, positive attitudes, and a strong sense of self-efficacy, these mothers effectively provide guidance, lead support groups, and engage in productive discussions with other mothers to encourage the adoption of the recommended IYCFP.

The key messages of the training session are as follows: optimal IYCFP, proper attachment of the breast to the child, and how to express and store breast milk. Regarding complementary feeding, we also conducted a cooking demonstration to teach people how to prepare and incorporate different types of locally accessible foods into homemade complementary meals. After the training, all PD mothers

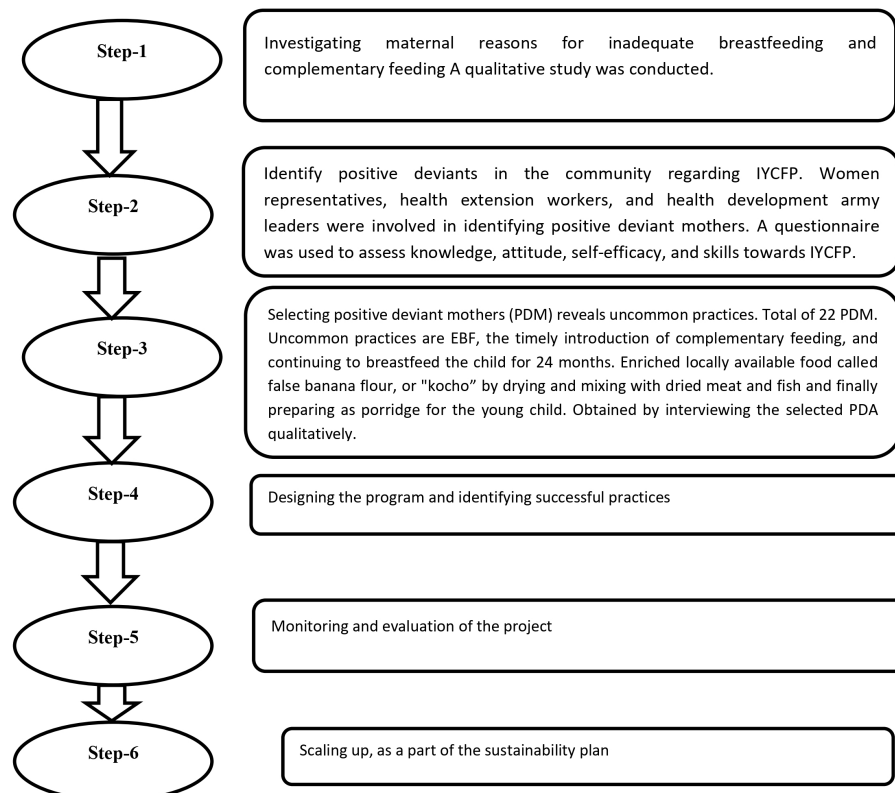


FIGURE 2  
Positive deviant approach steps.

received a copy of the information education material prepared for the sessions, while the manual prepared for this training was given at the beginning of the training.

The instructional strategies delivered included direct, interactive, participatory, and experience-sharing activities. These strategies aimed to enhance knowledge, attitude, and self-efficacy through various methods such as talks, group discussions, experience sharing, group work exercises, demonstrations, role-play, storytelling, and problem-solving. The intervention's key message focused on specific topics related to breastfeeding, such as the importance of early initiation and exclusive breastfeeding. It also addressed issues surrounding complementary feeding, including dietary diversity, minimum food frequency, and the appropriate time to start introducing complementary foods (CF). The intervention also emphasized the significance of enriching CF and provided step-by-step demonstrations on how to prepare enriched food items using locally available food options.

## Part 2: group training of mothers with PDM

Nutrition education sessions, including demonstrations, were provided to selected mothers in the intervention group for 12 consecutive days in groups in their community setting for 90–120 min each day. The intervention consists of these elements: (a) providing education on breastfeeding to increase knowledge, attitude, and self-efficacy in breastfeeding; (b) offering support for complementary feeding; (c) counseling on methods to enhance consistency, quantity, and frequency of food intake using locally accessible food options; (d) conducting practical demonstrations on cooking locally available food items; (e) providing hygiene support; and (f) guiding parents on how to feed their child during and after an illness.

## Part 3: home visits

Each positive deviant mother conducted a total of 12 home visits (twice a month) for the intervention group, aiming to bring the intended change to the maternal and child sides. During each home visit, counseling, sharing experiences of how they overcome their problems, and support were offered for the mother to reinforce the adoption of feeding practices she has been experiencing and to support them with training provided on optimum IYCFP. The mothers also demonstrated how to appropriately breastfeed and/or cook according to the age of the child. Moreover, feedback was given to the mothers participating in the trial. The participatory discussion was also carried out with the mother on the importance of breastfeeding and complementary feeding and their relevance for the health and growth of the child. Each mother was provided with a poster containing a key message for reinforcing the desired behavior.

Mothers were encouraged to inquire about any queries about the discussed topic. Additionally, a culturally suitable poster was used to visually depict information, such as the correct and incorrect methods of breastfeeding, the correct preparation of enriched flour, the appropriate thickness of complimentary food, as well as the inappropriate consistency. The poster also included images showcasing the advantages of adhering to the recommended IYCFP, presenting babies who were properly nourished versus those who were not.

All activities of PD mothers were supervised by the health professionals trained and recruited for supervision purposes. Overall supervision was also done by the researcher to get feedback from each positive deviant mother to identify if they had faced any challenges,

such as technical as well as medical problems. The checklist was employed to verify the presence of positive deviant and non-deviant mothers according to the predetermined schedule. A sign was attached to it.

The feedback had been given, and a solution was sought for both technical and medical issues. If the medical issues were raised with both the mother and the child, immediate referrals to nearby health centers were made.

## Control group

The control groups received the routine health education provided by the health extension workers working in the kebele.

## Blinding

The data collectors were not aware of the allocation clusters, and they were also not residents in any of the clusters. However, the trial mothers were aware of the intervention allocation since the nature of the intervention made it evident, although its specific purpose was not disclosed.

## Process evaluation

A process evaluation was conducted to document the implementation process of the intervention and assess whether the intervention activities were carried out according to the plan. It also aimed to evaluate the performance of the PD mothers who provided the intervention and determine the extent to which the intervention reached the intended target mothers (22).

## Data collection methods and outcome measurements

Mothers who were enrolled in the study were surveyed at the beginning and end of the study using a structured questionnaire to gather information on child, maternal, and household characteristics. The mothers' knowledge of breastfeeding was assessed based on 17 questions, with correct answers receiving a score of one and incorrect answers or unsure responses receiving a score of zero. The questionnaire used was adapted from a previous study among Chinese mothers, which was translated from English to Amharic (23). We decided to use cut-offs above and below the mean to dichotomize knowledge levels. Accordingly, all mothers who scored  $\geq$  the mean in the knowledge test were considered to have a high level of knowledge, and those scoring below the mean were considered to have a low level of knowledge.

The mothers' attitudes toward breastfeeding were evaluated using the Iowa Infant Feeding Attitude Scale, consisting of 17 items rated on a five-point Likert scale. Attitude toward breastfeeding was categorized as follows: (1) positive to breastfeeding (IIFAS score 70–85), (2) neutral (IIFAS score 49–69), and (3) positive to formula feeding (IIFAS score 17–48) (24). Similarly, the mothers' self-efficacy toward breastfeeding was measured using the short form of the breastfeeding

self-efficacy scale, which consisted of 14 items rated on a five-point Likert scale. All items are presented positively, and scores are summed to produce a range from 14 to 70. Breastfeeding self-efficacy was categorized as low self-efficacy (14–32 points), medium self-efficacy (33–51 points), and high self-efficacy (52–70 points).

Mothers' knowledge, attitude, and self-efficacy about complementary feeding were assessed using a pretested questionnaire. The knowledge questionnaire consists of 10 items and consists of both open-ended and multiple-choice questions. Each question was scored 1 for correct and 0 for incorrect answers. The scores were summed, and a mean score for knowledge questions was computed. Respondents who scored less than the mean were labeled as having "low" knowledge, and those who scored equal to or above the mean were considered to have "high" knowledge.

Attitudes toward complementary feeding consisted of 8 items on a five-point Likert scale, rating maternal attitudes toward complementary feeding. A mean score for attitude questions was computed, and respondents who scored below the mean were considered to have an "unfavorable" attitude, and those who scored equal to or above the mean were considered to have a "favorable" attitude. Complementary feeding self-efficacy was measured by 9 items on a five-point Likert scale measuring maternal confidence. A mean score for self-efficacy questions was computed, and respondents who scored below the mean were considered to have "low" self-efficacy, while those who scored equal to or above the mean were considered to have "high" self-efficacy.

Infants and children's length and weight were measured twice by two different teams of data collectors. The measurements were recorded on separate forms to ensure that the first measurement did not influence the second. Before each measurement, the weighing scale was calibrated to zero. Standard measures were obtained for height and weight (25, 26). For children aged 0–24 months, recumbent length was measured to the nearest 0.1 cm on a flat surface with a measuring tape and lying boards. For older children, standing height was measured to the nearest 0.1 cm, ensuring that the head, shoulder, buttocks, and heel all touched the vertical surface of the stadiometer.

## Data quality control

The questionnaire was originally developed in English and then translated into Amharic. It was then back-translated to English by an expert in the language to ensure consistency. To test the reliability of the questionnaire, a pretest was conducted on 5% of participants from the Bench-Sheko zone, which was outside of the study area. Cronbach's alpha was calculated and found to be 0.88, which is within the acceptable range ( $>0.7$ ), indicating good reliability. Before the actual data collection, supervisors and the researcher provided daily supervision and made necessary adjustments to the questionnaire.

## Data analysis

The intention-to-treat (ITT) principle was applied to all primary analyses. Double data entries were conducted using EpiData (version 3.1), and all statistical analyses were carried out using SPSS version 23. Descriptive statistics were used to present the baseline characteristics of the study groups. The chi-square test was utilized to assess baseline

differences between the study groups for categorical variables, while the *t*-test was used for continuous variables. Generalized estimated equations (GEE) regression analyses, adjusted for clustering, were employed to examine the effect of the intervention on knowledge, attitude, and self-efficacy toward optimum young child feeding and nutritional outcomes in the intervention and control groups. The mean percentage difference in PDA mothers was assessed using a two-sample test of proportions. LAZ, WAZ, and WLZ indices were created based on the WHO child growth standards (WHO Multicentre Growth Reference Study Group), using length and weight measurements. Statistical significance was determined at a value of *p* of less than 0.05.

## Ethical approval and consent to participate

The ethical review committee of the Jimma University Institute of Health Research and Postgraduate Office (reference number: IHRPG/938/20) has approved a study. Written informed consent was obtained from the mother of every enrolled child. The study was conducted according to the guidelines in the Helsinki Declaration for research involving human participants.

## Results

Initially, a total of 516 pairs of mothers and young children (258 in the intervention group and 258 in the control group) were recruited, resulting in a 100% response rate. Fourteen (5.43%) in the intervention group had to be excluded due to reasons such as the death of a young child ( $n=1$ ), relocation from the study area ( $n=3$ ), voluntary withdrawal from the study, or lost contact during the collection of endline data ( $n=10$ ). Eleven (4.26%) in the control group had to be excluded due to reasons such as the death of a young child ( $n=2$ ), relocation from the study area ( $n=2$ ), voluntary withdrawal from the study, or lost contact during the collection of endline data ( $n=7$ ). The data collected at the endline phase involved 491 mothers (95.15%) who had actively participated in both groups.

## Baseline characteristics

Except for child sex and child age, baseline infant and young child, maternal, and household characteristics were comparable between the intervention and control groups. The details about the baseline characteristics are described in Table 1.

## Effect of PDA on mothers' breastfeeding knowledge, attitude, and self-efficacy

The results showed a mean difference of (MD) breastfeeding knowledge (MD = 6.47; 95% CI 6.45–6.49), breastfeeding attitude (MD = 12.68; 95% CI 11.96–13.40), and breastfeeding self-efficacy (MD = 3.13; 95% CI 3.05–3.21) favoring the intervention group. Furthermore, comparatively, the highest and lowest impact of the intervention (effect size) was reflected in breastfeeding attitude (ES = 34%) and breastfeeding self-efficacy (ES = 9%) (Table 2).



TABLE 1 Socio-demographic characteristics of mothers, in Maji District, West Omo Zone, Southwest Ethiopia.

Variables	Intervention ( <i>n</i> = 258)		Control ( <i>n</i> = 258)		<i>X</i> <sup>2</sup> test	Value of <i>p</i>
	<i>n</i>	(%)	<i>n</i>	(%)		
Mother's age (in years)						
18–24	38	14.23	38	14.23	0.07	0.967
25–34	130	51.55	136	51.55		
35–49	90	34.22	84	34.22		
<b>M ± SD</b>	31.69 ± 7.74		30.83 ± 7.01			
<b>Marital status</b>						
Married	247	95.74	251	97.30	0.92	0.337
Divorced	11	4.26	7	2.70		
<b>Religion</b>						
Orthodox Christian	166	64.34	171	66.28	0.21	0.644
Protestant	92	35.66	87	33.72		
<b>Maternal occupation<sup>†</sup></b>						
Housewife/farmer	256	99.22	255	98.84		0.999
Government employee	2	0.78	3	1.16		
<b>Family size</b>						
1–3	58	22.48	58	22.48	3.02	0.221
4–6	131	50.77	147	56.98		
≥7	69	26.75	53	20.54		
<b>Monthly income of the household (ETB)</b>						
≤500	140	54.26	124	48.06	2.53	0.639
500–1,000	90	34.88	98	37.98		
1,000–1,500	14	5.43	16	6.20		
1,501–2000	8	3.10	12	4.65		
≥2000	6	2.33	8	3.11		
<b>Maternal educational status</b>						
Illiterate	97	37.58	91	35.27	0.30.	0.859
Primary school	141	54.65	146	56.59		
Secondary school and higher	20	7.77	21	8.14		
<b>Household food security status</b>						
Secured	14	5.43	13	5.04	0.04	0.843
Not secured	244	94.57	245	94.96		
<b>How long did you breastfeed your last child</b>						
<24 months	152	58.91	165	63.95	1.38	0.24
≥24 months	106	41.09	93	36.05		
<b>Child sex</b>						
Male	157	60.85	131	50.77	5.31	0.021*
Female	101	39.15	127	49.23		
<b>Child age (months)</b>						
0–5	41	15.89	45	17.44	15.03	0.002*
6–11	85	32.94	85	32.94		
12–17	118	45.74	90	34.88		
18–24	14	5.43	38	14.74		
<b>M ± SD</b>	10.97 ± 4.96		11.39 ± 5.80			

(Continued)

TABLE 1 (Continued)

Variables	Intervention ( <i>n</i> = 258)		Control ( <i>n</i> = 258)		<i>X</i> <sup>2</sup> test	Value of <i>p</i>
	<i>n</i>	(%)	<i>n</i>	(%)		
Birth order						
1st	45	17.44	44	17.05	0.09	0.958
2nd – 4th	171	66.28	174	67.44		
5th or more	42	16.28	40	15.51		
Number of ANC visits						
No ANC visits	118	45.74	116	44.96	0.04	0.981
<4 visits	112	43.41	113	43.8		
≥4 visits	28	10.85	29	11.24		
Received breastfeeding information						
No	174	67.44	179	69.38	0.22	0.636
Yes	84	32.56	79	30.62		
Place of delivery						
Home	173	67.05	184	71.32	1.1	0.294
Health institution	85	32.95	74	28.68		
Delivery type <sup>†</sup>						
Normal vaginal delivery	254	98.45	255	98.84		0.999
Caesarian section	4	1.55	3	1.16		
First time breastfeeding						
Immediately/within an hour of birth	91	35.27	98	37.98	0.87	0.833
After the first hour	130	50.39	127	49.22		
After 1 day	11	4.26	12	4.65		
Do not remember/ do not know	26	10.08	21	8.15		
Postpartum complications						
No	185	71.70	193	74.81	0.63	0.426
Yes	73	28.30	65	25.19		
Postnatal care						
No	214	82.94	225	87.21	1.85	0.174
Yes	44	17.06	33	12.79		
Number of children						
1–2	50	19.38	58	22.48	2.11	0.349
3–4	130	50.39	136	52.71		
≥5	78	30.23	64	24.81		
Parity						
Primiparous	45	17.44	44	17.05	0.01	0.907
Multiparous	213	82.56	214	82.95		

$\chi^2$  test; \*significant at  $p < 0.05$ ; <sup>†</sup>Fisher's exact probability test.

