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# Highlights in contraception and family planning 2021/22

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# Highlights in contraception and family planning 2021/22

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# Editorial: Highlights in contraception and family planning 2021/22

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KEYWORDS

contraception, family planning, fertility awareness, abortion, population-based

Editorial on the Research Topic
Highlights in contraception and family planning 2021/22

We are very proud to have the chance to present several very interesting studies on contraception and family planning in this Research Topic. The research articles address a wide variety of subjects related to reproductive health, contraception, and family planning from very different countries with distinct settings. The Research Topic on *Highlights in Contraception and Family Planning 2021/22* constitutes 13 original articles written by 74 authors and has been well-received as there have been 24,000 views and 4,070 downloads.

The article titled *Identifying Client Targets for Improved Mobilization and Uptake of Integrated Family Planning and Reproductive Health in Environmental Programs in Kenya* is a Brief Research Report article (Obat et al.). As a part of a population health environment program, data were collected from clients by community-based distributors from four environmental community-based organisations, and the contraceptive preferences and demographic features of the population were analyzed. This article emphasises the partnership in conducting reproductive health programs.

Gutin et al. published a Review titled *"What if They Are Pre-conception? What Should We Do?": Knowledge, Practices, and Preferences for Safer Conception Among Women Living With HIV and Healthcare Providers in Gaborone, Botswana*. They conducted qualitative in-depth interviews with 10 HIV healthcare providers and 10 WLHIV in Gaborone. Interviews were analyzed using a phenomenological approach. As safer conception knowledge was limited, the need for guidelines was pointed out.

Taylor et al. stated that unregulated sperm donations occur due to restrictive UK policies and practices for regulated donor insemination in their article *Are UK Policies and Practices for Regulated Donor Insemination Forcing Women to Find Unregulated Sperm Donors Online? A Perspective on the Available Evidence*. Alhassan and Madise examined the demand for modern family planning methods in urban Malawi and the needs of underserved groups in *Demand for Family Planning Satisfied With Modern Methods in Urban Malawi: CHAID Analysis to Identify Predictors and Women Underserved With Family Planning Services*.

Jonas et al. in their research article *Factors Associated With the Use of the Contraceptive Implant Among Women Attending a Primary Health Clinic in Cape Town, South Africa* analyzed the factors significantly associated with the intention of using the implant. A Brief Research Report by Wollum et al. summarised the results of the scales used for evaluating abortion experiences 6 months after abortion.

The Perspective article titled *The Potential of Self-Managed Abortion to Expand Abortion Access in Humanitarian Contexts* addresses the challenges that refugees and displaced people face in accessing abortion services. Delvaux et al. conducted a systematic review and narrative synthesis on the acceptability and satisfaction of contraceptive vaginal rings.

A qualitative study about women's perceptions of empowerment in relation to fertility intentions and family planning practices from Mozambique aimed to identify various factors that positively or negatively influence women's empowerment (Castro Lopes et al.). Halleran et al. aimed to analyze the knowledge of women who were trying to conceive about the timing and identification of the fertile window by using the Fertility Knowledge Questionnaire.

Ryan et al. reported the effects of three contraceptive methods (IUD, Depot-MPA, and levonorgestrel implant) on serum estradiol levels using data from the Evidence for Contraceptive Options and HIV Outcomes (ECHO) randomised trial. A qualitative study from Kenya investigated contraceptive method use trajectories among young women in Kenya and highlighted the needs of young women (Calhoun et al.). Finally, an original research article from Korhogo, Côte d'Ivoire, examined libido-sexual disorders and the abandonment of injectable contraceptives among users of the Ivorian Association for Family Well-Being (Essis et al.).

Family planning, reproductive health, and contraception are very important elements of well-being. Research in this area is required to improve service delivery and increase accessibility to modern family planning methods. We would like to thank the authors, editors, and reviewers for their precious scientific contributions.

## Author contributions

Writer. The author confirms being the sole contributor of this work and has approved it for publication.

## Conflict of interest

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

## Publisher's note

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REVIEW
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# "What if They Are Pre-conception? What Should We Do?": Knowledge, Practices, and Preferences for Safer Conception Among Women Living With HIV and Healthcare Providers in Gaborone, Botswana

*Sarah A. Gutin[1,2,3]*, Gary W. Harper[3], Neo Moshashane[4,5], Christina Bitsang[6], Jane Harries[2], Doreen Ramogola-Masire[7] and Chelsea Morroni[2,4,5,8]*

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Safer conception interventions that address HIV care, treatment, and prevention for HIV-affected couples are increasingly available in sub-Saharan Africa. Botswana, an HIV endemic country, is yet to offer formal safer conception services although universal test-and-treat approaches mean that increasing numbers of young, sexually active people living with HIV will start treatment and likely desire childbearing. In order to advance the safer conception discussion in Botswana, it is necessary to understand the current safer conception knowledge, practices, and preferences of healthcare providers and women living with HIV (WLHIV). We conducted qualitative in-depth interviews with 10 HIV healthcare providers and 10 WLHIV in Gaborone. Interviews were analyzed using a phenomenological approach. Safer conception knowledge was limited and safer conception discussions were rare. Healthcare provider and WLHIV preferences were at odds, with providers preferring WLHIV to initiate safer conception discussions, and WLHIV desiring providers to initiate safer conception discussions. Quotes from women and providers highlight deeper issues about power dynamics, concerns about stigma among women, and provider fears about promoting pregnancy. Providers emphasized the need for guidelines and training in order to improve the provision of safer conception counseling. These findings point to areas where safer conception in Botswana can be improved. Both WLHIV and providers would benefit from having information about a range of safer conception methods and approaches. In addition, since WLHIV felt hesitant about initiating safer conception conversations and feared stigma, and because putting the onus for starting safer conception discussions on women is a reversal of

normal roles and power structures, providers must take the lead and routinely initiate fertility desire and safer conception discussions. Assisting healthcare providers with clear safer conception guidelines and training would improve the provision of accurate safer conception counseling and facilitate reproductive choice.

**Keywords: safer conception, childbearing, reproductive rights, stigma, Botswana, women living with HIV (WLHIV)**

## INTRODUCTION

Across various sub-Saharan African countries, between 12 and 64% of women living with HIV (WLHIV) report a desire for a future pregnancy, making the risks for HIV transmission to partners and infants a concern (1–4). Although prevention of mother-to-child transmission of HIV (PMTCT) interventions are highly effective (5, 6), safer conception methods and approaches have been under-utilized. A variety of safer conception strategies exist including ART to reduce the infectiousness of the partner living with HIV (7, 8), pre-exposure prophylaxis (PrEP) for uninfected partners (9–11), condomless sex limited to the time of peak fertility (12), and artificial insemination (13, 14). Although some safer conception methods are cost-prohibitive, others are low technology and are more readily available in resource-constrained settings. Safer conception programs are still nascent in many high HIV prevalence countries but are gaining momentum (15–20).

One possible reason for poor safer conception utilization in sub-Saharan African settings is low levels of knowledge about safer conception techniques among both providers and clients (21–24). As a result, safer conception is rarely discussed during health consultations and WLHIV often do not seek safer conception counseling (24, 25). Despite the general lack of safer conception information during consultations, research has shown that WLHIV desire strategies to reduce HIV risk during conception and are receptive to provider discussions about safer conception (23, 26, 27). This suggests that safer conception advice offered by providers may be well-accepted by WLHIV as a way to make conception and pregnancies safer.

Even in supportive healthcare contexts, studies from sub-Saharan Africa suggest HIV care providers do not routinely discuss fertility desires or initiate accurate safer conception counseling with WLHIV of reproductive age (15, 16, 21, 23, 24, 27, 28). This may be a byproduct of many decades of HIV prevention messaging that has stigmatized childbearing among WLHIV, focused on condom use, and discouraged WLHIV from having repeat pregnancies (4, 24, 27, 29–32). As a result, communication is inhibited because women are often afraid to discuss their childbearing desires and anticipate stigma from healthcare providers (29, 33, 34). In addition, power imbalances exist between healthcare providers and clients, which makes it difficult for WLHIV to initiate these discussions (35, 36). Research from South Africa and Uganda suggests there is a need for routine provider initiation of counseling regarding future pregnancy (24, 27, 37).

Botswana has signed on to the UNAIDS 95-95-95 targets (95% HIV counseling and testing, 95% ART initiation, 95% viral load suppression) and has reported considerable progress toward meeting international targets. However, the HIV incidence rate in the country indicates substantial ongoing transmission (38). With an HIV prevalence among women of reproductive age of 24.6% (39) in Botswana and local data showing that 60% of women knew that they were living with HIV before becoming pregnant (3), safer conception is an especially relevant approach. Despite having high HIV treatment coverage and a healthcare system where access to primary care is not a limitation (40), current policies have provided limited guidance on offering safer conception for WLHIV and safer conception services are not yet being offered in a systematic way (41). The most current Botswana HIV guidelines mention various safer conception approaches but do not detail the package of services to offer WLHIV who want to become pregnant (41).

To advance discussion about safer conception in Botswana, it is necessary to understand the current state of safer conception counseling. We conducted qualitative interviews to better understand the knowledge, practices, and preferences of healthcare providers and WLHIV about safer conception as the opinions and preferences of both groups are critical to safer conception implementation and uptake. In addition, we include recommendations for how Botswana can improve the provision of safer conception counseling. Providing safer conception services that support the health of WLHIV, their partners, and their infants is an important approach that can prevent the spread of HIV and also support the reproductive rights of WLHIV.