## Effect of PDA on mothers' complementary feeding knowledge, attitude, and self-efficacy

Regarding PDA, the effect on the mother's complementary feeding (CF) showed a mean difference in (MD) complementary feeding knowledge (MD = 4.53; 95% CI 4.31–4.75), CF attitude (MD = 9.14; 95% CI 8.52–9.75), and CF self-efficacy (MD = 11.64; 95% CI

11.16–12.12). Furthermore, comparatively, the highest and lowest impact of the intervention (effect size) was reflected in CF self-efficacy (ES = 31%) and CF knowledge (ES = 12%) (Table 3).

## Effect of PDA on anthropometric outcomes

Positive deviant approach had no statistically significant effect on the prevalence of stunting and wasting in infants and young children

TABLE 2 Multivariate general linear modeling parameters for the effects of PDA on mother's breastfeeding knowledge, attitude, and self-efficacy.

Outcomes	Mean (SD)			
	Intervention	Control	MD (95% CI)	Effect size
BFKQ score	13.28 (1.85)	6.81 (1.01)	6.47 (6.45 to 6.49)	0.29
IIFAS score	65.79 (5.98)	53.11 (5.33)	12.68 (11.96 to 13.40)	0.34
BSES-SF score	38.12 (3.33)	34.99 (2.99)	3.13 (3.05 to 3.21)	0.09

BFK, breastfeeding knowledge questionnaire; IIFAS, The Iowa infant feeding attitudes scale; BSES-SF, Breastfeeding Self-Efficacy Scale—Short Form; SD, standard deviation; MD, mean differences.

TABLE 3 Multivariate general linear modeling parameters for the effects of PDA on mother's complementary feeding knowledge, attitude, and self-efficacy.

Outcomes	Mean (SD)			
	Intervention	Control	MD (95% CI)	Effect size
CF knowledge score	6.96 ± 1.09	2.43 ± 1.09	4.53 (4.31–4.75)	0.12
CF attitude score	28.55 ± 3.01	19.41 ± 2.75	9.14 (8.52–9.75)	0.29
CF self-efficacy score	32.52 ± 4.11	20.88 ± 3.85	11.64 (11.16–12.12)	0.31

CF, complementary feeding; SD, standard deviation; MD, mean differences.

TABLE 4 Effect of PDA on anthropometric outcomes at 6 months of follow-up.

Outcomes	Control area		Intervention area		Absolute percentage (%) difference 95% CI †	Value of <i>p</i>
	<i>n</i> *	<i>n</i> (%)	<i>n</i> *	<i>n</i> (%)		
Stunting (LAZ < -2)					-6.46 (-11.97, -2.31)	0.21
Baseline	258	70 (27.13)	258	78 (30.23)		
Endline	247	65 (26.31)	244	60 (24.59)		
Underweight (WAZ < -2)					-18.23 (-22.54, -4.55)	0.004
Baseline	256	61 (23.83)	256	70 (27.34)		
Endline	245	53 (21.63)	243	27 (11.11)		
Wasting (WLZ < -2)					-9.03 (-13.04, -5.21)	0.121
Baseline	256	33 (12.89)	256	36 (14.06)		
Endline	245	29 (11.84)	243	15 (6.17)		

\*At baseline, the total number of children surveyed was 516 (*n* = 258 in the intervention area and *n* = 258 in control areas), with no weight measurement (*n* = 7) and treated as missing values through. †Estimated by mixed effect linear regression analysis, adjusting for enrollment status in growth outcomes, child age and sex. Length-for-age (LAZ), weight-for-age (WAZ), weight-for-length (WLZ).

in the intervention group compared to the control group (diff:6.46, 95% CI: 2.31, 11.97%; *p* = 0.21) and 9.03% (95% CI: 5.21, 14.03%; *p* = 0.121), respectively. The intervention group showed statistically significant differences and a greater decline in the prevalence of underweight (18.23%, 95% CI, 4.55, 22.54%; *p* = 0.004) compared with the control group (Table 4).

## Discussion

### Impact of the intervention

This study utilized cluster randomized control trials to demonstrate the effectiveness of the Positive Deviant Approach (PDA) in enhancing various outcomes related to breastfeeding, complementary feeding, and child nutritional status among rural Ethiopian mothers and children. Specifically, the use of PDA resulted

in increased knowledge, improved attitudes, and greater self-efficacy toward breastfeeding and complementary feeding. Moreover, the study indicated notable improvements in weight-for-age z-scores (WAZ) and a reduction in cases of underweight among the children. The findings from this study are of utmost importance to public health as they depict the effectiveness of PDA in significantly improving child nutrition among rural Ethiopian mothers and children. Furthermore, the notable improvements in WAZ and a reduction in cases of underweight among children indicate the positive impact of PDA on child nutrition. These findings highlight the potential of implementing PDA as a strategy to address malnutrition and improve the overall health and well-being of rural communities.

The role of knowledge in health behavior change is widely acknowledged. The study discovered that the intervention group demonstrated increased scores in breastfeeding knowledge when compared to the control group. This study aligns with previous research conducted in Ethiopia (27) and India (28), which also found

that PDA effectively increased breastfeeding knowledge scores in the intervention group compared to the control group. However, this study contradicts a breastfeeding education and support intervention conducted in Ethiopia, where no notable difference was observed between the intervention and control groups in terms of breastfeeding knowledge scores (29). These differences may be explained by the nature of PDA, where the community's tacit knowledge was supported scientifically to solve its problems.

The current study showed the effect of PDA on improving breastfeeding attitudes in the intervention group compared to the control group at the endline. This study is in congruence with previous studies done in Ethiopia using PDA (27) and breastfeeding education and support interventions (29). The repeated exposure and positive, enduring evaluation of the importance of breastfeeding led the mother to develop a positive attitude toward breastfeeding, which contributed to an improved breastfeeding attitude score.

Self-efficacy significantly contributes to behavior change efforts. Higher levels of self-efficacy lead to increased motivation, perseverance, and confidence in one's abilities, which can ultimately result in sustained behavior change. This study showed PDA improved mothers' breastfeeding self-efficacy in the intervention group compared to the control group. This finding is in line with previous studies done in Ethiopia (27) and Malaysia (30).

This study revealed that PDA affects mothers' complementary feeding (CF) knowledge in the intervention group when compared with the control group. Our finding is in line with the study done in Ghana (31). The PDA also had an effect on the CF attitude score in the intervention group compared with the control group. This is because PDA may have changed the mothers' attitudes toward complementary feeding. The mothers previously assumed that complementary feeding was not affordable in their setting, and this intervention showed them how to use locally available food items for feeding their young children. This study's finding is in line with a community-based nutritional education intervention conducted in Kenya (32).

In our study, PDA improved complementary feeding self-efficacy among mothers in the intervention group compared with the control group. It has been demonstrated that self-efficacy is a powerful motivator for positive health behavior changes (33). In this study, the mothers in the intervention groups were provided with information and skills that potentially enhanced their confidence in providing complementary feeding for their young children. Notably, the results of this study align with those of a positive deviant intervention study conducted in Ecuador (34), which witnessed an improvement in complementary feeding self-efficacy among the mothers in the intervention group compared to the control group.

In this study, PDA had no statistically significant effect on the prevalence of stunting in infants and young children in the intervention group compared to the control group. The findings of this study are in congruence with trials conducted in Malawi (35) and Cambodia (36), which used nutrition education interventions. The finding of this study is contrary to the study done in Ethiopia, which used PDA (37), where the intervention had a significant effect on stunting among the intervention group. This difference can be explained by the fact that in our study, the intervention was for 6 months and in the previous study, the intervention was for 12 months, which may contribute to the change.

In addition, this study revealed that PDA showed a statistically significant effect on the declining prevalence of underweight children compared with the control group. The results of this study are consistent with those of similar experiments conducted in Ecuador and Cambodia (34, 36), which also used positive deviant/health nutrition and showed that at follow-up, children in the intervention arm had improvements in weight-for-age and the likelihood of being underweight was reduced for children in the intervention arm. This study also revealed that PDA has no statistically significant effect on wasting in the intervention group when compared with the control group. The findings of this study are in line with trials conducted in Ethiopia that used PDA (37).

## Implication of the study

This intervention study is quite relevant and contributes to the field of public health and particularly to nutrition programs by inspiring the public health practitioner toward community-based participatory approaches to resolving nutrition-related issues in the study area and beyond. The study showed the effectiveness of PDA in improving maternal nutrition-related knowledge, attitude, self-efficacy, and a child's nutritional status (reducing underweight) in the study area. This study also encourages future researchers to solve community problems with solutions that emerge from the community.

## Strengths and limitations of the study

The strength of our study was the utilization of a cluster randomized study design, which encompassed a relatively large sample size. Additionally, we employed a statistical approach to account for correlations within individual children and clusters. The inclusion of positive deviant mothers from the community further encouraged the sustainability of the intervention within the community. We ensured the use of validated tools to collect data on knowledge, attitude, and self-efficacy concerning both breastfeeding and complementary feeding. However, this study does have some limitations. Firstly, this study may introduce a social desirability bias into certain outcomes. Secondly, our study only involved two data collection sessions, conducted at baseline and endline. As a result, we recommend future studies include additional follow-up visits with enhanced enabling factors in place. This will aid in accurately capturing changes in mothers' knowledge, attitude, self-efficacy, and nutritional outcomes.

## Conclusion

In conclusion, this research demonstrates that PDA can improve a mother's nutritional knowledge, attitude, self-efficacy, and child's nutritional status (WAZ). Hence, incorporating PDA with government nutrition programs in rural communities can potentially enhance mothers' knowledge, attitude, self-efficacy, and nutritional outcomes. It is important to address the mother's nutritional knowledge, attitude, and self-efficacy in promoting actual behavior. Therefore, these findings can inspire community-based participatory approaches to nutritional interventions. Additionally, there is a need to conduct

further research to comprehensively understand the mechanisms by which PDA affects feeding practices.

## 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 Jimma University's Institute of Health Research and Postgraduate Office, Institutional Review Board. 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

AG: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Software, Validation, Writing – original draft, Visualization. PS: Conceptualization, Investigation, Methodology, Supervision, Validation, Visualization, Writing – review & editing, Software. MS: Conceptualization, Methodology, Supervision, Validation, Visualization, Writing – original draft, 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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# Raising patient voices in medical education: an assessment of patient perceived effect of social determinants of health conversations and the patient-physician relationship on quality of obstetric care, to inform the development of patient driven medical education curricula

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**Background:** Conventional medical education lacks the lived experiences of patients which may authentically convey the social determinants of health (SDOH) and resulting health disparities. Videos of first-person patient narratives may prove a valuable education tool in this regard. The objective of this study is to investigate how patient demographics, satisfaction with care, and patient-physician relationships influence obstetric patient interest and willingness to contribute to a SDOH video curriculum by sharing their lived experiences through first-person narratives.

**Methods:** Study design included an anonymous, cross-sectional survey and an optional semi-structured telephone interview. Participants were 18 years old with a live-birth delivery <8 weeks prior to recruitment and received care during their pregnancy at Los Angeles General Medical Center (LAGMC). Variables surveyed included demographics, satisfaction with care, aspects of the patient-physician relationship, perceived utility, and personal interest in contributing to an educational SDOH video. A bivariate analysis was conducted to compare participants' characteristics and responses on interest in contributing and perceived helpfulness of first-person patient SDOH videos.

**Results:** 72.43% of participants ( $N = 70$ ) believed a patient's first-person video on SDOH would be "Helpful" in preparing physicians to provide competent medical care; however, 71.43% responded "No" to "Interest" in sharing with physicians their experiences with SDOH. English preference and being U.S. born were factors significantly associated with viewing first-person SDOH video as "Helpful" ( $P > 0.001$ ). Major themes from telephone interviews reflected enthusiasm for first-person patient narratives and perceived benefits of using patient experiences to educate physicians on SDOH. However, participants cited barriers to disclosing SDOH including brief and strictly clinical interactions with physicians, lack of continuity of care, and fear of being judged by physicians.

**Conclusion:** While most participants recognized the utility of addressing social needs in medical education and reported satisfaction with their obstetricians and care, these factors did not uniformly translate into willingness to contribute first-person patient narratives. To improve the representation of patients from racial, ethnic, gender, linguistic, and sexual minorities into medical curricula, further research and strategies are needed to overcome the barriers discouraging patient disclosure of social needs to physicians.

#### KEYWORDS

social determinants of health (SDOH), patient-physician relationship, social needs, first-person narrative, obstetric, medical education, video

## Introduction

Medical academic institutions are increasingly dedicating efforts to collaborate with patients in training both current and future physicians, with a specific focus on imparting knowledge about the social determinants of health (SDOH)—defined as the social circumstances, environment, and behavioral patterns that significantly influence health outcomes (1–4). This is reflective of the efforts to encourage physician incorporation of patient concerns and circumstances in medical management, to deliver patient-centered care (5–8). Theoretically this approach has the potential to combat health disparities experienced by groups that have been disproportionately affected, to correct physician bias, and progress toward equitable health outcomes for diverse populations (9). However, systematic review of SDOH and patient-driven curricula reveal a notable inconsistency and several barriers to incorporating the diverse patient perspectives needed to achieve this goal (10, 11).

The underrepresentation of historically marginalized groups in medical academia and the health disparities they face have profound origins in systemic issues of racism and discrimination (12–15). Within the field of Obstetrics and Gynecology, much research exists demonstrating that persons of color are at higher risk for severe maternal morbidity and mortality (16). These findings prompt a call to action to address the SDOH influencing these glaring health disparities. As the medical community strives for inclusivity in patient-driven curricula, it is crucial to develop curricula that recognize these factors and inspire physician action to address these multifaceted barriers (17). Societal and individual factors pose significant hurdles for patients in sharing their unique perspectives with medical learners, including patient constraints due to their state of health, mobility, work, finances, personal commitments, health literacy and language barriers (11, 18). Concerns about privacy and fear of judgment, often rooted in historical injustices, coupled with the fear of encountering physician bias, create a formidable barrier for patients to openly share their social needs with medical learners (19–21). These factors may be compounded for groups that have been economically and socially marginalized. Failure to accommodate barriers hindering patient participation in curriculum development results in a missed opportunity to offer equitable engagement, especially for the individuals from

groups disproportionately impacted by these challenges. This oversight and passive approach in curricula development permits these voices and concerns to go unheard. Thus, to ensure an accurate reflection of patient perspectives to medical learners and increase integration of underrepresented voices in medical education, efforts are needed to develop patient driven SDOH curricula that foster an environment where these patients feel heard, valued, and respected, minimize patient burden, and provide equitable opportunities for diverse patient participation (22).

We propose that short video documentaries of first-person patient narratives on socio-cultural and environmental factors impacting their health may be an effective method to improve representation of diverse patient voices in medical academia. From the perspective of the medical learner, patient narratives have already shown great benefit in improving learner empathy towards patients and augment understanding of disease through emotional association (23–25). The addition of visuals provided by video documentation of patient experiences may enrich medical learner understanding of the aspects of a patient's life which influence health outcomes (26). But, more importantly, first person narratives have shown potential as a method for capturing underrepresented voices in medicine, while prioritizing content the storytellers wish physicians to understand (27). Ideally, with a more autonomous role as physician educators, patients may challenge the stereotypes, biases, and power dynamics that previously limited their representation in educational contexts. We hypothesize that by providing a platform where patients can authentically share their stories, with visuals to demonstrate the nuances of the SDOH, this forum will deliver an accurate representation and challenges faced by diverse populations in healthcare settings.

A significant advantage of utilizing video as a media to deliver patient narratives lies in its potential to foster critical reflection among healthcare professionals and drive quality improvement in the medical system (28). The approach of developing a mini documentary or first-person patient video narrative capturing patient interactions with medical systems, socio-cultural and daily environments, aligns with the principles of video-reflexive ethnography. As institutions have begun utilizing this method for improving systems for delivering patient-centered care (29), it is reasonable to consider this method as a way for addressing medical learner preconceptions about items that can be changed

within medical systems to address health disparities experienced by patients of underrepresented backgrounds. Therein also lies the potential that patients who provide their stories will have their social needs addressed in the discovery and improvement of the systemic issue by an engaged team of healthcare providers.

Thus, video patient-driven narratives on the SDOH have the potential to authentically demonstrate underrepresented voices and inspire change or safeguards against medical injustices. Theoretically, the use of a video curricula may accommodate patient societal and individual factors which pose as barriers to traditional methods of participation in medical education (e.g., limiting the need for repeated commitments to attend live medical lectures to share their narratives). However, prior to the development and assessment of this curricula, further research is needed to understand underrepresented patients' views of and willingness to contribute first-person narrative videos to teach SDOH to medical learners and combat systemic issues of racism and discrimination in medicine.

The objectives of this study are (1) To describe participants' responses on patient-physician relationships and their experience of physician bias toward personal attributes; (2) To conduct a comparison between participants with and without perceived utility, exploring their characteristics, responses, language preferences, and personal interest in contributing narratives, (3) To describe the qualitative responses among participants who participated in the telephone interview regarding the sharing of their experiences on video to teach medical students the importance of awareness of SDOH. Our investigative team will turn to the patient population at the Los Angeles General Medical Center (LAGMC), one of the county's main safety-net hospitals, which predominantly serves the areas of Metro and East Los Angeles: historically, under-resourced communities, burdened with socially determined poorer health outcomes (30).

## Materials and methods

### Target population

Our study aims to provide focused exploration of racial/ethnic minority obstetric patient experiences with physicians throughout the ante-, peri-, and postpartum periods, to direct the development of the proposed curriculum that will improve medical learner awareness and regarding the SDOH contributing to poorer maternal health outcomes for this patient population. As previously noted, these experiences and a patient's willingness to participate in medical education can be influenced by the patient-physician relationship or patient satisfaction with care, perceived physician competency, and overall trust in physicians. To better control for the frequency of patient-physician interactions as a potential influencing factor, a suitable sample would consist of individuals who share similar healthcare goals and engage with physicians within a comparable timeframe and at regularly scheduled intervals. Our focus was therefore directed toward the obstetric patients at LAGMC given this population's

routine interactions with physicians during prenatal and postnatal care.

### Ethics review

This study was reviewed and approved by the Institutional Review Board of the University of Southern California.

### Participant recruitment

We included postpartum patients who were at least 18 years old with a live-birth delivery less than 8 weeks prior and received care during their pregnancy from physicians at LAGMC. We excluded patients who did not have at least one prenatal care visit at LAGMC prior to delivery of their most recent pregnancy. The recruitment was conducted during the postpartum admission and/or postpartum visit at the LAGMC. By reviewing the patient's chart from July 2022 to February 2023, patients who met our study population criteria were approached by co-investigators and provided an information sheet with explanation of the content, risks and benefits associated with the opportunity for voluntary completion of a 30-question survey. The anonymous electronic survey was administered using REDCap, a HIPAA compliant research electronic data capture application. Participants who agreed to participate in the study and completed the survey were compensated for their time with a \$20 gift card.

### Survey content

Demographic questions focused on patient identity (gender, race/ethnicity) and obstetric outcomes (e.g., parity, gestational age of most recent pregnancy, delivery mode). In this survey, "non-medical personal challenges" was used to describe to participants the SDOH in layman's terms. Participants were invited to provide their opinions on the following topics: (1) Aspects of the patient-physician relationship shared between the participants and their obstetricians (2) Personal labor and delivery experience (3) Perceived value of conversations with physicians about non-medical personal challenges (4) Interest in providing personal narratives on non-medical personal challenges with physicians (5) Belief in utility of first-person video narratives on the effects non-medical personal challenges have on medical experiences and health outcomes, to educate physicians (6) Physician bias experienced by patients impacted by language/race/insurance type. Questions regarding the patient-physician relationship were adapted from the validated Van-der Feltz-Cornelis et al. survey (referred to as, PDRQ-9) (31), through which patients may report satisfaction with physician helpfulness, empathic understanding, interpersonal openness, availability, etc. Our survey was offered in English and Spanish. The survey was developed in English and translated into Spanish text by our bilingual investigators.

# Telephone interview

Upon the completion of the initial survey, participants were given the opportunity to participate in an optional semi-structured telephone interview within six months of completing the initial survey. Telephone interviews were designed to last

TABLE 1 Demographics of study participants.

	Frequency (%) N = 70
Preference for english	
Yes	50 (71.43%)
No	19 (27.14%)
No response	1 (1.43%)
Born in US	
Yes	42 (60%)
No	24 (34.29%)
No response	4 (5.71%)
Race/ethnicity	
Asian or Asian American	4 (5.71%)
Black or African American	4 (5.71%)
Latino or Spanish (Hispanic)	57 (81.43%)
Middle Eastern or North African	2 (2.86%)
White	3 (4.39%)
Employment status	
Employed (Full-time)	18 (25.71%)
Employed (Part-time)	13 (18.57%)
Employed and student	1 (1.43%)
Student, NOT employed	2 (2.86%)
Not employed and NOT student	23 (32.86%)
Other	11 (15.71%)
No response	2 (2.86%)
Health insurance	
Government sponsored insurance	61 (87.14%)
Private insurance	2 (2.86%)
Employer sponsored	1 (1.43%)
I don't know	2 (2.86%)
No insurance	2 (2.86%)
No response	2 (2.86%)
First delivery	
Yes	30 (42.86%)
No	39 (55.71%)
No response	1 (1.43%)
Days since delivery	
6 days or less	69 (98.57%)
2 weeks	1 (1.43%)
Mode of delivery	
Vaginal	40 (57.14%)
Vacuum	2 (2.86%)
Planned C-section	10 (14.29%)
Unplanned C-section	8 (11.43%)
Emergency C-section	9 (12.86%)
No response	1 (1.43%)
Infant's gestational age	
<28	1 (1.43%)
28–32	1 (1.43%)
32–34	1 (1.43%)
34–37	9 (12.86%)
37–40	41 (58.57%)
>40	16 (22.86%)
No response	1 (1.43%)

30 min, providing participants an opportunity to elaborate on their responses in the survey, and were conducted in the participants' preferred language (English vs. Spanish). The interview guide was designed to elicit participant reasoning for answering yes/no to interest in sharing non-medical personal challenges with physicians, perceived helpfulness of a first-person patient narrative video to educate physicians on non-medical personal challenges, perceived helpfulness of having conversations on non-medical personal challenges with physicians during medical visitations, and perception of physician familiarity with patient non-medical personal challenges. Examples of non-medical personal challenges were provided to participants at the start of the interview and participants were also encouraged to reflect and share anecdotes with interviewers on their own challenges that they believed would be educational for physicians. Participants were compensated for their time with a \$50 gift card following completion of the interview. Telephone interviews were recorded using the app CallRev and were transcribed and/or translated into English text by our bilingual investigators.

## Statistical analysis

Demographics of the study population and their survey responses were presented with descriptive statistics. Frequency and proportion for responses were reported. Then bivariate analysis was conducted to compare factors linked to participants' perceived utility of first-person patient narrative video (helpful/not helpful), participants' interest (yes/no) in contributing to the study, and participants responding to the survey in English vs. Spanish. Chi-square test was conducted with the significant level of 0.05 using STATA 16 (College Station, TX: StataCorp LP).

Qualitative analysis and coding of phone interview transcripts was conducted using the RADaR technique (32), independently by two bi-lingual researchers. Transcript codes were selected by the two researchers to reflect recurrent themes in participant reasoning for answers given in the qualitative survey. Major themes were selected to reflect codes frequently cited by both researchers.

## Results

### Survey participant demographics

A total of 90 individuals who met the inclusion criteria were approached to complete our electronic survey; 20 individuals chose not to participate in the study, achieving a response rate of 78%. The demographic information of survey participants is depicted in Table 1. Of the (N = 70) survey participants, 81.43% identified as Latino. The mean age of participants was 29.13 (SD 5.29). Most participants indicated their preferred language as English 71.43% while 27.14% preferred Spanish. More than half (60%) of participants were U.S. born. Approximately one-third (35.72%) of the participants are unemployed and most of the participants (87.14%) used government sponsored insurance.



Regarding the delivery history, almost all participants (98.57%) had a live birth 6 days or less prior to the survey; 60% had vaginal delivery and 38.57% had a C-section. Most of the participants (81.43%) delivered at term (gestational age  $\geq 37$  weeks). Demographic information was not collected on individuals who chose not to participate in the study.

### Patient-physician relationship and perceived bias

Across all aspects of the patient-physician relationship cited in this survey, the majority (92.86%) of participants “Strongly Agree/Agree” with being content with the treatment provided by physicians throughout their pregnancy (Table 2). 85.72% agree that their obstetric physicians allocated time to talk about non-medical personal challenges. 88.58% agree their obstetric physicians understood their non-medical person challenges affecting their health and pregnancy. 95.72% agree that their obstetric physicians provided clear explanations regarding treatment options when pregnancy related complications were encountered. 94.28% agreed with the recommendations made by

their obstetric physicians. 85.72% agreed their obstetric physicians were available to provide alternative solutions when recommendations were not agreed upon. And 94.29% of patients felt their pain was appropriately managed during and after labor. Most participants reported that their race/ethnicity (78.57%), preferred language (80%), and insurance (80%) “Did not affect” the care received from their obstetric physicians.

### Perceived utility and interest in personally contributing narratives

Most participants (72.86%) believed a patient’s first-person narrative video on non-medical personal challenges would be “Helpful/Very Helpful” in preparing physicians to provide competent medical care (Table 3). Satisfaction with aspects of the patient-physician relationship, race, language, and obstetric outcomes were not associated with participant’s view of the utility of patients sharing SDOH with physicians (Table 4). Participants with English as their preferred language and those who were born in the US were more likely to view a first-person patient narrative video as “Helpful/Very Helpful” ( $P < 0.001$ ).

TABLE 2 Participant responses to statements on the patient-physician relationship, perceived physician bias toward personal attributes, and labor and postpartum satisfaction.

Patient-physician relationship	Frequency (%) (N = 70)				
	Strongly agree	Agree	Disagree	Strongly disagree	No response
Overall I am content with the treatment provided by the doctor(s) that I worked with throughout my pregnancy	55 (78.57%)	10 (14.29%)	1 (1.43%)	3 (4.39%)	1 (1.43%)
The doctor(s) I worked with throughout my pregnancy made time to talk with me about my non-medical, personal challenges affecting my health and pregnancy.	51 (72.86%)	9 (12.86%)	0 (0%)	8 (11.43%)	2 (2.86%)
I felt that the doctor(s) that I worked with throughout my pregnancy understood my non-medical, personal challenges that were affecting my health and pregnancy.	52 (74.29%)	10 (14.29%)	1 (1.43%)	6 (8.57%)	1 (1.43%)
I think if doctors ask patients about nonmedical, personal challenges, it makes medical treatment better.	44 (62.86%)	12 (17.14%)	3 (4.39%)	9 (12.86%)	2 (2.86%)
When I had questions or when I or my baby experienced complications during labor or delivery, my doctor(s) gave me a clear explanation of what was happening and available treatment options.	57 (81.43%)	10 (14.29%)	0 (0%)	2 (2.86%)	1 (1.43%)
I agreed with the recommendations made by the doctor(s) throughout my pregnancy.	55 (78.57%)	11 (15.71%)	1 (1.43%)	2 (2.86%)	1 (1.43%)
If I could not follow through or did not agree with the recommendations made by my doctor(s) throughout my pregnancy, the doctor(s) was dedicated to helping me find a solution.	50 (71.43%)	10 (14.29%)	3 (4.39%)	5 (7.14%)	2 (2.86%)
I believe my pain was managed appropriately during and after labor.	59 (84.29%)	7 (10%)	2 (2.86%)	1 (1.43%)	1 (1.43%)
Perceived physician bias toward personal attributes	Positively affected	Negatively affected	Did not affect		No response
I believe my race/ethnicity _____ the care I received from the doctor(s) I worked with throughout my pregnancy.	14 (20%)	0 (0%)	55 (78.57%)		1 (1.43%)
I believe my preferred language _____ the care I received from the doctor(s) I worked with throughout my pregnancy.	11 (15.71%)	1 (1.43%)	56 (80%)		2 (2.86%)
I believe my financial situation/insurance coverage _____ the care I received from the doctor(s) I worked with throughout my pregnancy.	13 (18.57%)	0 (0%)	56 (80%)		1 (1.43%)
Labor and postpartum satisfaction	Very good	Good	Bad	Very bad	No response
How would you rate your labor and delivery experience?	51 (72.86%)	18 (25.71%)	0 (0%)	0 (0%)	1 (1.43%)
How would you rate your postpartum (after delivery) follow up experience?	50 (71.43%)	19 (27.14%)	0 (0%)	0 (0%)	1 (1.43%)

**TABLE 3** Participant perceived utility of a first-person patient narrative video to educate physicians on social determinants of health (SDOH) and interest in personally contributing narratives to the development of this educational tool.

Perceived utility in personally contributing narratives	Frequency (%) N = 70				
	Very helpful	Somewhat helpful	Not very helpful	Not at all helpful	No response
How helpful do you think showing doctors a video of community members sharing their experiences as a patient, would be in preparing doctors to provide medical care for people like you?	34 (48.57%)	17 (24.29%)	4 (5.71%)	14 (20%)	1 (1.43%)
Interest in personally contributing narratives	Yes	No			No response
Are you interested in sharing stories with doctors about personal challenges that are or have affected your health?	19 (27.14%)	50 (71.43%)			1 (1.43%)

**TABLE 4** Comparison of participants' characteristics and their responses to the perceived utility and interest in personally contributing narratives and language preferences among 64 participants who responded to questions regarding interest in sharing their own narratives, the perceived helpfulness of social determinants of health (SDOH) narratives, and language preferences.

	Interest in sharing own SDOH (N = 64)			Perceived helpfulness of SDOH narratives (N = 64)			Language preference (N = 64)		
	No	Yes	p	No	Yes	p	English speaking	Spanish speaking	p
	46 (71.88%)	18 (28.13%)		16 (25%)	48 (75%)		48 (75%)	16 (25%)	
<b>Participants' characteristics</b>									
Hispanic Latino (n = 69)			0.62			0.41			0.019
No	8 (16%)	4 (21.05%)		2 (11.11%)	10 (19.61%)		13 (25%)	0 (0%)	
Yes	42 (84%)	15 (78.95%)		16 (88.89%)	41 (80.39%)		39 (75%)	18 (100%)	
Total	50	19		18	51		52	18	
English preferred (n = 69)			0.64			<0.001			<0.001
Yes	37 (74%)	13 (68.42%)		3 (16.67%)	47 (92.16%)		49 (96.08%)	1 (5.56%)	
No	13 (26%)	6 (31.58%)		15 (83.33%)	4 (7.84%)		2 (3.92%)	17 (94.44%)	
Total	50	19		18	51		51	18	
Born in US (n = 66)			0.68			<0.001			<0.001
No	16 (34.04%)	8 (42.11%)		15 (83.33%)	9 (18.75%)		8 (16.67%)	16 (88.89%)	
Yes	31 (65.96%)	11 (57.89%)		3 (16.67%)	39 (81.25%)		40 (83.33%)	2 (11.11%)	
Total	47	19		18	48		48	18	
Employment status (n = 68)			0.16			0.38			0.37
Employed (Full-time)	15 (30.61%)	3 (15.80%)		2 (11.11%)	16 (32%)		16 (32%)	2 (11.11%)	
Employed (Part-time)	8 (16.33%)	5 (26.32%)		4 (22.22%)	9 (18%)		10 (20%)	3 (16.67%)	
Employed and student	1 (2.04%)	0 (0%)		0 (0%)	1 (2%)		1 (2%)	0 (0%)	
Student, NOT employed	0 (0%)	2 (10.54%)		1 (5.56%)	1 (2%)		1 (2%)	1 (5.56%)	
Not employed and NOT student	16 (32.65%)	7 (36.84%)		6 (33.33%)	17 (34%)		16 (32%)	7 (38.89%)	
Other	9 (18.37%)	2 (10.53%)		5 (27.78%)	6 (12%)		6 (12%)	5 (27.78%)	
Total	49	19		18	50		50	18	
Highest education (n = 68)			0.17			0.06			0.008
GED	19 (38%)	10 (55.56%)		13 (72.22%)	16 (32%)		15 (30%)	14 (77.78%)	
Some college	12 (24%)	4 (22.22%)		2 (11.11%)	14 (28%)		16 (32%)	0 (0%)	
Associates degree	4 (8%)	2 (11.11%)		0 (0%)	6 (12%)		6 (12%)	0 (0%)	
Bachelor's degree	5 (10%)	1 (5.56%)		2 (11.11%)	4 (8%)		4 (8%)	2 (11.11%)	
Graduate professional	0 (0%)	1 (5.56%)		0 (0%)	1 (2%)		1 (2%)	0 (0%)	
None of the Above	10 (20%)	0 (0%)		1 (5.56%)	9 (18%)		8 (16%)	2 (11.11%)	
Total	50	18		18	50		50	18	
Health insurance (n = 68)			0.35			0.12			0.12
Government	45 (91.84%)	16 (84.21%)		15 (83.33%)	46 (92%)		46 (92%)	15 (83.33%)	
Private	1 (2.04%)	1 (5.26%)		0 (0%)	2 (4%)		2 (4%)	0 (0%)	
Employer sponsored	0 (0%)	1 (5.26%)		0 (0%)	1 (2%)		1 (2%)	0 (0%)	
Unknown	1 (2.04%)	1 (5.26%)		2 (11.11%)	0 (0%)		0 (0%)	2 (11.11%)	
No insurance	2 (4.08%)	0 (0%)		1 (5.56%)	1 (2%)		1 (2%)	1 (5.56%)	
Total	49	19		18	50		50	18	
Delivery mode (n = 69)						0.63			0.77
Vaginal	31 (62%)	9 (47.37%)	0.05	11 (61.11%)	29 (56.86%)		29 (56.86%)	11 (61.11%)	