## METHODS

### Setting, Study Population, and Participant Recruitment

We conducted 20 individual in-depth, semi-structured interviews between August 2015—January 2016 with HIV/sexual and reproductive healthcare (SRH) providers and WLHIV in Gaborone, Botswana. Providers and WLHIV were drawn from six government-supported clinics, non-governmental organization-supported clinics, and a clinic at a tertiary educational institution in Gaborone that were all providing SRH and HIV care. The eligibility criteria for providers included being a medical doctor, nurse, or midwife, age 18 years or older, willing to participate in the study, able to give informed consent, and working at a study clinic. Eligibility criteria for women included being 20 to 40 years old, self-report of living with HIV, previously or currently pregnant, accessing care at a study clinic, willing to participate in the study, and able to give informed consent.

Providers were purposively sampled to represent a range of different clinic settings where WLHIV might access safer conception services, such as government-supported clinics and non-governmental organization-supported clinics. Providers were approached in person at their health facilities and assessed for interest and eligibility. All providers who were approached agreed to take part in the study. WLHIV were sampled to represent those who might access safer conception services in the public sector [within their reproductive years (age 20–40 years), varying amounts of time on ART, varying relationship statuses (married, in relationship, single), and varying partner status (sero-concordant or sero-different relationships)]. WLHIV accessing care at study clinics were informed about the study by health center staff and referred to the study coordinator. The study coordinator screened women for eligibility and explained the study aims. After assessing eligibility, <5% of eligible women did not complete interviews, most commonly citing time constraints. Women were reimbursed 30 Botswana Pula (∼ 3 USD) to cover local transport costs. By using this sampling technique, we were not trying to create a representative sample. Rather, we were attempting to gather in-depth information that could capture the lived experiences and viewpoints of providers and women living with HIV (42).

Ethical approvals were obtained from the University of Michigan Health Sciences and Behavioral Sciences Institutional Review Board (Ann Arbor, Michigan), the University of Botswana Research Ethics Committee, the Office of Research and Development (Gaborone, Botswana), and the Health Research and Development Division of the Botswana MOH. Permissions were also obtained from heads of health facilities before recruitment of providers and women living with HIV took place. Since the only record linking the participant and the research would be the consent document, we received a waiver of documentation of written informed consent in order to fully protect the identities of all study participants. However, all participants provided comprehensive verbal informed consent.

## Data Collection and Analysis

The data collection and analytic processes were informed by a social constructivist framework (43). Such a framework focuses on capturing and reporting multiple experiences, norms, and perspectives so as to develop an enhanced and deepened understanding of a particular context and cultural setting. A social constructivist approach allows one to learn about a culture-sharing group from the perspective of the group members using the language or phrases that they use to construct meaning (44). The goal of these interviews was to understand the current knowledge, practices, and preferences of healthcare providers and WLHIV about safer conception.

The initial interview guide was drafted, tested and revised through a collaborative process involving experts in the field of SRH and safer conception (two HIV/SRH researchers from the USA and one medical doctor from Botswana), and two local researchers in Botswana with many years of experience in HIV/SRH research, to ensure exploration of appropriate constructs. All members of the study team conduct behavioral research focused on SRH among people living with HIV.

In-depth semi-structured interviews with HIV/SRH providers were conducted in English (the language of medical professional activity in Botswana) by SG in private spaces where the providers worked or in a private location of the participant's choosing. All providers were fluent in English. Interviews lasted ∼ 1 h. Local, female research team members, who were fluent in both English and Setswana (the local language) conducted semi-structured interviews with WLHIV. Local research team members were experienced qualitative interviewers with topical expertise in HIV/SRH. Interviews with women took place in Setswana, English, or a mix of both, depending on participant preferences. Interviews were conducted in a private space at the health center where the woman was recruited or a private location of her choosing. Interviews lasted ∼ 1 h. A transcript in English was produced for each interview from either English or Setswana digital recordings. A study team member reviewed each transcript for quality and accuracy and corrections were made when necessary.

Data were analyzed using a psychological phenomenological framework (44, 45). Psychological phenomenology is focused on describing what a group of people has in common as they experience a particular phenomenon. It is primarily an inductive analytic approach that allows patterns, themes, and categories of analysis to emerge from the data (44, 45). It is different from other qualitative approaches in that it focuses on identifying elements of a particular phenomenon by describing what the phenomenon is and how it is experienced by a group of people (45).

After reading all transcripts and creating memos, we identified significant statements in the data and grouped these into clusters of meaning and recurring themes (46). We iteratively developed inductive codes that emerged from the data to complement our initial a priori codes, which were derived from the research questions (47). Through an iterative process, SG and an expert in the field of HIV/SRH identified, discussed, and compared key themes and then developed a codebook.

The web application Dedoose (www.dedoose.com) was used to facilitate systematic data management and coding (48). After exploring and coding the main themes in each interview, cross-case and comparative analyses were conducted to expand our understanding by examining similarities and differences across cases and between groups (WLHIV vs. healthcare providers) (45, 47). SG led the analysis and consulted regularly with co-collaborators to discuss interpretation of the data and ensure the cultural salience of findings. In cases where there was disagreement about interpretation, discrepancies were discussed until consensus was achieved.

# RESULTS

## Demographics

Ten interviews with HIV/SRH healthcare providers, and 10 interviews with WLHIV were conducted (**Table 1**). HIV/SRH providers consisted predominantly of nurses/midwives (nine women and one man). The mean age of providers was 41 years (ranging from 30–55 years). Providers had served people living with HIV for a mean of 10 years (ranging from 7–15 years). The mean age of WLHIV was 32 years (ranging from 24–39

**TABLE 1 |** Demographic characteristics of recruited participants.

| **Women living with HIV ($n = 10$)** | |
|---|---|
| Mean age (range) | 31.9 (24–39) |
| Relationship status | |
| Single | 2 |
| In relationship | 3 |
| In relationship/cohabiting | 3 |
| Married | 2 |
| Mean years since HIV diagnosis (range) | 7 (1–13) |
| Currently on ART | 10 |
| Mean years using ART (range) | 5.9 (1–13) |
| HIV status of primary partner | |
| HIV-positive (sero-concordant) | 7 |
| HIV-negative (sero-discordant) | 3 |
| Mean number of pregnancies (range) | 2.4 (1–4) |
| Mean number of living children (range) | 1.8 (1–4) |
| Has had pregnancy after learning HIV-positive status | |
| Yes | 9 |
| No | 1 |
| Currently pregnant | |
| Yes | 4 |
| No | 6 |
| **HIV/sexual and reproductive health providers ($n = 10$)** | |
| Mean age (range) | 41.1 (30–55) |
| Clinical cadre | |
| Nurse | 6 |
| Midwife | 3 |
| Doctor | 1 |
| Mean years as a clinician (range) | 17.7 (7–30) |
| Mean years at clinic (range) | 5.5 (1–19) |
| Mean years working with people living with HIV (range) | 9.9 (7–15) |

years) and women had known their HIV status for a mean of 7 years (ranging from 1–13 years, although one woman had been perinatally infected). Two women were single, three were in relationships with a regular partner (not cohabiting), three were cohabiting with a regular partner, and two were married. Seven women reported their most recent sexual partner was living with HIV while three reported being in discordant relationships. Four women were pregnant at the time of their interview (none of these was a first pregnancy) while six were recently pregnant. Nine of the 10 women had become pregnant since learning their HIV status.

## Overview

In this section, we first describe (1) knowledge about safer conception methods among both providers and WLHIV. Next, we examine (2) current practices related to fertility and safer conception discussions during counseling or clinical care visits. That is followed by a description of (3) preferences for offering safer conception counseling. We end by describing (4) recommendations from healthcare providers on what they believe they need in order to implement effective safer conception services for WLHIV in Botswana. Representative quotes are provided throughout to provide richer detail and examples of the various categories and themes. When describing participants, age is listed as a range in order to protect anonymity.

## Knowledge About Safer Conception

**Knowledge about specific safer conception methods.** Both providers and WLHIV had some knowledge of the concept of safer conception and specific safer conception methods. All providers were aware of at least one safer conception method. Almost all providers discussed HIV viral suppression, half discussed insemination techniques, and half mentioned timed unprotected intercourse during a woman's fertile days. When providers had safer conception information, they explained that they had learned such information from other providers or the internet but had not received any formal training. Amongst WLHIV, the most commonly mentioned safer conception approach was also viral suppression but few were aware of other safer conception approaches. Three women mentioned timed unprotected intercourse during a woman's fertile days and one woman mentioned insemination. Some WLHIV and providers described the importance of the combination of viral suppression and timed unprotected intercourse as a valuable safer conception strategy.

## Current Practices Regarding Safer Conception and Fertility Conversations

In discussing current practices related to safer conception in Botswana, respondents focused on four main areas: (1) the frequency of safer conception discussions, (2) the timing of safer conception discussions, (3) the focus of fertility-related conversations, and (4) the reality that few women arrive for safer conception counseling.

**Frequency of safer conception discussions.** Safer conception discussions were reported to be rare by both WLHIV and providers. Over half of the women reported that neither a provider nor they themselves had ever initiated a safer conception discussion. Three providers reported that they routinely ask clients about their fertility desires. Only four providers said they had ever initiated safer conception discussions with WLHIV. However, most noted that when it was discussed, clients most often raised the topic of safer conception.

> I include that (safer conception information) especially pre-test (during HIV pre-test counseling), especially if it's a young patient. I usually bring the issue of having children because I know that would be at the back of their minds so I would bring it pre-testing … But not that it comes very easily. Sometimes I remember it, but most times I just forget to talk about it but I try to talk about it post (during post-test counseling). But mostly it's from patients (the patients initiate the conversation). (Nurse midwife, 45–49 years).

> We went to the nurse's office and sat down with her. I told her that we would like to start a family and that we are both living with HIV. (WLHIV, 25–29 years).

**Timing of safer conception discussions.** Healthcare providers reported that when safer conception information was proactively provided, it was often brought up at ART initiation or during adherence counseling. If it happened, this was usually a once off conversation. Women reported that it was common during these visits for providers to tell clients to come seeking care if they desired a pregnancy.

> It is something that normally when I do an adherence counseling before they start treatment, I would also say it to them to say, "if you want to be pregnant this is what you should do". (Doctor, 40–44 years).

> They said if I wanted to be pregnant, I need to see a doctor before getting pregnant so that the doctor can give me a go ahead to be pregnant or tell me how long I have to stay before getting pregnant, or when to avoid getting pregnant. (WLHIV, 30–34 years).

**Focus of fertility-related conversations.** Both providers and women noted that fertility discussions tend to focus on condom use and pregnancy prevention and do not often include safer conception counseling. Some providers felt that they did not want to encourage WLHIV to continue childbearing. Perhaps because of this, few women came to seek safer conception advice.

> They just advise you to use condoms and things like that, but all in all, going deep, like I said, it is not done. (WLHIV, 35–39 years).

> I think we push them toward condoms … I think we just assume they should use condoms and maybe that's why they come back pregnant again even after condoms, condoms, condoms. I think so. I think even … they (WLHIV) just feel okay, we are expected to use condoms so why should I even go there and start talking of (pregnancy). (Midwife, 45–49 years).

**Few women arrive for safer conception counseling.** Providers were frustrated because they told WLHIV to come for safer conception advice and yet they acknowledged that few women came for counseling prior to pregnancy. Women also confirmed that providers told them to come for safer conception advice when they desired a pregnancy. However, most women explained they had not gone to seek safer conception advice from healthcare providers prior to becoming pregnant and instead arrived for care once they were already pregnant. Some women said they had not gone to seek safer conception advice because their pregnancies were unplanned, others because they were concerned about judgmental and negative attitudes from healthcare providers, and still others because they did not know that there were any safer conception approaches that providers could offer them.

> No, it's not common, they don't ask (for safer conception advice)—usually they will just come pregnant. (Nurse, 30–34 years).

> I have many children and I am afraid they will think I am irresponsible you know (if she comes seeking safer conception advice). But maybe that is not true, but I just feel they will think I don't care about myself—to have babies when taking treatment. (WLHIV, 35–39 years).

## Preferences for Offering Safer Conception Services

The preferences among providers and women for how to offer/who should initiate safer conception discussions were generally at odds. WLHIV preferred providers to initiate safer conception discussions while providers felt that it would be better if WLHIV initiated these discussions. However, each group felt that some of the onus for discussing safer conception fell on them. However, the quotes from women and providers suggest deeper issues about power dynamics, concerns about stigma among women, and provider fears about promoting pregnancy. We first discuss the perspectives of women followed by the perspectives of providers and finish by discussing the shared sentiment among providers and WLHIV that they would both feel comfortable discussing safer conception if the topic was brought up.

**Perspectives of WLHIV.** When they were asked about who should initiate safer conception conversations, women discussed (1) who should initiate safer conception discussion, (2) why they think one group or another should start these conversations, and (3) concerns about anticipated stigma and how this impacts discussion with healthcare providers. WLHIV were split on whether healthcare providers or both women and healthcare providers should initiate safer conception discussions. Some women felt that it was the responsibility of healthcare providers to bring up the topic of safer conception saying that it was difficult for women to discuss personal issues or that many women were afraid to initiate such discussions. As one woman explained, she felt it was the responsibility of the healthcare provider to ask her about fertility desires so as to "make her talk." As a client, she felt that she could not begin conversations about intimate issues. However, some women recognized that healthcare providers do not know when women want pregnancies, and therefore felt that both WLHIV and providers could initiate safer conception discussions.

> The healthcare worker should ask me if I am considering having babies. It should come from the healthcare worker. (Woman living with HIV, 35–39 years).

> I think it is their (healthcare provider) responsibility (to ask about safer conception), but I think I also have to ask, because it's not like they can tell if I want to have more children or not—it may also help if one tells them. (Woman living with HIV, 25–29 years).

An important component for women, related to who should initiate safer conception discussions, was concern about negative reactions and judgmental attitudes from providers. WLHIV felt that many women were afraid or shy about asking healthcare providers about safer conception. Women felt that having providers begin these discussions would feel more comfortable because many WLHIV fear bringing up sensitive topics with their providers.

> I honestly think a lot of women are scared to ask or initiate conversations with nurses, just like I was. (WLHIV, age unreported).

**Perspectives of healthcare providers.** When providers were asked about who should initiate safer conception discussions, their responses focused on two main themes: (1) a preference for WLHIV to initiate safer conception discussions because this showed investment in safer conception and (2) a recognition that they should initiate safer conception discussions because some clients may fear negative responses and judgmental attitudes from providers.

Most providers said they would feel more comfortable if WLHIV initiated safer conception conversations. Many felt it was awkward to ask women if they desired a pregnancy. Some providers thought that by initiating safer conception discussions, they would be promoting pregnancies for WLHIV and that was something they did not want to do. However, if women came seeking safer conception advice, providers felt this proved that women were dedicated to having safer conception information and were more likely to follow provider advice.

> I know some people are very, very uncomfortable with that (asking about safer conception needs)—it's like they're (healthcare providers) encouraging them (WLHIV) to go and get pregnant while they're positive. (Midwife, 45–49 years).

> I feel okay because if they (WLHIV) start the topic, I think they are there—they want that information (about safer conception) so just tell them, now we are going to call a spade a spade, we are going to talk about this, then you sit down, you talk about that. I don't have to hide anything. Especially if they came to me and asked for help, I think they would be willing to know everything. (Nurse, 30–34 years).

> I would say it will be more comfortable if the patient initiated it (safer conception discussions) because it will appear to me that ok, the patient is comfortable with this as well but then I know as a health worker that my role is to go beyond whatever the concern for that day is, so sometimes I just need to ask. (Nurse, 30–34 years).

Some providers echoed what WLHIV said and recognized that fear of negative reactions from judgmental providers may cause some women to avoid discussions about their desire for children. Some providers felt that if healthcare providers did not start safer conception discussions, that WLHIV would not actively ask about safer conception. Despite possible discomfort or awkwardness, a number of providers recognized that they needed to put their own feelings aside and proactively ask clients about their fertility desires in order to create an environment where clients felt comfortable and free to discuss their pregnancy intentions.

> Sometimes patients they will be scared to ask you. Ah, what will she (the nurse) say? So it's better to say it out so that you give them that atmosphere of feeling so comfortable to discuss these things. Where will they discuss them if they don't discuss them with you as the healthcare provider? (Midwife, 35–39 years).

> If you don't initiate things they will just keep quiet. They will fear to ask. They will be shy to ask and thinking that because I am HIV-positive maybe if I talk about pregnancy, maybe they (healthcare providers) are going to say something. Maybe I won't be doing the right thing. So I think the health provider should ask because we really need to assess every part of this person. (Nurse, 55–59 years).

**Shared comfort with discussing safer conception.** Despite varying opinions about whom should start safer conception discussions, both healthcare providers and WLHIV agreed that they would feel comfortable discussing safer conception if the topic was brought up. Many WLHIV desired safer conception discussions and felt such conversations should be routine. Women felt that such information was critical to know from a young age or right after learning one's HIV-positive status.

> I personally don't have any problem with that (discussing safer conception needs). I just feel okay, it's just fine." (Midwife, 45–49 years).

> I think it (safer conception discussions) should be done all the time. (WLHIV, 35–39 years).

> This education should be shared with every woman. Like maybe as soon as … a woman turns 18 it should be something that she is told at every clinic visit she goes to even if she has a headache. Or maybe even as soon as a woman tests positive it should be part of the post-counseling. She should be afforded a chance to digest her results but somehow given information about carrying on as a woman which includes having children. (WLHIV, age unreported).

## Healthcare Provider Recommendations for Improving Safer Conception in Botswana

Providers offered suggestions about how safer conception services could be improved in Botswana. Key recommendations focused on (1) the need for clear guidelines and protocols around safer conception and (2) the need for formal training.

**The need for safer conception guidelines.** Providers commented that there were no safer conception guidelines and overwhelmingly discussed the need for guidelines that would outline the services they should offer to couples. Although providers felt current guidelines were very clear about what to offer pregnant WLHIV, the current guidelines were unclear when it came to pre-conception. One provider suggested that perhaps women do not seek pre-conception advice because they know that there are no clear guidelines about what to offer them. Providers felt that having clear guidelines would help them know they were offering WLHIV accurate information and the correct package of services.

> There's no protocol. We need the Ministry of Health to develop that protocol or guidelines for if people … are HIV-positive or discordant and they want to conceive, these are steps you healthcare providers should take … We are waiting for that … It would be very helpful because you only have (guidelines) for those who are pregnant … we have to start them on treatment.

> What if they are pre-conception? What should we do? … Few, one out of twenty … will come for pre-conception counseling advice because they know there's no straight guidelines." (Midwife, 35–39 years).