(Continued)

TABLE 4 Continued

	Interest in sharing own SDOH (N = 64)			Perceived helpfulness of SDOH narratives (N = 64)			Language preference (N = 64)		
	No	Yes	p	No	Yes	p	English speaking	Spanish speaking	p
Vacuum	1 (2%)	1 (5.26%)		0 (0%)	2 (3.92%)		2 (3.92%)	0 (0%)	
Planned C-section	4 (8%)	6 (31.58%)		4 (22.22%)	6 (11.76%)		7 (13.73%)	3 (16.67%)	
Unplanned C-section	8 (16%)	0 (0%)		1 (5.56%)	7 (13.73%)		7 (13.73%)	1 (5.56%)	
Emergency C-section	6 (12%)	3 (15.79%)		2 (11.11%)	7 (13.73%)		6 (11.76%)	3 (16.67%)	
Total	50	19		18	51		51	18	
Weeks pregnant (n = 69)			0.26			0.73			0.73
<28	1 (2%)	0 (0%)		0 (0%)	1 (1.96%)		1 (1.96%)	0 (0%)	
28–32	1 (2%)	0 (0%)		0 (0%)	1 (1.96%)		1 (1.96%)	0 (0%)	
32–34	0 (0%)	1 (5.26%)		0 (0%)	1 (1.96%)		1 (1.96%)	0 (0%)	
34–37	5 (10%)	4 (21.05%)		1 (5.56%)	8 (15.69%)		8 (15.69%)	1 (5.56%)	
37–40	29 (58%)	12 (63.16%)		13 (72.22%)	28 (54.9%)		28 (54.9%)	13 (72.22%)	
>40	14 (28%)	2 (10.53%)		4 (22.22%)	12 (23.53%)		12 (23.53%)	4 (22.22%)	
Total	50	19		18	51		51	18	
First delivery (n = 69)			0.49			0.31			0.12
Yes	23 (46%)	7 (36.84%)		6 (33.33%)	24 (47.06%)		25 (49.02%)	5 (27.78%)	
No	27 (54%)	12 (63.16%)		12 (66.67%)	27 (52.94%)		26 (50.98%)	13 (72.22%)	
Total	50	19		18	51		51	18	
Participants's responses									
Content with treatment (n = 69)			0.72			0.57			0.006
Strongly disagree	2 (4%)	1 (5.26%)		1 (5.56%)	2 (3.92%)		0 (0%)	3 (16.67%)	
Somewhat disagree	1 (2%)	0 (0%)		0 (0%)	1 (1.96%)		1 (1.96%)	0 (0%)	
Somewhat agree	6 (12%)	4 (21.05%)		1 (5.56%)	9 (17.65%)		10 (19.61%)	0 (0%)	
Strongly agree	41 (82%)	14 (73.68%)		16 (88.89%)	39 (76.47%)		40 (78.43%)	15 (83.33%)	
Total	50	19		18	51		51	18	
Doctor started SDOH conversation (n = 68)			0.62			0.94			0.74
Strongly disagree	5 (10%)	3 (16.67%)		2 (11.11%)	6 (12%)		5 (10%)	3 (16.67%)	
Somewhat disagree	0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)	
Somewhat agree	6 (12%)	3 (16.67%)		2 (11.11%)	7 (14%)		7 (14%)	2 (11.11%)	
Strongly agree	39 (78%)	12 (66.67%)		14 (77.78%)	37 (74%)		38 (76%)	13 (72.22%)	
Total	50	18		18	50		50	18	
Doctors understood SDOH (n = 69)			0.35			0.62			0.5
Strongly disagree	5 (10%)	1 (5.26%)		2 (11.11%)	4 (7.84%)		3 (5.88%)	3 (16.67%)	
Somewhat disagree	0 (0%)	1 (5.26%)		0 (0%)	1 (1.96%)		1 (1.96%)	0 (0%)	
Somewhat agree	8 (16%)	2 (10.53%)		4 (22.22%)	6 (11.76%)		8 (15.69%)	2 (11.11%)	
Strongly agree	37 (74%)	15 (78.95%)		12 (66.67%)	40 (78.43%)		39 (76.47%)	13 (72.22%)	
Total	50	19		18	51		51	18	
SDOH conversation made a difference (n = 68)			0.67			0.19			0.19
Strongly disagree	7 (14.29%)	2 (10.53%)		3 (16.67%)	6 (12%)		5 (10%)	4 (22.22%)	
Somewhat disagree	3 (6.12%)	0 (0%)		2 (11.11%)	1 (2%)		3 (6%)	0 (0%)	
Somewhat agree	8 (16.33%)	4 (21.05%)		1 (5.56%)	11 (22%)		11 (22%)	1 (5.56%)	
Strongly agree	31 (63.27%)	13 (68.42%)		12 (66.67%)	32 (64%)		31 (62%)	13 (72.22%)	
Total	49	19		18	50		50	18	
Answered my questions/concerns (n = 69)			0.67			0.68			0.68
Strongly disagree	1 (2%)	1 (5.26%)		1 (5.56%)	1 (1.96%)		1 (1.96%)	1 (5.56%)	
Somewhat disagree	0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)	
Somewhat agree	8 (16%)	2 (10.53%)		2 (11.11%)	8 (15.69%)		8 (15.69%)	2 (11.11%)	
Strongly agree	41 (82%)	16 (84.21%)		15 (83.33%)	42 (82.35%)		42 (82.35%)	15 (83.33%)	
Total	50	19		18	51		51	18	
Agreed with recommendations (n = 69)			0.7			0.72			0.139
Strongly disagree	1 (2%)	1 (5.26%)		1 (5.56%)	1 (1.96%)		1 (1.96%)	1 (5.56%)	
Somewhat disagree	1 (2%)	0 (0%)		0 (0%)	1 (1.96%)		1 (1.96%)	0 (0%)	
Somewhat agree	9 (18%)	2 (10.53%)		2 (11.11%)	9 (17.65%)		11 (21.57%)	0 (0%)	
Strongly agree	39 (78%)	16 (84.21%)		15 (83.33%)	40 (78.43%)		38 (74.51%)	17 (94.44%)	
Total	50	19		18	51		51	18	
Felt comfortable speaking up (n = 68)			0.51			0.57			0.12
Strongly disagree	3 (6.12%)	2 (10.53%)		2 (11.11%)	3 (6%)		3 (6%)	2 (11.11%)	

(Continued)

TABLE 4 Continued

	Interest in sharing own SDOH (N = 64)			Perceived helpfulness of SDOH narratives (N = 64)			Language preference (N = 64)		
	No	Yes	p	No	Yes	p	English speaking	Spanish speaking	p
Somewhat disagree	3 (6.12%)	0 (0%)		1 (5.56%)	2 (4%)		3 (6%)	0 (0%)	
Somewhat agree	6 (12.24%)	4 (21.05%)		1 (5.56%)	9 (18%)		10 (20%)	0 (0%)	
Strongly agree	37 (75.51%)	13 (68.42%)		14 (77.78%)	36 (72%)		34 (68%)	16 (88.89%)	
Total	49	19		18	50		50	18	
Pain was managed (n = 69)			0.26			0.31			0.25
Strongly disagree	0 (0%)	1 (5.26%)		1 (5.56%)	0 (0%)		0 (0%)	1 (5.56%)	
Somewhat disagree	2 (4%)	0 (0%)		0 (0%)	2 (3.92%)		2 (3.92%)	0 (0%)	
Somewhat agree	6 (12%)	1 (5.26%)		2 (11.11%)	5 (9.80%)		6 (11.76%)	1 (5.56%)	
Strongly agree	42 (84%)	17 (89.47%)		15 (83.33%)	44 (86.27%)		43 (84.31%)	16 (88.89%)	
Total	50	19		18	51		51	18	
Influence of race/ethnicity (n = 69)			0.92			0.022			0.003
Positively affected	10 (20%)	4 (21.05%)		7 (38.89%)	7 (13.73%)		6 (11.76%)	8 (44.44%)	
Negatively affected	0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)	
Did not affect	40 (80%)	15 (78.95%)		11 (61.11%)	44 (86.27%)		45 (88.24%)	10 (55.56%)	
Total	50	19		18	51		51	18	
Influence of preferred language (n = 68)			0.67			0.06			0.06
Positively affected	7 (14.29%)	4 (21.05%)		5 (27.78%)	6 (12%)		6 (12%)	5 (27.78%)	
Negatively affected	1 (2.04%)	0 (0%)		1 (5.56%)	0 (0%)		0 (0%)	1 (5.56%)	
Did not affect	41 (83.67%)	15 (78.95%)		12 (66.67%)	44 (88%)		44 (88%)	12 (66.67%)	
Total	49	19		18	50		50	18	
Influence of finances/insurance (n = 69)			0.69			0.011			0.011
Positively affected	10 (20%)	3 (15.79%)		7 (38.89%)	6 (11.76%)		6 (11.76%)	7 (38.89%)	
Negatively affected	0 (0%)	0 (0%)		0 (0%)	0 (0%)		0 (0%)	0 (0%)	
Did not affect	40 (80%)	16 (84.21%)		11 (61.11%)	45 (88.24%)		45 (88.24%)	11 (61.11%)	
Total	50	19		18	51		51	18	
Labor experience (n = 69)			0.56			0.66			0.66
Good	14 (28%)	4 (21.05%)		4 (22.22%)	14 (27.45%)		14 (27.45%)	4 (22.22%)	
Very good	36 (72%)	15 (78.95%)		14 (77.78%)	37 (72.55%)		37 (72.55%)	14 (77.78%)	
Total	50	19		18	51		51	18	
Postpartum experience (n = 69)						0.98			0.52
Good	15 (30%)	4 (21.05%)	0.46	5 (27.78%)	14 (27.45%)		13 (25.49%)	6 (33.33%)	
Very good	35 (70%)	15 (78.95%)		13 (72.22%)	37 (72.55%)		38 (74.51%)	12 (66.67%)	
Total	50	19		18	51		51	18	

Participants who thought that race/ethnicity did not affect medical care ( $P = 0.022$ ) and those who thought that insurance type did not affect medical care ( $P = 0.011$ ) were more likely to view a first-person patient narrative video as “Helpful/Very Helpful.” Most participants (71.43%) were not interested in sharing their own non-medical personal challenges with physicians. We did not find the significant association between any factors with participants’ interest in providing the first-person video recordings.

### Preferred survey language

Comparing between participants who responded to the survey in English vs. Spanish, the level of education attained was statistically different ( $P = 0.008$ ), with (56.45%) English survey respondents reporting attained education higher than GED, compared to (9.5%) in Spanish survey respondents (Table 4). Spanish survey respondents were significantly more likely to be non-US born ( $P < 0.001$ ) and were more likely to be non-content

with treatment received from physicians ( $P = 0.006$ ). Participants who responded to the survey in Spanish were more likely to report a “Positive Effect” of their race/ethnicity ( $P = 0.003$ ) and insurance type ( $P = 0.011$ ) on their medical care received while participants who responded to the survey in English viewed that neither had any effect.

### Phone interview participants

Of those who completed the initial survey ( $N = 70$ ), 30 participants indicated they were interested in participating in the telephone interview with a response rate of 42.8% for interest. Contact was attempted by one of our researchers within 6 months of the interested participants completing the initial electronic survey. Of the 30 interested participants, 9 responded to recruitment and conducted a phone interview with one of our researchers with a response rate of 30% for interview participation. 7 interviews were conducted in English and 2 in

Spanish. 3 of 7 English speaking participants and 2 of 2 Spanish speaking participants responded “Yes” to “Interest” in sharing their own determinants with physicians. All 9 phone interview participants reported that a first-person patient narrative video on the SDOH would be “Helpful/Very Helpful” to educate physicians on how to improve care for patients in the community. And all interviewees reported their labor and postpartum experiences were “Good/Very Good.”

## Major themes

### A. Perceived benefit of a first-person patient narrative video: improving physician SDOH knowledge

During the phone interviews, the participants were asked to elaborate on their perceived helpfulness of first-person patient narrative video for training physicians on the social determinants of health. They recognized value in providing physicians with additional context and insight into their personal experiences affecting their health. One of the main benefits they highlighted was the exposure of physicians to real-life experiences different from their own (Table 5). Specifically, participants believed that by watching first-person patient videos, physicians would gain a deeper understanding of the diverse challenges patients face due to social determinants of health related to socioeconomic status.

*“...If I am going through something, and I’m talking to the doctors, and I just had a baby two days ago, and I’m gonna*

*get evicted in a day or so, because I don’t have the funds, because I got a notice...The doctors don’t understand that. They pay, they rent, they have money and jobs. They don’t understand how it is to be homeless or about to be homeless. You get what I’m saying? They might understand, but they don’t relate.”*

Participants agreed that patient videos would effectively paint a vivid picture of the complex circumstances that make it challenging for patients to achieve desired health outcomes. They felt that by witnessing patients’ stories navigating the often compounding, multitude of stressors affecting patient health (e.g., financial constraints, lack of accessibility to safe housing, and medical jargon), these videos would humanize the experiences of patients and make these stressors more tangible for physicians to appreciate.

*“...People in different socioeconomic statuses are kind of oblivious to the realities and hardships that low-income community members face. And hearing it firsthand from somebody like myself who is a part of that community can be eye opening to them.”*

The participants anticipated that a better understanding of a patient’s circumstances would allow physicians to make the connection between root causes of patient illness and respective health outcomes. As the lack of context regarding patient social needs, that can only be provided by the patient, will likely steer a physician to only address superficial health complaints and symptoms.

*“...Letting the doctor know the background...to me, and my lifestyle, and what I do that is affecting my health...[The doctor] will better understand. Will help them better understand how to treat me as a patient. Sometimes they just see the surface level and don’t know the history or facts or story to the health problems.”*

Thus, only when physicians begin identifying and addressing the underlying determinants that may be exacerbating or causing their patients’ health problems, the participants believe physicians can provide relevant and realistic treatment plans tailored to address the specific challenges patients face outside of the clinical setting and ultimately work efficiently towards desired health outcomes.

*“I feel like, you know, the doctor knowing the patient better... About their personal life...would actually come to, like, some rare conclusions regarding their health. Because, like I said, a lot of things can trigger things that are affecting their health.”*

And in showing physicians patient experiences, participants reported the added benefit of teaching physicians to become comfortable with discussing social determinants, thereby creating an environment where patients feel more at ease.

*“I feel that [talking about non-medical personal challenges] helps because, when [physicians] know about our things that*

TABLE 5 Major themes and thematic codes derived from participant responses in telephone interview.