**The need for safer conception training.** In the absence of formal safer conception guidelines, providers were doing their best to share the safer conception information they had with WLHIV. However, most providers felt unprepared to discuss safer conception techniques because of the lack of clear safer conception guidelines or protocols. All providers expressed the desire for formal trainings about safer conception methods, approaches, and the correct package of services to offer WLHIV who wish to become pregnant.

> If you don't have information sometimes you rely on something, maybe your research and you don't even know if it's accurate. Like sometimes you research about something on the internet but you don't even know if it's the right thing. I believe we should be trained so that when you talk to a client, you know what you are talking about. (Nurse, 35–39 years).

# DISCUSSION

In this qualitative study, we sought to gain a deeper understanding of the knowledge, practices, and preferences of healthcare providers and WLHIV about safer conception in Botswana. We found that safer conception knowledge is limited, safer conception discussions are rare, and WLHIV would like providers to initiate routine safer conception counseling. Many women were concerned about stigma and feared bringing up sensitive topics with their providers. Providers voiced a need for clear guidelines and desired training on this topic. The results show that in order to offer effective safer conception counseling in Botswana, some fundamental changes are needed. A multi-pronged approach, that addresses limitations at the individual, interpersonal, and policy level, may be best suited to create lasting change.

## Limited Safer Conception Knowledge and Conversations

Both WLHIV and providers exhibited limited knowledge of safer conception methods. Other sub-Saharan African studies have also reported similar findings (15, 23, 27, 49, 50). By far, the safer conception method that was mentioned most often was viral suppression for the person living with HIV. This finding is similar to studies from Kenya and South Africa that have found that treatment adherence for viral suppression was understood as a safer conception approach (17, 23). This understanding of the importance of treatment adherence is encouraging and may be due to Botswana's efforts to achieve the goal of 73% virologic suppression among people living with HIV,in line with UNAIDS targets (38, 51). While this level of knowledge about the importance of viral suppression is encouraging, providers and clients would benefit from having information about a wider range of safer conception methods since one approach will not work for all couples.

Despite advice from healthcare providers that they should seek pre-conception care, few WLHIV were arriving for safer conception counseling. This created a clear tension between the recommended medical advice women were receiving and the fact that most women do not arrive for care until they are pregnant, thus forgoing safer conception. As noted here and in other settings, providers often emphasize a condom-centered prevention approach (24, 27). This likely implies to WLHIV that pregnancy is not encouraged and inhibits women from seeking pre-conception support.

## Power Dynamics Between WLHIV and Healthcare Providers

WLHIV and healthcare provider views on who should initiate safer conception discussions are generally at odds, with WLHIV wanting providers to initiate these conversations, and providers feeling more comfortable with women initiating them. However, the expectation among healthcare providers that WLHIV should initiate safer conception discussions when they want to conceive is surprising as it is a role-reversal from how medical discussions normally begin in this setting. Sub-Saharan African data suggests the client-provider relationship is highly unequal in terms of social power with services often offered in a top-down way (35, 52). In these situations, providers wield considerable control, as it is presumed that providers know more than clients and because they often act as gate-keepers to services (15, 35, 53). This is especially true of the client/nurse relationship which is reported as particularly disempowering (52). Therefore, expecting clients to challenge the standard provider/client script and to begin safer conception discussions is a reversal of normal roles and power structures.

In addition, consistent with our research and similar to other settings, WLHIV in this study anticipated stigma and were afraid to discuss fertility desires with healthcare providers because they feared poor treatment and judgmental behaviors from providers because of their desire to have children (25, 33, 36, 54). In addition, some healthcare providers were not initiating fertility-related discussions with women because they did not want to encourage childbearing among WLHIV. Although this may stem from concerns about HIV transmission to partners and infants, not wanting to discuss safer conception may be rooted in stigmatizing concerns about promoting pregnancy amongst WLHIV. An important component of stigma is that certain groups are devalued. This differential valuing also pertains to the reproduction of the stigmatized group so that their fertility is devalued compared to other women by those with social or political power (55). Historically, there is a well-established atmosphere of stigma surrounding childbearing among WLHIV from both healthcare providers and community members (15, 29, 30, 56, 57). This acts as a cue in the environment that tells WLHIV that they, and their fertility, are not valued, and this reinforces social inequalities.

These finding highlight the link between social power and stigma. Structural and individual level stigma reinforces differential power relationships between healthcare providers and WLHIV and can be linked to forms of social power that

reproduce inequalities that marginalize certain groups (58–60). Therefore, expecting people who are part of a vulnerable, marginalized, and stigmatized group to initiate a conversation about a stigmatized topic, such as childbearing among WLHIV, and to challenge well-established power structures and social hierarchies with the people they depend on for essential healthcare, is implausible.

If the advice that WLHIV should come seeking safer conception counseling is not yielding results, it is time for a new approach. Given the well-established atmosphere of stigma surrounding childbearing amongst WLHIV, and women being fearful to discuss fertility desires with healthcare providers, it falls on healthcare providers to create a welcoming environment where fertility desires and safer conception can be discussed openly (22, 33). Therefore, healthcare providers need to routinely initiate conversations about fertility desires and safer conception and reassess these desires over time since fertility desires are not static. If providers do not initiate these conversations they are unlikely to occur. Some providers recognized that it was their role to begin these discussions but others require support and values clarification training related to reproduction among WLHIV in order to separate their personal feelings from their required job functions (61). In addition, tools need to be developed that will facilitate routine screening of fertility intentions so WLHIV can be supported with either appropriate safer conception or family planning methods. Existing tools such as the One Key Question® initiative, which screens women of reproductive age by asking, "Would you like to become pregnant in the next year?", could be adapted and may be a simple way to routinely and proactively assess pregnancy intention in a non-judgmental way (62, 63). Visual aids that can be used to assist women in understanding the various safer conception strategies would also be helpful.

## Healthcare Policy and Guidelines

As a first step, policy guidelines that instruct healthcare providers to routinely discuss fertility desires and offer safer conception or FP services, as appropriate, are needed. Other countries in the region, such as South Africa, have developed guidelines that encourage providers to routinely discuss safer conception with WLHIV of reproductive age (13, 64). Such a guideline has the added benefit of destigmatizing and normalizing such discussions. However, these guidelines need not single out WLHIV and could instead instruct all primary healthcare providers to routinely discuss fertility desires with all people of reproductive age, regardless of HIV status. Such a policy or guideline can have important structural ramifications by signaling that the reproduction of all women is equally valued. Within health centers, such a policy can change healthcare provider behavior and the way that providers interact with WLHIV and all people of reproductive age more generally. At the level of individual client interactions, it is hoped that the policy change will indicate a more accepting and non-judgmental healthcare environment where WLHIV and providers can openly discuss childbearing desires. Since providers will be expected to ask WLHIV about their fertility aspirations at each visit, this should signal that this is a normal conversation to have and that healthcare providers are receptive to discussing fertility desires.

The policy should be accompanied by guidelines that provide clear information for providers about the care that should be offered to WLHIV who wish to conceive and practical information and services that can be offered to reduce the risks of HIV transmission. Providers voiced this same recommendation as a way to improve the provision of safer conception services in Botswana. They requested clear safer conception guidelines that outline the services they should offer to WLHIV who wish to conceive and they desired training on these guidelines and safer conception more broadly. This desire among healthcare providers for policy guidelines and safer conception training has been noted in other countries as well (17, 28, 61, 65). In the absence of clear guidelines, providers are relying on whatever safer conception information they have been able to gather from various sources. However, providers wanted definitive guidance from their Ministry of Health so they would have assurance that they were offering accurate information. As recommended by other researchers, implementation guidelines that are practical and measurable along with comprehensive training with a strong education and counseling component should help with safer conception service provision (37, 65).

## Strengths and Limitations

This study has strengths and limitations. Data were drawn from a modest sample of urban healthcare providers and WLHIV in Gaborone, Botswana. This likely has implications for the applicability of the findings to rural settings. However, recruitment of participants was from six clinics in Gaborone, covering a range of settings. In addition, due to the modest sample, important attitudes may have been missed but women living with HIV and providers repeated the same themes, despite the small sample. The healthcare providers in this sample consisted mostly of nurses and midwives. The attitudes of this group of healthcare providers may differ from higher or lower-level cadres but since nurses provide the bulk of primary healthcare in Botswana (66), the attitudes of this group are especially salient. This study could have benefitted from the inclusion of male partners. The knowledge, practices, and preferences of male partners around safer conception will be important to document in future studies since most decisions about safer conception are made as a couple and men often play a dominant role in childbearing decisions in many sub-Saharan African contexts. However, in this study, we had concerns about potential disclosure challenges when trying to recruit male partners. However, women access SRH services more frequently than men, making their perspectives especially important and relevant to this topic. At the time of this study, safer conception services were not routinely offered in public sector clinics. Due to this, it may be that knowledge levels were particularly low. However, these results document the current state of safer conception services in Botswana in the absence of a formal Ministry of Health and Wellness supported service. Finally, women in this study were interviewed at various times either during or following their pregnancies. It is possible that perceptions may vary depending on the amount of time since the pregnancy, creating issues with recall. However, interviewing women at various points in their pregnancies or post-partum

allowed us to examine the diverse attitudes of WLHIV who recently experienced pregnancy.

## CONCLUSION

By detailing the knowledge, practices, and preferences of healthcare providers and WLHIV, this work creates a starting point for additional discussions about how to best implement safer conception in Botswana. The results indicate that training about safer conception techniques will be needed for healthcare providers and informational campaigns that explain various safer conception methods will be needed to reach WLHIV. In addition, given the power differentials between WLHIV and providers, and fear among WLHIV about approaching providers about childbearing, the onus falls on healthcare providers to routinely initiate conversations about fertility desires and safer conception. Although providers may feel uncomfortable initiating safer conception conversations, they must focus on providing non-judgmental SRH services because anticipated stigma may keep WLHIV from accessing the full cascade of HIV prevention, care, and reproductive health services. Offering safer conception services in Botswana would be a valuable addition to a comprehensive HIV prevention strategy and supports the reproductive rights of WLHIV. Furthermore, by discussing fertility desires with all people of reproductive age repeatedly over time, a policy shift could signal that it is normal for all people, irrespective of HIV-status, to have reproductive aspirations that deserve to be respected and validated. By reducing HIV-related stigma surrounding reproduction and providing care and services that are free from judgment, it is also possible to reinforce and embrace a human rights framework that recognizes the basic right of all couples and individuals to decide freely and responsibly the number, spacing, and timing of their children.

## ETHICS STATEMENT

Ethical approvals were obtained from the University of Michigan Health Sciences and Behavioral Sciences Institutional Review Board (Ann Arbor, Michigan), the University of Botswana Research Ethics Committee, the Office of Research and Development (Gaborone, Botswana), and the Health Research and Development Division of the Botswana MOH. Permissions were also obtained from heads of health facilities before recruitment of providers and women living with HIV took place. Since the only record linking the participant and the research would be the consent document, we received a waiver of documentation of written informed consent in order to fully protect the identities of all study participants. However, all participants provided comprehensive verbal informed consent.

## AUTHOR CONTRIBUTIONS

SG, GH, and CM: conceived and designed the study. SG, NM, and CB: performed the experiments. SG, GH, NM, CB, and CM: analyzed the data. SG, GH, JH, DR-M, and CM: wrote the paper. All authors contributed to the article and approved the submitted version.

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# Identifying Client Targets for Improved Mobilization and Uptake of Integrated Family Planning and Reproductive Health in Environmental Programs in Kenya

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**Background:** We conducted a population health environment program in Lake Victoria Basin (LVB) and assessed incorporation and integration of family planning with environmental conservation.

**Methods:** Routine program data were collected from clients by community-based distributors from four environmental community-based organizations. Multivariable regressions identified factors associated with distribution of: (1) oral contraceptive pills to women, (2) male condoms, and (3) integrated family planning and environmental messaging.

**Results:** April 2015 through May 2016, 10,239 client encounters were completed, with 56% made by men. We distributed contraceptive pills at 28% of client encounters. Multivariable modeling showed this was more likely for women <40 years old ($p < 0.001$) and was less likely for women attending household (30%) and group sessions (46%) compared to individual sessions ($p < 0.001$). Male condoms were distributed at 73% of client encounters; ($p < 0.01$, all) women were half as likely to receive condoms than men, and single and widowed clients were more likely than married clients to receive condoms. Integrated messaging occurred at 89% of client encounters, and was 85% more likely for women, increased with client age, and was less likely for single and widowed persons. Exit interviews with 87 clients (42% male, 58% female) confirmed program data by report of commodities received: 27% contraceptive pills, 75% male condoms, 91% integrated messaging.

**Conclusions:** Partnership with environmental conservation organizations effectively expanded family planning and reproductive health to non-traditional audiences and men among rural communities surrounding LVB-Kenya. Specific client subgroups can be targeted for improved mobilization and uptake of services.

**Keywords: program evaluation, population, health, and environmental health, Kenya, family planning, reproductive health services, environmental health, health education**

## INTRODUCTION

Population, health and environment (PHE) capitalizes on the interconnectedness between people's livelihoods, health and the environment to promote family planning (FP) (1). The feasibility of PHE has been demonstrated broadly, including in the Philippines, Ethiopia, Madagascar, Uganda, and Kenya (2, 3), and has demonstrated capacity to reach men and adolescent boys (1, 3). A review of PHE programs from the Philippines, Ethiopia, and Madagascar shows increased uptake of FP over stand-alone or parallel programs (3).

PHE programs are mainly targeted toward remote and ecologically sensitive landscapes where the population often have limited access to FP. The majority of the population living around the Kenyan Lake Victoria Basin (LVB) rely on the land, agriculture and fishing for their livelihoods and the region is characterized by high poverty rates (4). Due to declining land productivity, soil degradation, desertification, loss of biodiversity, and crop and livestock diseases, food security has been challenged (5, 6). With high total fertility rate, 3.9 per woman nationally and 4.3 per woman for the Nyanza Region which encompasses the Kenyan LVB, there is rapid population growth (4). In the LVB counties of Kenya, 20–25% of children are born <24 months after a previous birth (4). The situation is exacerbated by the high unmet need for FP in Nyanza Region (4).

In the most recent Kenyan Demographic Health Survey, modern contraceptive use increased from 32% in 2003 to 53% in 2014 (4), and new data from the Kenyan Ministry of Health shows that modern contraceptive use was at 61.4% in 2019 with 78.4% satisfied demand (7). The most commonly used modern contraceptives are injectables (48%), implants (18%), oral pills (14%), intrauterine device (5.9%), and sterilization (5.6%) (7). Despite this success, modern contraceptive coverage is unequally distributed, with Nyanza Region being an area with lower coverage, especially amongst women in rural areas and those who are impoverished (4). The effects of contraceptive gap are well known: negative impacts on educational attainment for girls and women with subsequent economic impacts, correlation with unsafe abortion, and increased rates of adverse pregnancy outcomes. Drivers of contraceptive gap are multifactorial, but traditional cultural roles and the influence of men's knowledge and beliefs related to FP are critical, making PHE a desirable approach to promoting FP (1–3).

Through the program called SHAPE-LVB (Sustainable Health and People's Environment in Lake Victoria Basin), Nyanza Reproductive Health Society (NRHS) provided technical assistance and training to one non-governmental organization (NGO) and three community-based organizations (CBOs) to enable them to integrate FP into their programs using a PHE approach. While the utility of PHE approach has been demonstrated, evaluations of large-scale programs are limited. We identified client and service delivery factors associated with integration of FP messaging and commodity distribution into routine environmental, health, livelihood and poverty alleviation programs, to better understand how to improve program delivery.

## MATERIALS AND METHODS

### Description of SHAPE-LVB Program

NRHS is a NGO based in Nyanza Province, Kenya, that focuses on reproductive health services and research including voluntary medical male circumcision, FP, and HIV prevention and treatment. The partner NGO and CBOs provide services to: (1) fisher folk (poverty alleviation, HIV prevention, welfare of children and parents), (2) natural resources management workers (food security, capacity building, water and economic empowerment), (3) agricultural livelihood workers (rainforest preservation, indigenous plant promotion, and energy-saving education), (4) environmental protection workers (plastic waste management). SHAPE-LVB staff trained 48 cross-sector community based distributors (CBDs) (12 from the NGO and each CBO) in providing community-based FP, provision of FP commodities and other PHE related commodities and giving cross-sector referrals for FP methods. From September 2014 through March 2015, SHAPE-LVB staff developed and tested a curriculum based largely on The BALANCED Project methodology in Tanzania (8) and also drawing on the HoPE-LVB program in Uganda and Kenya (9, 10) to integrate FP and reproductive health (RH) messaging with environmental conservation.

We started the program process with participatory appraisal at project sites and PHE context-specific messages based on key informant interviews. Leaders from the NGO and each CBO were trained, and after sufficient performance on post-test assessments, they then trained their organization's CBDs. The CBD's ability was also assessed by pre- and post-test evaluation of knowledge and skills to employ integrated messaging and distribution of FP commodities, specifically condoms and oral contraceptive pills. SHAPE-LVB staff developed a network of providers for referral for long-term contraceptives and obtained supplies from Ministry of Health (MoH) public health facilities. Each CBD was linked to a single nearby health facility and introduced to the facility's leadership, specifically the FP commodities focal person. All local facility and community leaderships were informed about the project and the implementation model. Entry meetings were conducted with all the departmental heads of health of the counties and sub-counties (the sub-national administrative units in Kenya) where the project was implemented. The CBOs and NGO facilitated community entry through meetings with the community gatekeepers. The CBDs then collected the condoms and oral contraceptive pills and replenished their stock as needed, after submission of monthly reports using the MoH tools for dispensing FP commodities. The FP commodities distributed by the CBDs were free of charge to the clients since they were provided by the MoH. CBDs were given a monthly stipend of 1,500 Kenyan shillings (∼$15 US dollars) to reimburse them for travel and time. After this phase of training and capacity building, the SHAPE-LVB program was implemented in April 2015.

CBDs met with clients in their communities to discuss FP and environment, and distribute FP commodities. Integrated messaging and data collection were conducted in the clients' preferred language (English, DhoLuo, Kiswahili). Information

from these meetings, or client encounters, was documented to help assess the FP integration program, which is the level of analysis. Many CBDs had multiple encounters with a client. At each encounter between the respondents and the CBDs, the respondents were provided with information on the various Family Planning (FP) methods as well as what the CBDs could offer. Additionally, they were offered contextually relevant messaging on environmental conservation measures. Depending on the respondent's choice, they either received the FP of choice from the CBD at that encounter or at a follow-up visit to the respondent's home; or, were referred to the nearest health facility for the methods the CBDs did not provide.