Major themes	Codes	Descriptions
Barriers to sharing SDOH with physicians	Barrier_judge	Barrier to conversations about SDOH is fear of judgment
	Barrier_time	Barrier to conversations about SDOH of health is length of appointment time/physician-patient interactions
	Barrier_turnover	Barrier to conversations about SDOH is frequent physician turnover/continuity of care
Perceived benefit of a first-person patient narrative video	Diff_Experience	Having physicians learn about patient experiences different from their own
	SDOH_report	SDOH conversations improve physician report with patients (improved sense of trust)
	SDOH_relevant	SDOH conversations improve medical treatment
Aspects of the patient-physician encounter that participants desire improvement	Feedback_empathy	Patients desire more empathy from their physicians
	Feedback_communication	Patients desire more communication with their physicians



*are not health-related, or some other things, I think they help better and it is easier for them to listen to us and pay more attention to us."*

## B. Barriers to sharing SDOH with physicians: short and strictly clinical interactions

Participants were also asked to elaborate on their reported satisfaction with care received during their pregnancy and encouraged to provide feedback for physicians on how to improve quality of care provided. Although all participants reported having a "good" labor or postpartum experience, many alluded to dissatisfaction with the minimal interaction and opportunity for communication between physician and patient. The main barrier repeatedly referenced by participants being the lack of time spent with a given physician due to short appointments and strictly clinical conversations (Table 5).

*"Like, I feel like they are not giving enough time with the patients. Like, doctors come like 'Hey, what's your problem? Let's fix it. Okay, that's it. I'm going to give you a prescription.' And then they leave. If they don't have communication skills to be able to hear the patient more, then they are just diagnosing a patient based on the findings of whatever problem they got."*

Other participants referenced physician disinterest in patient's concerns not related to clinical signs and symptoms, discouraging patients from engaging in meaningful conversations with physicians all together.

*"Because there were certain experiences where I was just brushed off. Like what I was feeling wasn't important to them. While I felt like it was important."*

An additional factor experienced by patients receiving care at LAGMC barring patient-physician communication is the frequent changes in designated physicians due to the nature of the safety-net and teaching hospital system. This continuous turnover poses a barrier for patients to establish a sense of comfort and trust necessary for open discussions about their social determinants of health.

*"Switching doctors from doctors, you don't get comfortable with a certain one and then you don't feel comfortable telling them certain things."*

The lack of continuity with physicians makes it challenging for patients to build rapport, hindering their willingness to share personal information and seek support for the social factors affecting their health. While participants acknowledge that they cannot change the system and the resulting constant change of physicians, they believe that if physicians were to engage in discussions beyond a patient's chief medical complaint, it would provide patients with a sense that their needs are being

addressed and that the physician is trying to understand and support them.

*"I get that you can't always see the same doctor, but maybe spending a few moments during the visit. 'Cus most of the time it is very rushed. So just taking a little extra time or a few more minutes to spend with the patients. And not disregard that or what things arise."*

## C. Barriers to sharing SDOH with physicians: patient discomfort and anticipated physician bias

Participants who reported "No" interest in sharing stories on their non-medical personal challenges, or social determinants of health with physicians were asked to elaborate on the reason for their disinterest. The most frequently reported contributing factor was a lack of comfort with their physicians and fear of judgment (Table 5).

*"Just 'cus some of them are a little bit personal and I know some people will be uncomfortable sharing certain stories with people."*

Some participants referred to prior experiences where, after becoming vulnerable and sharing intimate details with their physicians about their personal lives, the lack of physician empathy and engagement in social need resolution discouraged them from offering this information to physicians again in the future.

*"Sometimes I think that there are some doctors that do have personal opinions, I guess you could say, yeah. And I feel like since they have their own personal opinions, they don't feel like going on with the situation or the conversation that they are in."*

*"We can talk about it all day long, but after I talk my heart out. Then what? I'm still...my problems still remain."*

And one participant reported fear that their medical treatment may be negatively affected as knowledge of her personal circumstances would awaken physician bias.

*"Maybe something political might come up. Then giving staff and doctors the opportunity to treat me as a patient with prejudice. Or be biased based on something I might say or the way that I live my life. So that is a fear."*

## Discussion

### Perceived utility of medical education SDOH video of first-person patient narratives

The results of our survey and focus groups reflect participant enthusiasm for the development of first-person narrative videos to inform physicians about SDOH. The benefits participants foresaw

in providing context behind health problems lay in the ability to elicit physician understanding of patient social needs and inspire comprehensive medical care to address health determinants of patients facing similar challenges. However, while most participants recognized the utility of addressing social needs in medical education, this recognition did not uniformly translate into interest in contributing narratives to the development of this tool. The concerns voiced by our focus group participants that were unwilling to share their narratives revolved around barriers of rushed and strictly clinical interactions with physicians, lack of continuity of care, and fear of being judged by physicians. Patient's unwillingness to share personal aspects of their lives given their perception of judgment from physicians is not without reason. Numerous studies have demonstrated physicians are not immune to implicit bias. This bias leads to the application of stereotypes to specific populations, such as minorities or obese patients, influencing clinical decisions and detrimentally impacting health outcomes (33–36). Interestingly, although most of our participants agreed that their experience with physicians reflected the aspects of a strong patient-physician relationship and were satisfied with the treatment received throughout their most recent pregnancy, it appears these factors were not enough to motivate participants and outweigh their concerns in sharing their narratives with physicians.

Participant discomfort regarding social need conversation seems to carry greater weight than the influence exerted by the patient-physician relationship. These results echo findings from prior investigations focused on patient social need screening, wherein it was discovered that patients become increasingly uneasy about disclosing sensitive information as the number of social needs they face accumulates (37). It is crucial to highlight that our study's participant population reflects the demographics of the Los Angeles County safety net hospital—a population at high risk for health burdens and social needs, predominantly Hispanic, utilizing government assistance insurance programs, with lower levels of education and socioeconomic status. Our findings support our understanding that an exploration of methods to encourage patients to comfortably share their experiences with SDOH, is crucial to improvement in representing individuals from these demographics in patient driven SDOH medical curricula.

Notably, prior to asking participants to contribute their narratives, the aspects of anonymity were not explicitly addressed with participants and assurance regarding the confidentiality of their personal information presented in the proposed videos was not provided. As a result, a pertinent question arises of whether patients would be more inclined to share their narratives if given the option of having their stories portrayed without disclosing the speaker's identity. However, it is important to be aware that specific populations harbor justified distrust towards the medical system due to a history of prolonged mistreatment. Hence, a crucial component of incorporating these perspectives involves building trust and offering patients a platform to share their experiences without concerns about judgment or exploitation (38). Moreover, this consideration underscores the utmost importance of addressing ethical concerns and ensuring

patient safety when implementing innovative approaches in medical education.

A compelling direction for future research could involve investigating the safeguards patients would prefer to increase their willingness to contribute narratives. Furthermore, a more in-depth exploration of the motivations and the interplay between types, quantity, and nature of social needs and willingness to contribute personal narratives is necessary to align with patient preferences and develop a curriculum that they find useful. The valuable insights gleaned from such research could significantly inform curriculum developers, facilitating the bridging of representation gaps and the enhancement of diversity in medical education.

A strength of this study lies in the successful inclusion of participants identifying as racial and ethnic minorities, which are often underrepresented in both medical research and investigations related to social determinants of health. This methodology shed light on potential variations among individuals within the same ethnic group, highlighting the influence of cultural elements and educational backgrounds on their levels of engagement with medical education and perceived utility of social needs programming. The Hispanic population encompasses a significant degree of diversity, a characteristic that is also reflected among our study participants. Notably, those who completed the English survey were born in the United States and possessed higher levels of education, in contrast to the Spanish survey participants who were more likely to be non-U.S. born. Considering the significantly higher perceived helpfulness by English survey respondents, it is conceivable that a heightened awareness of the impact of social needs on health status could serve as a motivating factor for these individuals to support the use of patient social need information in medical care (39). Our results also suggest there may be potential differences in perspectives regarding racism and physician bias seen amongst Hispanic participants. While our participants were predominantly Hispanic, Spanish survey respondents demonstrated notably higher levels of dissatisfaction with the obstetric care. However, Spanish survey respondents were more likely to report their race/ethnicity and insurance acted as protective factors on the quality of medical treatment received. These findings suggest that care expectations and perceptions of physician bias may vary amongst patients of the same race/ethnicity with different social backgrounds.

## Limitations

Limitations of this study include a small sample size and lack of generalizability. The  $n = 9$  participants willing to participate in our optional telephone interview may reflect a skewed point of view and may not reflect a more generalized consensus when it comes to willingness to share stories. In addition, we did not record the demographic information or motivations of patients who did not wish to participate in our study. It is possible that patients who have had impactful experiences or strong opinions regarding the quality of their care may be more inclined to

participate in sharing their experiences. Additionally, this population represents a community reflective of Los Angeles County, but these opinions may not be generalizable to other settings or populations.

When addressing the use of video media to share patient's own personal narratives, the decision was made to not provide further information or examples of the video format presentation. This was done to limit participant bias toward the use of video as a media to include patient perspectives in medical education. This is a limitation in our study as interest in participation may differ if participants were provided with an example video in which they could assess how confidentiality would be maintained and how they would remain in control of their narrative, as a common barrier to participation noted by participants was concern for privacy.

To address potential differences in frequency of physician-patient interactions amongst participants, this study employed a specific participant demographic that required recurrent engagement with physicians through scheduled antepartum care. However, despite this approach, participants from our focus group still voiced experiences of encountering multiple physicians over the course of their pregnancies. This frequent rotation of physicians was identified as a notable barrier to establishing the level of comfort necessary to engage in candid conversations about non-medical personal challenges. This is a limitation in our study's design, as we did not record the exact number of physicians each participant interacted with. This absence of data prevents us from drawing specific correlations between the frequency of physician changes and patient satisfaction. Furthermore, the discussions conducted in our focus groups revealed that nursing staff also played a significant role in patient reflection of care received. Consequently, attributing patient satisfaction solely to interactions with physicians would be an oversimplification of the complex dynamics within a healthcare setting. However, in selecting our sample population, our study's findings also highlight the constraints posed by the teaching hospital environment, particularly in terms of continuity of care. Continuity of care, a fundamental aspect of healthcare, is essential not only for patient well-being but also for medical learners to effectively screen for and address patients' needs. The challenges associated with maintaining this continuity can impact the rapport between patients and physicians, potentially hindering the ability to initiate sensitive conversations about social determinants of health. Another study limitation was not explicitly inquiring about participants' individual social needs to ensure survey brevity.

## 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 University of Southern California Institutional Review Board. 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 study was deemed exempt and participation posed less than minimal risk.

## Author contributions

SB: Conceptualization, Data curation, Formal Analysis, Investigation, Methodology, Project administration, Resources, Visualization, Writing – original draft, Writing – review & editing. AR: Data curation, Investigation, Methodology, Writing – review & editing. CE: Investigation, Methodology, Writing – review & editing. PG: Data curation, Formal Analysis, Investigation, Writing – review & editing. IS: Data curation, Formal Analysis, Methodology, Supervision, Writing – review & editing. EMC: Funding acquisition, 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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# Water, sanitation and hygiene at sex work venues to support menstrual needs

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**Introduction:** Adequate menstrual health and hygiene (MHH) is necessary for women's health and equity of all menstruators. Female sex workers (FSW) require good MHH to prevent discomfort and exposure to pathogens. No studies have evaluated water, sanitation, and hygiene (WASH) conditions of FSW. We report on a cross-sectional WASH assessment at FSW venues in Kisumu, western Kenya.

**Methods:** Stakeholders identified 77 FSW venues in Kisumu, of which 47 were randomly sampled and visited between April–May 2023. A standardized structured survey of WASH conditions was deployed by trained research staff using Android tablets after proprietor's consent. WASH scores ranging 0–3 were computed based on point each for direct observation of water available, soap available, and acceptable latrine. MHH scores ranging between 0–4 were computed (one point each) for direct observation of: currently available soap and water, locking door on a usable latrine, functional lighting, and a private area for changing clothes or menstrual materials, separate from the latrine(s). WASH and MHH scores were compared by venue type using non-parametric Kruskal-Wallis tests, and non-parametric Spearman rank tests.

**Results:** Full WASH criteria was met by 29.8% of venues; 34.0% had no adequate WASH facilities; 46.8% had no female latrine; and 25.5% provided soap and water in private spaces for women. While 76.6% had menstrual waste disposal only 14 (29.8%) had covered bins. One in 10 venues provided adequate MHH facilities. Poorest WASH facilities were in brothels and in bars, and three-quarters of bars with accommodation had no MHH facilities.

**Discussion:** WASH and MHH services were sub-optimal in the majority of FSW venues, preventing menstrual management safely, effectively, with dignity and privacy. This study highlights the unmet need for MHH support for this population. Poor MHH can deleteriously impact FSW health and wellbeing and compound the stigma and shame associated with their work and ability to stay clean. Acceptable and cost-effective solutions to sustainably improve WASH facilities for these populations are needed.

**Trial registration:** [Clinicaltrial.gov](https://clinicaltrials.gov/ct2/show/study/NCT0566678) NCT0566678.

## KEYWORDS

water, sanitation and hygiene (WASH), female sex workers, menstrual health and hygiene (MHH), sexual and reproductive health, reproductive tract infections, waste disposal



# 1 Introduction

Urbanization is projected to reach 62% of the population across sub-Saharan Africa by 2050 (1). Interventions have been initiated to address urban stress, deprivation, and structural inequities but most face contextual, socio-political, institutional, and resource challenges (2). Inadequacies in water, sanitation and hygiene (WASH) facilities in living and working environments and related exposure to health hazards is a major consideration (3). Sustainable Development Goal 6 recognizes safe WASH as a basic human right necessary to ensure health and wellbeing (4). In March 2023, the World Health Organization (WHO) and the United Nations Children's Fund called on all nations to radically accelerate action to make WASH a reality for all (3).

Adequate WASH is required for all menstruators to urinate, defecate and manage their menstruation with privacy, safety, and comfort (4), and is a basic rights of all menstruators, essential for girls' dignity, and key to ensuring equity in health and education (5). In 2012, the WHO Joint Monitoring Programme affirmed the need for reliable access to water and soap for body and handwashing, sanitation options that are clean and private, sustainable disposal amenities, and access to clean menstrual hygiene materials, both at home and away from home (6). More recently menstrual health and hygiene (MHH) has become more prominent, encapsulating the physical and psychological aspects of menstruation, and broader systemic factors that link menstruation with health, wellbeing, gender equality, education, equity, empowerment, and human rights (7).

Studies on the menstrual and WASH needs of economically vulnerable persons, who rely on sex for livelihood such as female sex workers (FSW), are largely related to evaluations of intravaginal practices in relation to HIV and STI risk or potential use of vaginal rings. Such evaluations illustrate the need for soap and water for hygiene across cultures (8); for example, in Tanzania, water, water and soap, or other agents were reported as essential for cleaning vaginal secretions ("dirt"), menstrual blood and post-coital discharge (9). Sex workers in Cambodia reported stigma, and discrimination associated with their ability to clean themselves intravaginally (10). Caruso and colleagues recommend a gender-based goal for WASH is necessary to understand how compromised resources affect women, noting for example, that menstrual hygiene needs often are not considered in design and delivery of WASH, with implications for satisfaction and safety (11).

Sanitation insecurity poses a threat to women's safety, wellbeing and dignity (12). Psychosocial stress was found to be a common response to inadequate WASH access among females in international research (13). In Kenya, lack of sanitation has been shown to increase non-partner violence (14), and causes shame and marginalization (15). In rural Kenya, poor WASH and subsequent menstrual practices in adolescent girls and young women have been associated with bacterial vaginosis (16, 17). WASH-related challenges are common in Kisumu County in western Kenya where our study takes place: while 71% of the population obtains water from an improved water source, 17% rely on surface water; 26% use unimproved sanitation services, with an additional 4.8% resorting to open defecation (18). In a 2017 national household survey of 4,556 Kenyan women aged 15 to 49 who menstruated in the past 3 months, 80% reported disposing of menstrual materials in the

toilet/latrine and 22.5% reported using sleeping area as their main location for MHH (19).