## Data Collection and Program Measures

Self-reported sociodemographic variables were age, sex, marital status, job, and prior FP use were collected by CBDs using closed-ended, standardized forms. CBDs also recorded the session type (individual, family, group), commodities distributed, and the content of messaging discussed. Integrated messaging was defined as receiving at least one of each message (environmental and FP/RH) at a single client encounter. Examples of environmental topics include safe and clean drinking water, forestation, or sustainable fishing; examples of FP/RH topics include modern contraceptive methods, pregnancy spacing, STI/HIV prevention/treatment, and voluntary medical male circumcision. In the last 2 months of the program, a structured exit survey was made available at all sites to measure counseling topics, services received, and satisfaction with services and CBDs, and was administered by NRHS interns (as part of student practica; i.e., they were independent of the SHAPE-LVB program). Interview completion was voluntary and represents a convenience sample of clients.

## Statistical Analysis

The analysis of SHAPE-LVB program data was determined exempt (did not meet the definition of human subject research) by the University of Illinois at Chicago School of Public Health. We identified factors associated with: (1) distribution of any contraception pills (progestin-only or combined progestin and estrogen) to women; and among men and women, (2) distribution of male condoms, and (3) the dissemination of integrated messages. Univariate analysis described the distribution of client encounter factors and the distribution of contraceptive commodities. Bivariate analyses showed the association between the covariates and each outcome variable. Covariates were entered into multivariable analysis if Pearson Chi-squared test was significant at a $p$-value $<0.05$. Multivariable regression models identified factors associated with distribution of commodities (binomial) and integrated messaging (multinomial). Because clients could have multiple visits over time, analyses were conducted at the encounter-level and we therefore used cluster-based variance estimation to account for correlations among individuals with multiple visits. Gender was assessed for interaction with a likelihood ratio test, and it was included if the $p$-value was $<0.05$. We conceptualized a multi-level modeling approach to enable us to assess the effects of covariates at different levels on the outcomes because individuals were nested within CBDs and CBDs were nested within CBOs or NGO. We concluded that no random effects terms were needed for CBD or CBO/NGO based on the Hausman specification test (11) at a significance level of $p$-value $> 0.05$ and minimal difference between fixed effects and random effects coefficients. Therefore, we present fixed effects associations with 95% confidence intervals (95% CI) generated with cluster-based variance. Log-binomial regression and multinomial regression with exponentiation of the logit coefficients generated

**TABLE 1 |** Distribution of encounter-level client factors from April 2015–May 2016, $N = 10{,}239$.

| Variables* | Males encounters $N = 5{,}753$ (56.2%) $n$ (%) | Female encounters $N = 4{,}486$ (43.85%) $n$ (%) |
|---|---|---|
| Median Age in Years (IQR) | 28 (24–33) | 28 (24–33) |
| **Marital status** | | |
| Married | 3,641 (63.3) | 3,092 (68.9) |
| Single | 2,042 (35.5) | 1,094 (24.4) |
| Widowed | 70 (1.2) | 300 (6.7) |
| **Used any family planning** | | |
| Ever | 4,206 (73.2) | 3,244 (72.4) |
| Never | 1,543 (26.8) | 1,234 (27.6) |
| **Session type** | | |
| Individual | 3,536 (61.5) | 2,947 (65.7) |
| Household | 748 (13.0) | 784 (17.5) |
| Group | 1,468 (25.5) | 754 (16.8) |
| **Environmental population served** | | |
| Environmental protection | 1,013 (17.6) | 1,460 (32.6) |
| Natural resource Management | 1,944 (33.8) | 1,061 (23.7) |
| Agricultural management | 1,831 (31.8) | 1,143 (25.5) |
| Fisher Fork support | 965 (16.8) | 822 (18.3) |
| **Target population** | | |
| Farmer/Environmental | 3,876 (67.5) | 2,462 (55.0) |
| Fisher person | 351 (6.1) | 359 (8.0) |
| Other† | 1,356 (23.6) | 1,267 (28.3) |
| Sex worker | 4 (0.1) | 242 (5.4) |
| Student | 159 (2.8) | 150 (3.4) |
| **Message**** | | |
| Integrated | 5,093 (89.1) | 3,978 (89.1) |
| Reproductive-Health-Only | 351 (6.1) | 359 (8.0) |
| Environmental-Only | 275 (4.8) | 127 (2.8) |
| **Number of *individuals* and multiple visits** | | |
| Individuals with one visit only | 2,470 (69.4) | 2,262 (74.9) |
| Individuals with two or more visits | 1,091 (30.6) | 760 (25.1) |
| Median (Range) Visits per individual with more than one visit | 3 (2–15) | 2 (2–13) |

**Some cells do not sum to N due to missing data; missing data ranged from 2 to 13 observations (<0.2%), except as otherwise noted. **missing, n = 56 (0.5%). †Other primarily included boda boda drivers and touts, informal business persons, casual laborers, house help.*

**TABLE 2 |** Encounter-level distribution of commodities from April 2015–May 2016, $N = 10{,}239$.

| Variable* | |
|---|---|
| **Overall** | ***N* = 10,239 *n* (%)** |
| Distribution of male condoms at all client encounter | 7,439 (72.7) |
| Median number of condoms Received (IQR) | 20 (15–30) |
| Distribution of male condoms at male client encounters | 5,385 (93.6) |
| Median number of condoms received (IQR) | 20 (15–30) |
| Distribution of male condoms at female client encounters | 2,054 (45.8) |
| Median number of condoms received (IQR) | 20 (12–30) |
| **Distribution of commodities at female client encounters** | ***N* = 4,486 (43.8%) *n* (%)** |
| **Female condoms** | |
| Any | 294 (6.4) |
| None | 4,192 (93.6) |
| **Receipt of contraceptive pills** | |
| Yes | 1,239 (27.6) |
| No | 3,247 (72.4) |
| **Progestin only pills, number of months supply** | |
| 0 | 4,149 (92.5) |
| 1 | 226 (5.0) |
| 2 | 14 (0.3) |
| 3+ | 97 (2.2) |
| **Combined pill, number of months supply** | |
| 0 | 3,583 (79.9) |
| 1 | 600 (13.4) |
| 2 | 63 (1.4) |
| 3+ | 240 (5.4) |
| **Referred to health facility for long term contraception*** | |
| Yes | 398 (8.9) |
| No | 4,080 (91.1) |

*Sum cells do not sum to N due to missing data; missing data ranged from 2 to 8 (<0.2%).

adjusted prevalence rate ratios (aPRR). There was <1% missing within variables in this data. All analyses were performed in Stata/SE version 14.0 (Stata Corporation, College Station, TX).

# RESULTS

From April 2015 through May 2016, SHAPE-LVB conducted 10,239 client encounters (56.2% men) completed by 6,583 individuals [3,561 men (54.1%), 3,022 women (45.9%)]. Of clients with multiple visits, the median was 2 (range 2 to 15 visits) and did not differ between men and women ($p = 0.22$). The median age of both men and women was 28 (IQR 24–33; **Table 1**). Two-thirds of clients (66%) were married and over 70% had used FP methods before the encounter. Client sessions were 63% individual, 15% household, and 22% group. The majority of encounters (62%) were with farmers or environmentalists; 10% were with other target populations (7% with fishers, 3% with sex workers).

## Factors Associated With Receipt of Contraceptives

We distributed contraceptive pills at 1,239 (28%) client encounters with women (**Table 2**). Results of multivariable modeling (**Table 3**) demonstrate that oral contraception was increasingly more likely to be distributed to women until age 30 and then decreased with increasing age ($p < 0.001$). Women attending in household and group sessions were 30 and 46% less likely, respectively, to receive contraceptives than those attending individual sessions ($p < 0.001$). Women who were single or widowed were also less likely to receive contraception than married women (12 and 20%, respectively; $p < 0.001$).

CBDs made referrals to long-term contraceptives for 398 (9%) of the encounters with women. Referral to long-term contraceptives was 19.5% among women <19 years-old and 14.2% among 20–24 year-old women, and decreased from 9.6% among women aged 25–29 years to 6.7% among women aged 40 years and older ($p < 0.001$; data not shown). Referral for long-term contraception was made for 12.3% of married women, compared to 7.4% of single women and 3.3% of widowed women ($p < 0.001$). Among women reporting no previous FP practices, 12.8% received referral to long-term contraception compared to 9.5% with prior FP use ($p = 0.005$). Overall, distribution of oral contraceptives or referral to long-term contraception was given to 34.5% of women, and this was 43.2% among women with no previous FP use.

## Factors Associated With Male Condom Distribution

Male condoms were distributed at 73% of client encounters, though this was at 94% of encounters with men and only 46% of the encounters with women (**Table 2**). The median number of individual condoms distributed at an encounter was 20. In multivariable modeling (**Table 4**), men were twice as likely to receive condoms than women ($p < 0.001$), with little variation in condom distribution by age. Single and widowed clients were more likely to have received condoms compared to married clients ($p < 0.001$). Sex workers and fishers were 86 and 18% more likely to receive condoms, respectively. There was interaction with gender and all covariates ($p < 0.05$). Women were less likely to receive condoms whereas men were more likely to receive them. Single and widowed women were more likely to receive condoms whereas single and widowed men were less likely to receive condoms. Among those having never used FP methods before, women were 13% less likely to receive condoms and men were 14% more likely (data not shown).