In a nation-wide key population size estimation exercise conducted 2017–2018 by the National AIDS and STD Control Program (NASCO) of the Kenyan Ministry of Health (20), estimates of FSWs ranged from 129,271 to 206,609, with the mean being 167,940. Improving WASH facilities and resources to support MHH in the workplace is essential for health, wellbeing, and productivity, though to our knowledge, venues where sex work occurs have not been specifically called out as workplaces in relation to WASH and MHH studies (21). This article presents data on WASH facilities at venues where sex work takes place in Kisumu, Kenya, to determine whether any deficits identified may impact participants' ability to manage their menstrual needs. These aspects could be important confounders or mediators to any MHH intervention and could directly affect individual hygiene behaviors.

## 2 Methods

### 2.1 Study site

This study was conducted in Kisumu, western Kenya. Located on the shores of Lake Victoria, Kisumu is approximately ~320 km from Nairobi. Kisumu houses a population of ~800,000 persons, extending to 1.2 m when including the wider metropolitan area. The population is of mixed heritage, but predominantly of Luo ethnicity. Close to half (47%) of residents live in informal settlements including Kondele, Obunga, Nyalenda, Nyawita, and Manyatta (22). Similar to health, oversight of WASH facilities are devolved to the county Ministry of Health, through their WASH Division in Kisumu. However, in a vulnerability mapping exercise carried out by UN-Habitat, in seven informal settlements nearly three-quarters (74%) of water points were managed by individuals (e.g., business owners), with the majority charging for access, and only 5% publicly managed by county or national government (23).

### 2.2 Study design and sampling

This WASH study is a sub-study to a parent study designed to evaluate the effectiveness and safety of menstrual cups for FSW. Briefly, the study is a single arm trial which began February 8, 2023 (ClinicalTrials.gov NCT05666778; Pan African Clinical Trials Registration PACTR202305912778108), in which FSW undergo a control phase of 1 year of observation of MHH and sexual practices and incidence of Bacterial vaginosis (BV) and sexually transmitted infections (STIs). After this control phase, they are provided with a reusable menstrual cup that can be worn during sex, followed by another year of follow-up for MHH and sexual practices, BV, and STIs. While menstrual cups have a good safety profile (24), our parent study is assessing cup contamination, and WASH factors may affect this.

#### 2.2.1 Selection of sex work venues for WASH assessment

For the WASH assessments in this cross-sectional study, we first identified hot spots, as places where FSW meet or congregate, meet one another to socialize, and also solicit or have sex with

### BOX 1 Description of sex work venue types assessed for WASH in Kisumu, Kenya, 2023.

**Sex Den/Brothel:** These are premises explicitly dedicated to providing sex. They are more secure than the streets. The brothels are rented by the female sex workers, paid for on an hourly or daily basis. Typically, in the venues assessed in this study, brothel rooms ranged from 100 KSH to 500 per day KSH, and could be charged per night or per number of hours.

**Street/Highway/Alley:** These are streets, alleys and highways where sex workers solicit for sex during the day, at night or late evening. They may have sex in vehicles, short stay lodges or on the streets.

**Restaurant:** An enterprise that prepares food and serves to customers. Restaurants may also serve beverages containing alcohol.

**Bar:** A bar is an alcohol vending venue. Clients that go to this venue are met by a sex worker and solicitation happens at the bar, after which, depending if lodges are available within the bar, they can proceed to have sex there. There are bars without lodging, and this means that the client and the sex worker go elsewhere. Some bars also have restaurants within the venue. Some sex workers have sex in bars without lodging, in the areas with poor lighting and designated for sex. This is not with authority from the owners, but it happens.

**Guest house:** This is a type of lodging that is less expensive and less formal than a hotel. Sex workers who solicit for sex on the street or bars without lodging may have sex with clients in the more affordable guest houses. Typically, in the venues assessed in this study, guest house rooms ranged from 300 to 1,500 KSH per room per night, with hours of occupancy allowed generally from 8 or 9 p.m. to between 7 to 8 a.m.

their clients. The hotspots are referred to as venues, and include brothels, bars, restaurants, and guesthouses. The initial designation of brothel, bar, restaurant, or guesthouse was determined by FSWs at the time of initial hotspot listing, and was confirmed or revised upon in-person visit by the study team. Descriptions of venues are provided in [Box 1](#), and follow the typologies used in national FSW hotspot mapping (20). Some venues can be a single-typology enterprise, while others can be combination typology, for example where alcohol is sold, has a lodging, and serves food.

## 2.2.2 Sampling venues

Peer leaders from two community organizations that support FSW in Kisumu, Keeping Alive Society's Hope (KASH) and Kisumu Sex Workers Alliance (KISWA), identified and engaged venues where sex work takes place. The peer leaders were current or former FSW. These peers are registered with KASH and KISWA and are the focal persons for FSW in their specific hotspot. They are key in educating FSW on issues of health (including HIV testing and PrEP counseling), safety, and managing clients and daily work. The peers come from different regions within Kisumu Central Subcounty. Each peer leader had her own area of town with minimal overlap to another person's area. From an initial listing of 80 hotspots, there were 3 redundancies which were removed. From the list of 77 hotspots, a 50% simple random sample was generated ( $N = 39$ ), stratified on venue type ([Table 1](#)) and area of town. Street based locations and venues located in the central business district were under-represented, and a second sample was drawn to increase central business district representation, for a total of 47 venues to be assessed.

**TABLE 1** Distribution of characteristics at 47 sex work venues in Kisumu, Kenya.

	$N = 47$
	$n$ (%)
Venue type	
Street-based	3 (6.4)
Guest House/lodging	5 (10.6)
Bar	15 (31.9)
Brothel	6 (12.8)
Guest House/lodging + Bar	4 (8.5)
Restaurant + Bar	6 (12.8)
Guest House/lodging + Restaurant + Bar	8 (17.0)
Latrine types and availability	
Type of toilets/latrines	
Flush/pour-flush to sewer	35 (74.5)
Flush/Pour-flush to tank or pit	1 (2.1)
Pit latrine with slab/covered	10 (21.3)
Bucket	1 (2.1)
Separate latrines for women and men	
Yes, completely separate latrines	32 (68.1)
Latrines are joined and there is a privacy wall	1 (2.1)
Common use latrines only	14 (29.8)
Total number of toilets available to women only	
0	23 (48.9)
1	14 (29.8)
2	5 (10.6)
3–4	6 (10.6)
Mean proportion of toilets available to women that are usable	93.8%
Total number of toilets available to men only	
0	16 (34.0)
1	10 (21.3)
2	14 (29.8)
3–4	7 (14.9)
Mean proportion of toilets available to men that are usable	100%
Total number of common use toilets available	
0	18 (38.3)
1	11 (23.4)
2	8 (17.0)
3–4	4 (8.5)
5–12	6 (12.8)
Mean proportion of common use toilets that are usable	94.8%
Total number of latrines counted on premises	183
Total number of latrines assessed	151 (82.5%)

(Continued)

TABLE 1 (Continued)

	<i>N</i> = 47
	<i>n</i> (%)
Proportion of latrines with...	
Unstable flooring	11.1%
Holes in wall	12.9%
Strong offensive smell	51.0%
Urine or feces on the floor	42.6%
No roof	3.5%
No door	24.3%
No locking door	65.8%
No functional lighting	37.3%
There is at least one usable toilet/latrine accessible to women only, at all times	22 (46.8)
Where are the women's toilets located?	
Within building	25 (53.2)
Outside building but on premises	13 (27.7)
Off premises (for all 7, distance was reported as <1 min walk)	7 (14.9)
Some within building, and some outside building but on premises	2 (4.3)
How clean are the toilets	
Not clean	9 (20.0)
Somewhat clean	18 (40.0)
Clean	18 (40.0)
Are latrines or septic tanks emptied (or latrines are safely covered when they fill)	
No	36 (76.6)
Yes	10 (21.3)
Unknown	1 (2.1)
How is solid waste (garbage) from the venue disposed of	
Private waste collection system	44 (93.6)
Burned on premises	1 (2.1)
Openly dumped on premises	2 (4.3)
<b>Water availability</b>	
Main source of drinking water	
Piped	29 (61.7)
Protected well	1 (2.1)
No water source	2 (4.3)
Purchased in Jerry cans	15 (31.9)
The venue treats the water from the main source to make it safe to drink	
No	37 (82.2)
Yes (3 piped source, 1 protected well, 4 Jerry cans)	8 (17.8)
Boiling	2
Chlorination	6
No water source (excluded from percent calculations)	2

(Continued)

TABLE 1 (Continued)

	<i>N</i> = 47
	<i>n</i> (%)
Drinking water is currently available	29 (61.7)
Piped	21 (72.4)
Protected well	0 (0)
Jerry cans	8 (53.3)
No water source	2
Number of drinking water taps at the venue	
0*	23 (48.9)
1	21 (44.7)
2	2 (4.3)
12	1 (2.1)
There are handwashing facilities at the venue	30 (63.8)
<b>WASH assessment</b>	
Water is currently available	28 (59.6)
Soap is currently available	22 (46.8)
There is at least one acceptable latrine	20 (42.6)
WASH Score (sum of one point each for water, soap, latrine)	
0	16 (35.6)
1	6 (13.3)
2	9 (20.0)
3	14 (31.1)
<b>Conditions for menstrual hygiene and health</b>	
For venues with handwashing facilities, current availability of soap and water	
Neither water nor soap	2 (6.7)
Water only	8 (26.7)
Water and soap	20 (66.6)
Are water and soap available in a private space for women to manage menstrual hygiene?	
No, no water or soap in a private space	32 (68.1)
Yes, water but no soap	3 (6.4)
Yes, water and soap	12 (25.5)
Separate from the toilets/latrines, there is a private place where women can change their menstrual materials	10 (21.3)
There are disposal mechanisms for menstrual hygiene waste at the venue	36 (76.6)
How are sanitary pads disposed of at the venue	
Thrown in pit latrine	6 (12.8)
Placed in a regular trash bin and collected by municipal services	36 (76.6)
Women take them with them	5 (10.6)

(Continued)

TABLE 1 (Continued)

	N = 47
	n (%)
There are covered bins for disposal of menstrual hygiene materials	14 (29.8)
MHH Score (one point each for: latrine with locking door, latrine with functional lighting, soap and water currently available and located at the toilet, a private place separate from toilets/latrines)	
0	14 (31.1)
1	9 (20.0)
2	14 (31.1)
3	4 (8.9)
4	4 (8.9)

\*Of 23 venues with no drinking water tap: 2 are from the venues with no water source, 10 are at venues that rely on water purchased in Jerry cans, 11 are from sources with piped water. Of the 11 with piped water, 8 did not have water currently available. Of the 3 with currently available piped water, they were classified as “no drinking water taps” because the pipes are inside the premises and not publicly available.

2.2.3 Venue recruitment and consenting

The peer leaders were informed of the 47 identified venues and the proposed dates for the visits. They then visited the venues to inform the proprietors of the request to visit, the purpose of visit (to do a WASH assessment for a research study), and the desired dates of the visits. They then communicated back to the Project Coordinator (EO) to confirm acceptance by the proprietors. All the visits were arranged to take place on weekdays and during daytime hours (9 a.m.–4 p.m.). Visits were arranged in advance. Upon arrival at the venue, the study explanation and consent form were read to proprietors in their preferred language (Kiswahili, DhoLuo, or English) and signed before the WASH assessment was done. No personal or identifying information was collected from the proprietor. Conditions for the three street venues were assessed for the nearest location at which FSW had an agreement that they could use the facilities, though sex work (solicitation, sex acts) was not reported to take place at these locations. One was a restaurant (without bar) and the latrine was within the building; the other two were bars with lodging and the latrines were within the premises.

2.3 Data collection

Researchers trained on WASH measurement made assessments using a standardized coded survey questionnaire, adapted from the United Nations High Commissioner for Refugees WASH in schools checklist (25). The following measures were assessed (Supplementary material for full survey): access to a latrine with inside locking door, clean water, and soap; primary source of and distance to nearest water (pump, borehole, piped, etc.); conditions of latrine (stability of floor/platform, holes in wall, offensive smell, feces or urine pooled on floor). Locations having a private place for FSW to wash or change MHH were

recorded as separate features. Bathroom facilities are referred to as a latrine throughout this report and may or may not have included a toilet or other fixed receptacle for collecting urine or feces. Researchers were trained on WASH assessments, with two (EO, CA) attending each assessment, with additional researchers supporting them. One researcher entered findings directly into an electronic Android tablet hosting Open Data Kit (ODK), while one entered finding on a paper form. Disagreements and discrepancies were discussed in real time while at the venue; if not resolved onsite, they were discussed subsequently with the PI (SDM) and technical officer (GZ). Not all women or females menstruate, and not all menstruators are women or females; we use the term women and FSW throughout this report following the WASH checklist wording (25) and the study’s target population.

2.4 Data processing of WASH and MHH scores

2.4.1 WASH score

In order to compare across locations, we generated WASH scores ranging 0–3 modified from Alexander et al. (26). The score was comprised of one point each assigned for direct observation of: water available, soap available, and acceptable latrine. “Acceptable” latrines were defined as having all of the following features: clean (no visible feces on floor), no strong/offensive smell, having door and roof, no major holes in walls, stable floor or platform (26). Venues were classified as having an acceptable latrine if there was at least one latrine meeting these criteria. Latrines were also categorized as to whether or not they were usable (defined as available, functional, and with a closable door that locks) (25), and a latrine could be usable, while not being acceptable. For example, an unclean latrine with strong/offensive smell and non-functional lighting could meet the definition for usable, though not acceptable.

2.4.2 MHH score

A MHH score ranging between 0–4 was determined based on one point each for: currently available soap and water, locking door on a usable latrine, functional lighting, and a private area for changing clothes or menstrual materials, separate from the latrine(s). The score aspects of presence of soap and water, locking door on usable latrine, and private area were adapted from adapted from Alexander et al. (26), with “locking door on a usable latrine” substituting for a “privacy wall” as we felt that insufficient in these settings. Functional lighting was included in the MHH score, given that a large portion of sex work takes place after dark, and given the types of work setting (brothels, bars, street-based). Inclusion of a private area, functional lighting, and lockable door is supported by prior research indicating these as user priorities among residents of low-income urban settlements, including in Kisumu (27). All latrines had to have functional lighting and all doors had to be locking to be assigned a point for each, respectively.

## 2.5 Statistical analysis

Characteristics of sex work venues are represented with frequency distributions. WASH and MHH scores were compared by venue type using non-parametric Kruskal-Wallis test. The correlation between WASH and MHH score was done using non-parametric Spearman rank test. Statistical analyses were conducted using Stata/SE v17. For two venues (one bar, one brothel), WASH and MHH scores could not be calculated because they each had one latrine that was reported to be in use at the time of the assessment. These two locations did have soap and water available on premises, and locking doors, but acceptability of the latrine could not be assessed, and they did not have private areas separate from latrines for changing menstrual materials.

## 3 Results

### 3.1 WASH facility settings

WASH assessments were conducted between 18th April to 5th May 2023, with one conducted earlier in February to test the tools. In total, 47 venues were contacted, all 47 proprietors consented to WASH assessment, and WASH facilities at 47 venues used by FSW were observed (Table 1). Over a third (38.3%) of venues were bars offering food or accommodation, or both; one third (32%) of venues were bars only, with the remaining venues representing brothels (12.8%), accommodation (10.6%), and on the street (6.4%). Garbage was predominantly (93.6%) disposed through private waste collectors.

### 3.2 WASH evaluation

Nearly one third (29.8%) of venues were observed to have water, soap and usable latrines, and just over one third (34.0%) had no observed adequate WASH facilities (Table 1). The majority (74.5%) of latrines were flush linking to the municipal sewer system, or pit latrines (21.3%). Two thirds of latrines (68.1%) were separate for women and men. Latrines were frequently of poor quality, with two-thirds having no locking door, half with a strong offensive smell, and close to half with urine or feces on the floor (Figures 1A–C). A quarter had no door and a third no lighting. Close to half (46.8%) had no female latrine, with 14 facilities having one latrine and 11 with two or more latrines. Half (53.2%) of latrines were located within the venue and a further quarter on the premises but outside the main building. In these same facilities, one third had no latrine for males, 10 had one and 21 had two or more male latrines. Two-thirds of premises had unisex latrines, with 10 locations having three or more latrines. Over nine out of every ten latrines were observed to be usable, with one in five not clean. Ten venues reported that they emptied latrines or septic tanks when full. Overall, just under half (46.8%) of facilities were observed to have at least one usable latrine accessible to women. Less than one-third of venues met full WASH criteria, and those with the highest standards are exemplified in Figures 1G–I. Those considered to be “average” by study staff are depicted in Figures 1D–F. It should be noted that while investigators classified some latrines as unusable

(Table 1, Figures 1A, B), these latrines were all technically being used by the venues.