## Factors Associated With Integrated Messaging

Integrated FP and environmental messaging occurred at 89% of client encounters and was similar across organizations

**TABLE 3 |** Results of multivariable log-binomial regression: factors associated with receiving contraceptive pills among women.

| | Received contraceptive pills | | Chi-squared *P*-value | Crude PRR (95% CI) | Adjusted PRR* (95% CI) *N*= 4,479 |
|---|---|---|---|---|---|
| | Yes, *N* = 1,239 *n* (%) | No, *N* = 3,247 *n* (%) | | | |
| **Age in years** | | | | | |
| 13–19 | 42 (18.2) | 189 (81.8) | <0.01 | 1.24 (0.85–1.81) | 1.30 (0.82–2.06) |
| 20–24 | 322 (29.0) | 790 (71.0) | | 1.97 (1.50–2.60) | 1.90 (1.37–2.63) |
| 25–29 | 399 (32.6) | 825 (67.4) | | 2.22 (1.69–2.91) | 1.89 (1.38–2.60) |
| 30–34 | 279 (29.0) | 682 (71.0) | | 1.98 (1.50–2.61) | 1.76 (1.28–2.43) |
| 35–39 | 148 (23.7) | 476 (76.3) | | 1.62 (1.20–2.17) | 1.39 (1.00–1.95) |
| 40+ | 49 (14.7) | 285 (85.3) | | Ref | Ref |
| **Marital status** | | | | | |
| Married | 946 (30.6) | 2,146 (69.4) | <0.01 | Ref | Ref |
| Single | 232 (21.2) | 862 (78.8) | | 0.69 (0.61–0.79) | 0.88 (0.76–1.03) |
| Widowed | 61 (20.3) | 239 (79.7) | | 0.66 (0.53–0.84) | 0.80 (0.61–1.05) |
| **Session type** | | | | | |
| Individual | 927 (31.5) | 2,020 (68.5) | <0.01 | Ref | Ref |
| Household | 195 (24.9) | 589 (75.1) | | 0.79 (0.69–0.90) | 0.70 (0.60–0.81) |
| Group | 116 (15.5) | 638 (84.6) | | 0.49 (0.30–0.33) | 0.54 (0.45–0.65) |
| **Family planning usage** | | | | | |
| Ever | 845 (26.1) | 2,399 (73.9) | <0.01 | Ref | N/A, not in final model |
| Never | 392 (31.8) | 842 (68.2) | | 1.22 (1.10–1.35) | |
| **Environmental population served** | | | | | |
| Environmental protection | 248 (17.0) | 1,212 (83.0) | <0.01 | Ref | Ref |
| Natural resource management | 261 (24.7) | 798 (75.4) | | 1.45 (1.24–1.69) | 1.24 (1.00–1.54) |
| Agricultural management | 593 (51.8) | 551 (48.2) | | 3.05 (2.69–3.46) | 2.46 (2.05–2.95) |
| Fisher fork support | 137 (16.5) | 686 (83.4) | | 0.98 (0.81–1.19) | 0.94 (0.73–1.20) |
| **Target populations** | | | | | |
| Farmer/environmental | 830 (33.7) | 1,632 (66.3) | <0.01 | 1.40 (1.05–1.88) | 1.10 (0.78–1.57) |
| Fisher person | 33 (8.9) | 338 (91.1) | | 0.37 (0.24–0.57) | 0.36 (0.22–0.60) |
| Other | 336 (26.8) | 919 (73.2) | | 1.12 (0.83–1.50) | 1.09 (0.77–1.57) |
| Sex worker | 2 (0.8) | 240 (99.2) | | 0.03 (0.01–0.14) | 0.04 (0.01–0.18) |
| Student | 36 (24.0) | 114 (76.0) | | Ref | Ref |

**PRR, Prevalence Rate Ratio; CI, Confidence Interval. Adjusted for all variables shown as well as month of encounter.*

(85.6–91.0%). The agricultural management CBO disseminated environmental-only information at just 12 encounters (0.41%; **Table 5**). Due to the small cell size, modeling of this variable produced wide confidence intervals and large effect sizes. Receiving integrated messaging or reproductive-health-only messaging compared to environmental-only was more likely for women than men (aPRR = 1.85 and aPRR = 2.14, respectively; **Table 6**). Generally, as age increased, the likelihood of integrated messaging increased, and reproductive-health-only messaging decreased. Client encounters with single persons and widows were less likely to receive an integrated or reproductive-health-only message compared to encounters with married clients. Compared to those with previous FP use, clients who had never used FP were less likely to receive integrated or reproductive-health-only messages compared to environmental-only.

## Client Exit Survey

Overall, 87 clients completed the exit interview, representing 12% of the 724 unique clients seen over the 2-month period the exit survey was offered. Participants were more likely to be female (58%) and similar in age (29 compared to 28 years) to the total program population. In general, respondents' reports confirmed program data regarding FP commodities received: 27% contraceptive pills among women, 27% of women with referral for long-term contraception, 75% receiving male condoms among all clients, 91% integrated messaging among all clients. Asked to rate the CBD they worked with, scores ($n$ = 85) ranged from 5 to 10, with median "10" (64% reported "10") and only 9 (11%) reported a score < "8"; all 85 respondents said they would return to this CBD again. Regarding the environmental programs, overall 84% of exit interview respondents reported receiving any environmental commodity

**TABLE 4 |** Results of multivariable log-binomial regression: factors associated with receiving any male condoms.

| | Received male condoms | | Chi-squared *P*-value | Crude PRR (95% CI) | *Adjusted PRR (95% CI) *N* = 10,212 |
|---|---|---|---|---|---|
| | Yes, *N* = 7,439 *n* (%) | No, *N* = 2,798 *n* (%) | | | |
| **Gender** | | | | | |
| Male | 5,385 (93.6) | 368 (6.4) | <0.01 | Ref | Ref |
| Female | 2,054 (45.8) | 2,430 (54.2) | | 0.49 (0.47–0.51) | 0.48 (0.45–0.49) |
| **Age in years** | | | | | |
| 13–19 | 495 (79.8) | 125 (20.2) | <0.01 | 1.00 (0.95–1.05) | 0.92 (0.87–0.98) |
| 20–24 | 1,809 (72.3) | 694 (27.7) | | 0.91 (0.87–0.94) | 0.92 (0.88–0.97) |
| 25–29 | 2,024 (71.2) | 820 (28.8) | | 0.89 (0.86–0.94) | 0.96 (0.92–1.00) |
| 30–34 | 1,409 (70.7) | 585 (29.3) | | 0.89 (0.85–0.92) | 0.99 (0.94–1.03) |
| 35–39 | 884 (70.7) | 367 (29.3) | | 0.89 (0.84–0.93) | 1.00 (0.95–1.05) |
| 40+ | 818 (79.8) | 207 (20.2) | | Ref | Ref |
| **Marital status** | | | | | |
| Married | 4,499 (66.8) | 2,232 (33.2) | <0.01 | Ref | Ref |
| Single | 2,685 (85.6) | 451 (14.4) | | 1.28 (1.25–1.31) | 1.22 (1.19–1.26) |
| Widowed | 255 (68.9) | 115 (31.1) | | 1.03 (0.96–1.11) | 1.28 (1.16–1.40) |
| **Session type** | | | | | |
| Individual | 4,781 (73.8) | 1,702 (26.2) | <0.01 | Ref | N/A, not in final model |
| Household | 789 (51.5) | 742 (48.5) | | 0.70 (0.66–0.74) | |
| Group | 1,868 (84.1) | 353 (15.9) | | 1.14 (1.11–1.17) | |
| **Family planning usage** | | | | | |
| Ever | 5,481 (73.6) | 1,967 (26.4) | <0.01 | Ref | Ref |
| Never | 1,947 (70.1) | 830 (29.9) | | 0.95 (0.93–0.98) | 0.97 (0.94–0.99) |
| **Environmental population served** | | | | | |
| Environmental protection | 1,604 (64.9) | 868 (35.1) | <0.01 | Ref | Ref |
| Natural resource management | 2,468 (82.2) | 536 (17.8) | | 1.27 (1.22–1.31) | 1.20 (1.14–1.25) |
| Agricultural management | 2,013 (67.7) | 961 (32.3) | | 1.04 (1.00–1.08) | 0.99 (0.95–1.04) |
| Fisher fork support | 1,354 (75.8) | 433 (24.2) | | 1.17 (1.12–1.21) | 1.14 (1.09–1.20) |
| **Target populations** | | | | | |
| Farmer/environmental | 4,678 (73.8) | 1,660 (26.2) | <0.01 | 1.00 (0.94–1.08) | 0.96 (0.90–1.03) |
| Fisher person | 599 (82.9) | 124 (17.1) | | 1.13 (1.05–1.22) | 1.18 (1.09–1.27) |
| Other | 1,703 (65.3) | 905 (34.7) | | 0.89 (0.94–1.08) | 0.94 (0.88–1.01) |
| Sex worker | 225 (91.5) | 21 (8.5) | | 1.25 (1.15–1.34) | 1.86 (1.70–2.05) |
| Student | 227 (73.5) | 82 (26.5) | | Ref | Ref |

**PRR, Prevalence Rate Ratio; CI, Confidence Interval. Adjusted for all variables shown as well as month of encounter.*

or referral: 82% water and sanitation, 71% agricultural, 55% agroforestry, and 26% fishing.