### 3.3 Water source and availability

Two-thirds (61.7%) of venues had piped drinking water, and an additional third of venues obtained water through purchasing in Jerry cans, with two-thirds of venues having water available for drinking at the time of survey. Nearly half (49%) of venues had no observed water drinking taps: 2 at venues with no water source, 10 at venues in which water was purchased in Jerry cans, and 11 from sources with piped water. Of these 11 venues with piped water, 8 did not have water currently available, and for 3 venues water was currently available, though taps were not available as they were inside the premises (e.g., a kitchen or private room) and could not be accessed by patrons. Four out of five venues did not treat water to ensure it was safe for drinking. Two-thirds (63.8%) had handwash facilities, with ~60% having water and under half (46.8%) having soap.

### 3.4 WASH for MHH

While two thirds of venues had water and soap available, only one quarter (25.5%) were observed to provide this in private spaces for women, and a private place to change was available in one in five venues. Three quarters (77%) of venues could dispose of MHH waste; this was predominantly through bins with waste then collected by municipal services with general trash (i.e., no venue reported separate collection services for MHH waste). However covered bins were observed in less than a third (29.8%) of venues. Less than one in ten venues (8.9%) fulfilled the criteria of providing adequate MHH services, in terms of a latrine with locked door, functional lighting, soap and water located at the latrine, with a private place to change. Nearly one third (31%) of venues fulfilled none of these criteria.

### 3.5 Comparison of venue types and WASH facilities

The WASH score distribution differed by venue type ( $p = 0.044$ , Kruskal-Wallis test) (Table 2; Figure 2). Across venues, the poorest WASH availability was in brothels, bars alone, or bars with accommodation, with 75.0%, 66.7%, and 46.7% respectively having no WASH facilities available (Table 2). The highest mean and median scores for WASH facilities were in venues classed as bar with restaurants, the majority having water, soap, and at least one acceptable latrine, while brothels and bars with accommodation had the lowest scores with few facilities available for women.

### 3.6 Comparison of venue types and MHH facilities

Overall, there was no statistically significant difference in MHH score by venue type. Only 4 (8.9%) venues achieved an MHH



**A Guest house and bar****Unacceptable and Unusable****B Bar****Unacceptable and Unusable****C Brothel****Unacceptable but Usable****D Guest House and Bar****Acceptable and Usable****E Guest House and Bar****Acceptable and Usable****F Brothel****Unacceptable but Usable****G Restaurant and Bar****Acceptable and Usable****H Bar****Acceptable and Usable****I Guest House and Bar****Acceptable and Usable****FIGURE 1**

Examples of latrines and classification of acceptability and usability. **(A)** This latrine from a Guest House and Bar was classified as unacceptable and unusable: the flooring was unstable, there were holes in the walls, there was no functional lighting, and it was very unclean with strong smell of urine and feces. Notably, this latrine was also shared with the community tenants. **(B)** This latrine from a Bar was classified as unacceptable and unusable: the floor was very unstable ("can sink at anytime" was noted by investigators doing the assessment), the door had no lock, and it was very unclean and had a strong smell of urine and feces. **(C)** This latrine from a Brothel was classified as unacceptable but usable: It was very unclean with urine on the floor, pungent smell of urine and feces, and no functional lighting. **(D)** This latrine (labeled as "Ladies") from a Guest House and Bar was classified

*(Continued)*

FIGURE 1 (Continued)

as usable and acceptable: being somewhat clean, no strong odors of urine or feces, locking door, stable flooring, no holes in wall, and functional lighting. Investigators also noted a covered bin for disposal of MHH materials. At this venue, water was available, but soap was not. (E) This latrine from a Guest House, Restaurant, and Bar was classified as acceptable and usable: a wall separated male and female toilets, flooring was stable, doors were lockable, there was functional lighting and no strong smell of urine or feces. A handwashing point was located outside the latrines, and water was available but not soap. This venue had multiple handwashing points and the one near the restaurant had water and soap available. Additionally, there were handwashing points near or inside the guest rooms with both water and soap available. (F) This latrine at a Brothel is usable but unacceptable. It was clean with no smell of urine, and stable flooring, but with no door, no functional lighting, and limited privacy. While not directly applicable to females, we provide this example of a urinal as it was representative of several urinals observed. (G) This latrine from a Restaurant and Bar was classified as acceptable and usable: very clean, with locking door, stable flooring, functional lighting, and a covered bin for disposal of used menstrual materials. There were multiple handwashing points with water and soap. (H) The latrine at this Bar was classified as usable and acceptable: very clean, with functional lighting, locking door, stable flooring, a covered bin for disposal of used menstrual materials, and handwashing facilities with water, soap, and a towels for drying hands. (I) The latrine at this Bar was classified as usable and acceptable: very clean, with functional lighting, locking door, stable flooring, a covered bin for disposal of menstrual materials, and handwashing facilities with water, soap, and a functional, air-blowing hand dryer available. The photographs were taken using the study tablets via the ODK programming, with express permission of the venue proprietors who consented to the WASH assessment.

TABLE 2 Distribution of availability of water, soap, acceptable latrine and WASH score by venue type.

Venue type	Nothing available (i.e., WASH score = 0) <i>n</i> (%)	Water available <i>n</i> (%)	Soap available <i>n</i> (%)	At least one acceptable latrine available for use of women <i>n</i> (%)	WASH score mean/median (range)
Street*, <i>N</i> = 3	0 (0)	3 (100)	2 (66.7)	1 (33.3)	2/2 (2–2)
Guest house, <i>N</i> = 5	1 (20)	4 (80)	3 (60)	2 (40)	1.8/2 (0–3)
Bar, <i>N</i> = 14	7 (50)	7 (50)	4 (28.6)	5 (35.7)	1.1/0.5 (0–3)
Brothel, <i>N</i> = 5	4 (80)	1 (20)	0 (0)	0 (0)	0.2/0 (0–1)
Guest house and bar, <i>N</i> = 4	3 (75)	1 (25)	1 (25)	1 (25.0)	0.8/0 (0–3)
Restaurant and bar, <i>N</i> = 6	0 (0)	5 (83.3)	5 (83.3)	6 (100)	2.7/3 (1–3)
Guest house and restaurant and bar, <i>N</i> = 8	1 (12.5)	5 (62.5)	5 (62.5)	5 (62.5)	1.9/2 (0–3)
Total (% of 45)	16 (35.6%)	26 (57.8%)	20 (44.4%)	20 (44.4%)	1.5/2 (0–3)

\*WASH conditions for street based sex work were assessed for the nearest location at which FSW had an agreement that they could use the facilities. These were (one was restaurant without bar and latrine was within building, the other two were bars with lodges and the latrines were within the premises), though sex work (solicitation, sex acts) was not reported to take place at these locations.

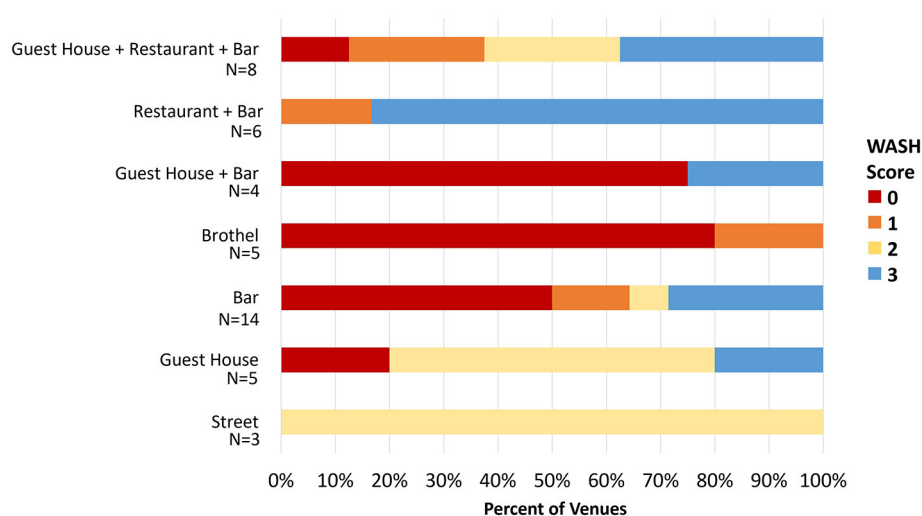


FIGURE 2

Distribution of WASH score by venue type. The X-axis shows the percentage of venues meeting a particular WASH score, which is represented by the legend to the right. For example, for venues that are classified as Guest House and Bar (*N* = 4), 75% had a WASH score of zero and 25% had a WASH score of three.

TABLE 3 Distribution of menstrual health and hygiene score and score components by venue type.

Venue type	Nothing available (i.e., MHH score = 0) n (%)	Water and soap available at latrine n (%)	Latrine with door that locks n (%)	Functional lighting at latrine n (%)	Private space separate from latrines where women can change pads or clothes n (%)	MHH score mean/median (Range)
Street based, N = 3	0 (0)	3 (100)	1 (33.3)	2 (66.7)	0 (0)	1.7/2 (1–2)
Guest house, N = 5	1 (20)	1 (20)	2 (40)	4 (80)	3 (60)	2.2/3 (0–4)
Bar, N = 14	6 (42.9)	7 (50)	3 (21.4)	8 (57.1)	1 (7.1)	1.2/1.5 (0–4)
Brothel, N = 5	1 (20)	1 (20)	2 (40)	2 (40)	1 (20)	1/1 (0–2)
Guest house and bar, N = 4	3 (75)	0 (0)	1 (25)	1 (25)	1 (25)	0.75/0 (0–3)
Restaurant and bar, N = 6	0 (0)	5 (83.3)	0 (0)	3 (50)	2 (33.3)	2/2 (1–4)
Guest house and restaurant and bar, N = 8	3 (37.5)	5 (62.5)	2 (25)	3 (37.5)	2 (25)	1.5/1.5 (0–4)

score of 4, while 31.1% had a score of zero (Table 3; Figure 3). The highest proportion of venues classed as bars with accommodation, or bars alone had no MHH support, e.g., with 75% and 42.9% scoring zero on the MHH score (Table 3). WASH score and MHH score were positively correlated (Spearman’s rho = 0.66,  $p < 0.001$ ) due to some related elements (e.g., doors and locking door being components of “acceptable” latrine within WASH score) (Figure 4).

4 Discussion

WASH facilities were found to be sub-optimal in nearly all sex work venues assessed, with only three (7%) observed to have adequate MHH and WASH (scores). While in most instances FSW could find somewhere to urinate, defecate, and manage their menstruation, the environments were often unacceptable and lacked the components needed for them to manage their menstrual needs safely, effectively, with dignity and privacy. One third of the facilities had nothing available for WASH.

Access to safe WASH is a well-recognized human right and is vital for health and wellbeing (4). This encompasses health for all (3), regardless of type of employment and social status (28). A strong evidence base has been built on the WASH needs of school-going girls (29–31), and on WASH facilities for women, with exemplar studies in India focusing on sanitation insecurity (12), and research illustrating associations between poor WASH and urogenital infections (32, 33), and women’s mental health (34). We found no evidence of any studies examining access or quality of WASH facilities for menstruating FSW in the literature, other than the vaginal ring studies noting that FSW need access to soap and water to clean secretions, menstrual blood and post-coital discharge (8, 9). Anecdotal reports from brothels in Bangladesh and sex workers in India also observe lack of access to facilities with adequate WASH and MHH standards, and link this to issues of human rights and dignity (35, 36). Studies note that FSW encounter stigma and discrimination if they are unable to clean themselves intravaginally (10). Other studies among community members (agree) that poor WASH decreases wellbeing, with one study in western Kenya noting anxiety, frustration, embarrassment, negative identity, marginalization and a lack of self-efficacy (15).

In our study, a lack of WASH facilities was most notable in premises solely providing accommodation, with somewhat improved facilities if a bar or restaurant was attached. The reason that WASH and MHH scores were better at bars or places with a restaurant is that they need a permit to do business and fall under national regulations. The Kenyan National Food Safety Regulations mandate food serving outlets to maintain good hygiene, with a legal requirement to provide sanitation and handwashing facilities (37). Owners are thus held accountable. Studies on accountability for WASH conditions in childcare centers have reflected on the importance of social accountability in informal settlements in Nairobi (38). Poor WASH in establishments frequented by FSW that are not restaurants or bars appear to have few mandatory regulations, thus limiting accountability for WASH and MHH standards. In Nairobi, in informal settlements, a strong association was found between absent landlords and poor WASH facilities (22).

During conversations with proprietors, they often noted the cost of private disposal services or of purchasing water and soap

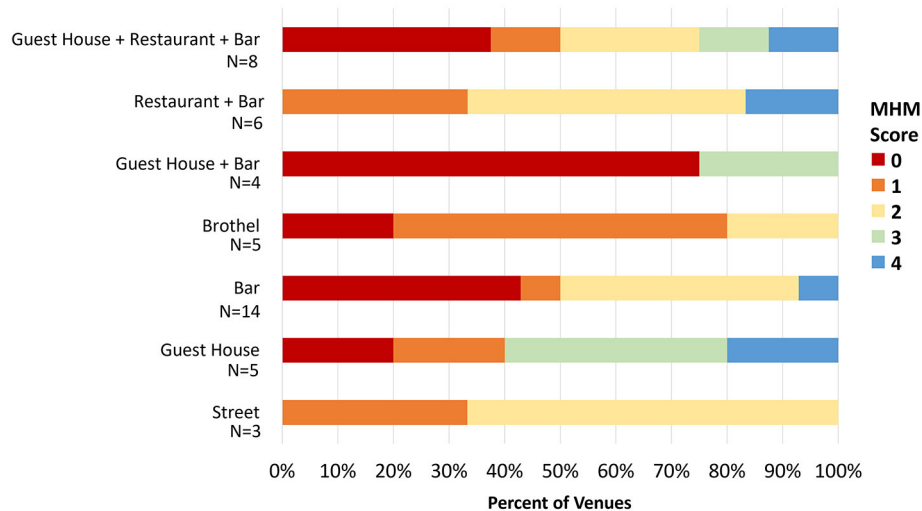


FIGURE 3

Distribution of MHH score by venue type. The X-axis shows the percentage of venues meeting a particular MHH score, which is represented by the legend to the right. For example, for venues that are classified as Bar ( $N = 14$ ), 43% had a MHH score of zero and 7% had a MHH score of one, 43% had a MHH score of 2, and 7% had a MHH score of 4.

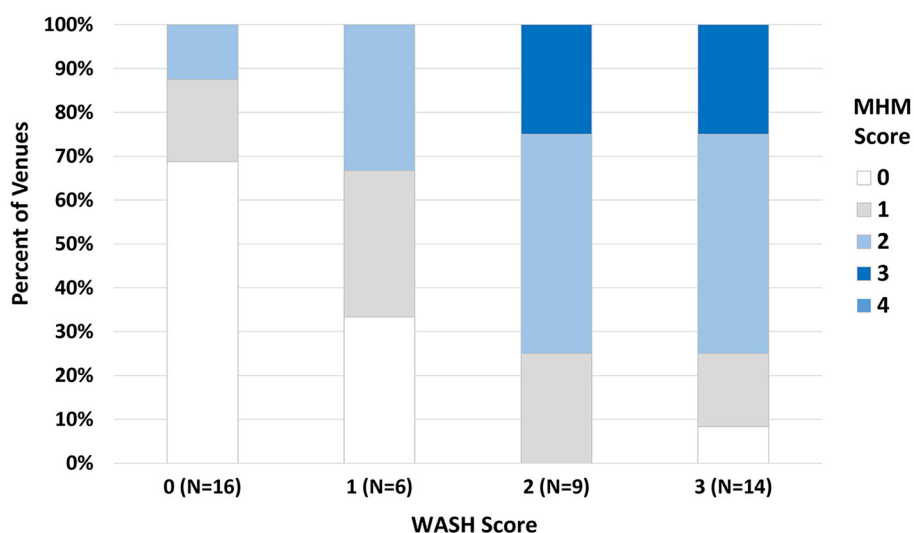


FIGURE 4

Distribution of MHH score by WASH score. The y-axis shows the percent of venues having an MHH score ranging 0–4 (legend, right), stratified by WASH score ranging 0–3, as depicted on the x-axis. For example, among 16 venues with a WASH score of zero, nearly 70% of those also had a MHH score of zero.

as barriers to providing adequate services. Because the benefits of WASH interventions may not accrue directly to these venues, novel programs that integrate financial incentives or subsidies, improved technology, and positive behavior change interventions may be necessary to raise standards for improved latrines, clean water access, and appropriate waste disposal at venues where FSW engage in sex work (39). At some venues, some proprietors were unaware of the need for covered disposal or of having handwashing facilities and disposal bins near the latrines. While structured research is needed on the barriers, facilitators, costs, and potential benefits of improving WASH and MHH standards in these settings, initial steps may include education that incurs minimal costs (e.g., the

need for covers for bins, to place them near latrines, to place handwashing facilities near latrines).

We note that at 43% of venues, latrines were outside the premises. The study team conducting the WASH assessments, comprised of female Project Coordinator (EO) and Study Nurse (CA) who were accompanied by female peer leaders and accompanied in 25% of assessments by female PI (SDM) or female technical officer (GZ), observed that this would require going off premises to remove the MHH material and conduct any personal washing, and then after the sexual encounter, returning to the off-site latrine to clean themselves if the place of sex was not private and did not have water or soap. Distant WASH facilities, with no



safe changing space, greatly complicate this common approach and potentially can create harm, e.g. if there is no privacy, or lighting, and women changing can be taken against their will and violated both physically and sexually (14). Moreover, we noted the disposal was largely inadequate across all venue types. Commonly, MHH materials were included in mixed trash.

Menstruation is recognized to be of public health importance. WASH in schools has been prioritized, and the Kenyan government has built a cadre of experts who, in consultation with cross-sectoral expertise, has developed and published strategies on MHH, policy guidelines, and a training handbook for teachers (40–42). The strategy document and training guide note the variety of products available for menstrual care, however, in practice, only disposable sanitary pads are offered as part of a MHH programme for schoolgirls. The tendency toward single use pads, which have dominated the product regulatory market, places additional burden on WASH facilities, around consistent supply, cost, issues about seeing blood which is culturally unacceptable, and waste disposal. Menstrual cup use, including among FSW would help to alleviate these issues.

The aim of this assessment was to evaluate WASH facilities where sex work takes place, as deficits may impact participants' ability to manage their menstrual needs. Our parent study aims to evaluate whether menstrual cups impact the vaginal microbiome, BV, and STIs among FSW who rely on sex for economic livelihood. In this sub-study, we found that WASH facilities in places where sex work takes place are commonly unacceptable, and thus reflect on how this can impact on safe cup use. A systematic review and meta-analysis demonstrated that menstrual cups have a good safety profile, with very rare serious adverse events associated with their use (24). Infection with *Staphylococcus aureus* has not been evident in real-life studies, with no difference in prevalence rates across differing menstrual products (43, 44). However, cup contamination due to poor WASH environments could be a consideration. For example in rural schools in western Kenya where WASH facilities were inadequate, (30). *E. coli* found on the cups was associated with initial use of cups, though the rate of *E. coli* recovery decreased among experienced cup users (43).

## 4.1 Limitations

In the nation-wide key population size estimation exercise conducted 2017–2018 (20), there were an estimated 5,151 FSW in Kisumu, with 438 hotspots identified (20). Of these 438 venues, 130 were in Kisumu Central, where our WASH assessment took place. While we cannot determine whether sex work hotspots included in our study are the same as those in the 2017/2018 assessment, our data may represent between 30%–40% of FSW hotspots in Kisumu City. The national findings did not report venue type or frequency by geographic location, so we cannot fully assess generalizability of our assessment. However, the majority of venues assessed in our study were bars (with and without lodging), which is in keeping with the national key population hotspot estimation exercise, where they comprised 75% of hotspots; streets/alleys/highways accounted for 5%, guest house/lodging 4.4%, and brothels (1.6%). Another strength of our study was the use of direct observation, as

self-reported measures of sanitation have been shown to have low reliability (45).

This study was conducted within Kisumu City, and may thus over-represent quality of service provision for Kisumu County. For example, WASH facilities within a central business district may have the advantage of being on municipal water supply, and sanitation system within the town infrastructure. While our WASH assessments took place at a range of areas in Kisumu City, we could not assess differences by town location due to limited number of type of venues within an area. Such analyses would be impeded by sparsity and would compromise confidentiality. Of the 183 latrines counted on premises, we were able to assess 151 (82.5%), due to others being “in use” or “unavailable.” While we cannot provide evidence, study co-authors who conducted the assessments suspected that at least some of these “unavailable” latrines were likely of lower standards and proprietors were not wanting to show them. We classified venues as having an acceptable latrine if there was at least one latrine meeting the criteria, but if there were very many users, this may not have been acceptable. We did not ask proprietors about the average numbers of men and women visiting the venues or how this varied at peaks days and times, and future assessments of WASH at sex work venues should attempt to assess this. We also note that assessing the end of the service chain for disposal of waste material was outside the scope and ability of interviewers to ascertain. We recommend that future studies include this neglected component of MHH.

## 5 Conclusions

Good quality WASH interventions go beyond the immediacy of cleaning the body, and are needed to support all menstruator's wellbeing and self-autonomy (15), and reduce violence (14), infections (16, 17), stigma and discrimination (10). WASH facilities currently available for FSW in this urban area of western Kenya are inadequate for their needs, especially in relation to MHH. Research is needed to identify acceptable and cost-effective approaches to sustainably improve WASH facilities in places of sex work.

## Data availability statement

The datasets presented in this study can be found in online repositories. The names of the repository/repositories and accession number(s) can be found below: de-identified WASH data. Final analytic dataset of 47 records. [Supplementary Table of WASH Checklist](#) is the modified UN tool that was used and provides dictionary to dataset. University of Illinois at Chicago. Dataset. <https://doi.org/10.25417/uic.24224779.v1>.

## Author contributions

PP-H: Funding acquisition, Investigation, Methodology, Writing – original draft. EO: Investigation, Project administration, Supervision, Writing – review & editing. CA: Investigation, Project administration, Writing – original draft. GZ: Data curation, Investigation, Methodology, Writing – review & editing. FO:



Investigation, Supervision, Writing – review & editing. SM: Conceptualization, Data curation, Formal analysis, Funding acquisition, Investigation, Methodology, 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

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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.2024.1305601/full#supplementary-material>

SUPPLEMENTARY TABLE 1  
WASH checklist.

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# Suggestions for political reparations for reproductive abuses against Black women

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## KEYWORDS

reproductive justice (RJ), reparations for historical injustices, reproductive health, access to contraception, access to fertility

## Introduction

Multiple scholars and activists have argued that Black women and other marginalized genders (i.e., transgender, gender nonconforming, and agender) are the most marginalized and minoritized people both in the United States and globally. The suffering Black women experience is broad from numerous microaggressions on a regular basis (1) as well as blatant macroaggressions (2) both of which cause compounding harm in the lives of Black women (2). These harms include but are not limited to higher rates of depression found in Black women experiencing higher rates of microaggressions as well as increasing levels of anxiety (2). These increasing levels of anxiety and depression are well known to impact cardiac function and have been implicated in cardiac disease.

Given the reproductive ability of the majority of Black women at some point in their life and the compounding of marginalization given the status as both women and as Black people, Black women are in a unique position to be victims of reproductive abuse. Discussions about reproductive abuses have been increasingly common as well and have included complicit and active actions of obstetrician gynecologists in the United States (3–5). Given the increasing discussion regarding reproductive abuses and understanding implicit bias in reproductive medicine, in this article, I hope to review these abuses to make the case for the need for reparations, followed by concrete suggestions for providing these reparations to Black women.

J. Marion Sims, the commonly cited father of obstetrics and gynecology, has been credited with designing the speculum that we currently use when treating patients as well as surgical techniques to repair fistulas developed secondary to childbirth (6, 7). While these discoveries remain important modernly, we cannot discount the fact that J. Marion Sims operated on enslaved women with neither their consent nor anesthesia, despite giving anesthesia to white women after having perfected this procedure. These women were found to serve as his surgical assistants after medical students and in training physicians no longer were able to stomach the thought of torturing these women or found that his experimentations were scientifically flawed and inappropriate to perform on humans (6). To add insult to injury, we credit J. Marion Sims with these discoveries despite the fact that they had been coopted from other physicians in the field and many women across the world had initiated the designs for these speculums prior (8).

While many of us can agree that operating on nonconsenting enslaved patients is against both good judgement and medical ethics, J. Marion Sims was applauded during his life and after for these accomplishments. Additionally, the field continued to engage in practices similar to these. Black women in the Southeast United States remained victimized by undergoing “Mississippi Appendectomies” in which they were sterilized against their will,

without their knowledge, and when these were not medically indicated (9). Additionally, incarcerated women, whose very experience and existence in incarceration intentionally mimics that of American chattel slavery (10, 11) continued to experience forced sterilization until 2012 in the state of California (12). This, however, does not account for the number of women who have and continue to experience coercion, undue influence, and incomplete information when undergoing sterilization procedures.

Contraception coercion is ever present. The fact that many physicians who deliver reproductive healthcare view contraception as a medical requirement causes us to discuss the benefits of contraception without discussing its risks. We also introduce our own bias into these discussions and The American College of Obstetrician Gynecologists openly recommends discussing the most effective contraceptive methods first, instead of first discussing the patient's goals for contraception (13), which leads to patient's being more likely to use long acting reversible contraception (LARC) (14) and takes control away from patients in being able to regain desired fertility in a time they desire without presenting to medical care (15). Patient's identities have been implicated in certain studies regarding the amount of education and time spent with patients, showing that patients are exposed to medical procedures for insertion of LARC—which carries risk—without proper consent (16). Because effectiveness over autonomy is valued, Black women report experiencing high rates of marginalization while seeking family planning services as well as undue pressure to utilize LARC methods—leading to dissatisfaction with these methods and early discontinuation (17). Obstetrician gynecologists have not only individually performed these acts of injustices, American societies have encouraged these injustices to take place. Calls to action in the past have been directed at supporting organizations in engaging in transformative practices and supporting justice for patient safety (18). Additional calls to action have been discussed including increased resident physician education (19), however educational actions alone are insufficient to remedy these issues. Given the tangible harm that has occurred both by individuals and through reproductive societies at large with their complicit behavior, specific political actions and reparations must be considered to remedy this harm.

These can be difficult to define, promote, and enact. However, in order to generate the most good, professional societies can specifically target political actions in which they can engage to promote equity and attempt to redefine a new relationship that this field may hope to have with Black women who seek our services. The political weight that many professional reproductive health colleges and societies hold are well known. Many obstetrician gynecologists participate in political lobbying given the highly political nature of the work we engage in. Many women's health advocacy and lobbying projects have been led by obstetrician gynecologists including maternal and newborn health initiatives (20) and obstetrician gynecologists societies have argued for an integral role in advocacy for patients' reproductive health (21).

Specific political reparative actions can revolve around using a reproductive justice approach. This specific perspective revolves

around understanding that each person has the right to have or not have children and the right to parent children in safe environments (18). This approach has been specifically developed by Black women, including scholar activist Loretta Ross, and reinforced with ongoing literature and works by scholars such as Kimberle Crenshaw and Angela Davis. This perspective is designed to understand the specific struggles of Black women and to address their concerns from a perspective that will help the most.

## Specific steps for action

### Lobbying to change medicaid sterilization policies

The American College of Obstetricians and Gynecologists has published its stance on revising Medicaid policies to ensure that people can access sterilization without the need for waivers to increase access to sterilization. However, specifically introducing policies and engaging in ongoing lobbying to ensure that this action is passed. Lobbying coalitions have been proven to be an effective strategy for leading to change (22). While it may appear paradoxical to increase access to sterilization, the pendulum has swung too far in the opposite direction and does not allow there to be improved access to one of the most effective forms of contraception through sterilization. Ongoing agitation is required to allow there to be access to this method. Because obstetrician gynecologists have caused the requirement for this insurance mandate through inappropriate and forced sterilization, it is the responsibility of governing bodies and other professional societies to ensure that we continue using our political power to increase ongoing access when it has caused the absence of this access. These same lobbying tactics should be taken up by additional state and national level reproductive medicine societies. Studies have argued that by removing Medicaid sterilization policies will significantly increase access to sterilization by over 30%, would decrease unintended pregnancies by thousands, and would save millions of dollars (23).

### Call for and continue ongoing lobbying for requirements for fertility treatment in all health insurance policies in the United States

The reproductive abuses that Obgyns have caused to Black women has often led to infertility. Therefore, one way to repay these groups is to attempt to offer medical treatment that will assist them in conceiving again. Given that Black women suffer disproportionately higher rates of infertility and have disproportionately lower access to fertility treatments secondary to cost (24, 25), it is integral that to reduce these barriers, we call for coverage for infertility. Many professional reproductive health societies have yet to call and lobby for insurance plans to cover infertility treatment in all medical insurance plans. Therefore,

these societies should use their political pull and power for ongoing lobbying of infertility coverage. Insurance mandates have been shown to increase access for marginalized people to effective, infertility treatment and we can therefore believe that expanding this across all insurance plans will continue to improve access fertility treatment (25). As many people in the United States, including Black people, use Medicaid as their primary health insurer, ensuring infertility coverage is included in Medicaid plans is vital to ensuring increased access to care for all patients, especially the most marginalized patients.

## Call for defunding of police and carceral systems

Carceral systems and modern policing are rooted in racist, chattel slavery in the United States (26, 27). These also dis To truly be able to move effectively provide reparations, we must recognize that the prison systems in which so many people have been forcibly sterilized are rooted in racism and other forms of oppression. Therefore, aligning with groups that have started organizing to abolish and defund policing in the United States is integral. While this alone is unlikely to be the sole solution, given that sterilization abuses occur outside of these settings. However, it would eliminate a hierarchy in which incarcerated people are at the mercy of systems designed to harm them and prevent those systems from sterilizing them against their will and promoting sexual abuse. While the American College of Obstetricians and Gynecologists has expressed alignment with ending sterilization of incarcerated women due to this hierarchy (28), ongoing lobbying will assist in eliminating the additional abuses that occur in these settings.

## Begin the process of defining the financial reparations that may be required

In discussing reparations, one commonly used method of righting wrongs includes providing monetary compensation for the damage which has been done. However, it is difficult to specifically define the cost of intentional iatrogenic loss of fertility as well as the cost of psychological harm and trauma physicians may be responsible for under the watchful eye of a governing body. Without asking Black communities and individual Black people who have lost their fertility due to our wrongs, we cannot know what the monetary value of this loss may be. Therefore, research should be conducted to assess what financial reparations might feel most appropriate to individuals and their communities. That research should then be used to inform specific next steps which can be taken to compensate these groups. Some examples of how to appropriately assess how to provide these reparations can be found in assessing what reparations were offered after the Tuskegee Syphilis Experiment (29, 30). Many additional steps have been discussed about

financial reparations for the Guatemalan Sexually Transmitted Infection Experiments 31), but these have yet to be enacted. Attempting review the proposed model and try to enact these is promising and may help to create positive relationships. Importantly, multiple groups of people receive reparations from various countries or organizations globally, including people Indigenous to the United States and Jewish people who had family members victimized in the Holocaust. These have been found to be acceptable by the United Nations and therefore, offering similar reparations on the same basis to Black women will likely be both acceptable and welcome—given widespread belief that Black people deserve reparations in Black communities and decades of discussion arguing for the need for these.

## Conclusion

Reparations are a requirement to move forward and commonly promote healing. Given the long history of abuses that have occurred against Black women and other people who can become pregnant, obstetrician gynecologists should consider the role that individually we have played and overall, the role that the field has played in marginalizing this population. We have a responsibility to try to do better for our patients and for the sake of our colleagues and for ourselves. These reparations may not be the final solution. However, given the known benefits of transformative justice, we must try something to move forward to reduce the pain and suffering our patients experience at our hands.

## Author contributions

The primary author developed these ideas and wrote this manuscript. All author contributed to the article and approved the submitted version.

## 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.

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