## DISCUSSION

Analysis of our PHE program demonstrates that most (89%) clients received integrated FP and environmental messages. Women were more likely than men to receive the integrated messages, but more than half (56%) of clients were men. This is a hallmark of the PHE approach, which has been demonstrated to be an effective method of reaching more men than would have been reached through traditional FP programs, in addition to improving FP uptake and practices (3, 12–14). This is critically important in Kenya and other sub-Saharan countries where men often play a primary decision-making role in the decision to adopt and sustain FP methods, and where men's knowledge is positively associated with female partner FP uptake (15–18). Our analyses identified actionable factors that could lead to improved program outcomes.

Analysis of the program also demonstrated FP integration with (1) male condoms distributed at 73% of client encounters and (2) contraceptive pills distributed at 28% encounters with women. Among women reporting no previous FP practices, 32% received contraceptive pills and this may represent new client coverage, though overall, only 36% of women received contraceptive pills (28%) or were referred for long-term methods (8%). Contraceptive distribution and FP messaging were more likely in individual sessions. This suggests that clients should be

**TABLE 5 |** Bivariate analysis of integrated messaging, $N = 10{,}183$.

| | Message | | |
|---|---|---|---|
| | **Integrated** | **Reproductive-health-only** | **Environmental-only** |
| | ***N* = 9,071** | ***N* = 710** | ***N* = 402** |
| | ***n* (%)** | ***n* (%)** | ***n* (%)** |
| **Gender** | | | |
| Male | 5,093 (89.1) | 351 (6.1) | 275 (4.8) |
| Female | 3,978 (89.1) | 359 (8.0) | 127 (2.8) |
| **Age in years** | | | |
| 13–19 | 516 (84.1) | 70 (11.4) | 27 (4.4) |
| 20–24 | 2,191 (88.2) | 205 (8.3) | 88 (3.5) |
| 25–29 | 2,518 (88.9) | 205 (7.2) | 111 (3.9) |
| 30–34 | 1,784 (90.0) | 124 (6.3) | 75 (3.8) |
| 35–39 | 1,135 (91.1) | 73 (5.9) | 38 (3.1) |
| 40+ | 927 (90.6) | 33 (3.2) | 63 (6.2) |
| **Marital status** | | | |
| Married | 5,990 (89.5) | 454 (6.8) | 250 (3.7) |
| Single | 2,751 (88.2) | 244 (7.8) | 124 (4.0) |
| Widowed | 330 (89.2) | 12 (3.2) | 28 (7.6) |
| **Session type** | | | |
| Individual | 5,678 (88.1) | 509 (7.9) | 259 (4.0) |
| Household | 1,354 (88.8) | 134 (8.8) | 37 (2.4) |
| Group | 2,037 (92.2) | 67 (3.0) | 106 (4.8) |
| **Family planning usage** | | | |
| Ever | 6,738 (90.6) | 442 (6.0) | 254 (3.4) |
| Never | 2,321 (84.8) | 268 (9.8) | 148 (5.4) |
| **Environmental population served** | | | |
| Environmental protection | 2,179 (88.9) | 182 (7.4) | 89 (3.6) |
| Natural resource management | 2,672 (89.4) | 121 (4.1) | 197 (6.6) |
| Agricultural management | 2,693 (91.0) | 254 (8.6) | 12 (0.4) |
| Fisher fork support | 1,527 (85.6) | 153 (8.6) | 104 (5.8) |
| **Target populations** | | | |
| Farmer/environmental | 5,816 (91.9) | 306 (4.8) | 206 (3.3) |
| Fisher person | 653 (90.6) | 11 (1.5) | 57 (7.9) |
| Other | 2,127 (82.8) | 315 (12.3) | 126 (4.9) |
| Sex worker | 215 (87.8) | 27 (11.0) | 3 (1.2) |
| Student | 248 (80.5) | 50 (16.2) | 10 (3.3) |

**TABLE 6 |** Results of multivariable multinomial logistic regression*: factors associated with integrated messaging, $N = 10{,}156$.

| **Variables** | **Integrated vs. environmental-only** | **Reproductive-health-only vs. environmental-only** |
|---|---|---|
| | **Adjusted PRR (95% CI)** | **Adjusted PRR (95% CI)** |
| **Gender** | | |
| Male | Ref | Ref |
| Female | 1.85 (1.46–2.34) | 2.14 (1.61–2.84) |
| **Age in years** | | |
| 13–19 | 1.11 (0.64–1.94) | 2.80 (1.36–5.77) |
| 20–24 | 1.30 (0.90–1.87) | 2.56 (1.50–4.38) |
| 25–29 | 1.25 (0.90–1.75) | 2.18 (1.32–3.61) |
| 30–34 | 1.31 (0.91–1.89) | 2.09 (1.24–3.54) |
| 35–39 | 1.55 (1.01–2.38) | 2.43 (1.34–4.39) |
| 40+ | Ref | Ref |
| **Marital status** | | |
| Married | Ref | Ref |
| Single | 0.89 (0.67–1.18) | 0.74 (0.53–1.05) |
| Widowed | 0.42 (0.27–0.66) | 0.26 (0.12–0.55) |
| **Session type** | | |
| Individual | Ref | Ref |
| Household | 1.42 (0.97–2.08) | 1.39 (0.90–2.14) |
| Group | 1.21 (0.94–1.55) | 0.46 (0.32–0.66) |
| **Family planning usage** | | |
| Ever | Ref | Ref |
| Never | 0.52 (0.41–0.66) | 0.72 (0.54–0.97) |
| **Environmental population served** | | |
| Environmental protection | Ref | Ref |
| Natural resource management | 0.48 (0.34–0.68) | 0.64 (0.41–0.99) |
| Agricultural management | 9.05 (4.62–17.7) | 16.5 (8.11–33.6) |
| Fisher fork support | 0.58 (0.42–0.80) | 1.27 (0.86–1.87) |
| **Target populations** | | |
| Farmer/environmental | 1.52 (0.73–3.17) | 0.46 (0.21–1.02) |
| Fisher person | 0.66 (0.30–1.44) | 0.06 (0.02–0.17] |
| Other | 0.73 (0.35–1.55) | 0.69 (0.31–1.55) |
| Sex worker | 2.00 (0.51–7.84) | 2.55 (0.60–10.9) |
| Student | Ref | Ref |

**Observation-level analysis with cluster-based variance estimation at level of individual.*

offered options for session type (individual, group, household) or set aside times for individual consultation during group sessions to reduce barriers for sensitive topics. Some target populations were less likely to receive contraception (e.g., fisher folk, sex workers). While some CBDs and program staff reported anecdotally that most sex workers were already receiving FP commodities, it is unclear why fisher folk women were less likely to receive contraceptive pills. There are numerous factors associated with uptake of contraceptives among women, and a broad literature review finds one key factor is the role of the male sex partner (19). Male partner support increases the uptake of contraceptives, and conversely, lack of partner approval can reduce the odds of contraceptive uptake (20–22), which we confirm in our study of couples in Kisumu, Kenya (23). Thus, in the current study, this may also contribute to explanation of lower uptake among women in household or group sessions, if their partners were not supportive.

Across the three CBOs and one NGO, there was substantial variability in the distribution of oral contraceptives (at 17–52% of encounters) and male condoms (at 65–82% of encounters), though integrated messaging was conducted consistently (at 86–91% of encounters). Though we did not collect this information

as analyzable data, the main programmatic challenge reported by CBDs was erratic supplies of the FP commodities ("stockouts"). Stakeholder meetings between program staff and health facility staff identified recommendations to reduce stockouts: improved logistics and planning at the facility level, expanded budgeting at the county and national level, and strongly prioritizing consistent supply of FP commodities to reduce negative impacts on health. These recommendations are in keeping with studies demonstrating the impact of improved budgeting, planning, and logistics on reducing FP commodities stockouts (24, 25). Organizational or community characteristics may have impacted success in achieving program indicators. Previous PHE evaluations associate success with shared understanding and partnership with Ministry of Health workers, social marketing and support from local social institutions, inclusion of both male and female CBDs and younger PHE practitioners to appeal to adolescents and young adults (14, 26). In the future, measuring organizational level factors such as these and provision of interim assessment and feedback may mitigate sub-optimal distribution of commodities.

### Limitations, Strengths, and Recommendations

Our client encounter log lacked some measures that would enable more intensive evaluation of the program. USAID guidance for monitoring and evaluating PHE programs (27) recommends several individual and community level measures of population (e.g., percent of reproductive age women who were clients of a community-based distributor, outcomes of referrals), health (e.g., percent of households with improved water, sanitation and hygiene), environment (e.g., percent of farmers/fishers who adopt improved agricultural/marine practices), and integration indicators (e.g., percent of population within a target/project area receiving all three PHE elements) to evaluate effectiveness, though this requires long-term monitoring and resource investment in capturing these measures. In addition, the encounter logs only captured quantitative data and our results do not provide qualitative data to contextualize the findings. Future studies should include measures of quality and quantity of messaging, satisfaction with messaging and contraceptives, as well as additional characteristics of individuals, which could directly foster program improvement. Because of the large scale of the program, we recommend monitoring a small proportion of randomly selected clients to validate program indicators at the individual level. A strength of our program is that we measured integrated messaging, capture of non-traditional audiences, and the number of PHE educational sessions provided in the target community. Our exit survey confirmed high levels of referral and commodities distribution for environmental programming. In keeping with the goals of PHE, we created new partnerships that linked organizations from different sectors. Given that PHE programs already have demonstrated effectiveness, we did not make use of a control area; rather, our goal was to implement a PHE program on a community scale. To observe the impact on fertility practices of this PHE program and others like it, we recommend sustained programming with population level surveillance, preferably capitalizing on existing Demographic Health Surveys.

## CONCLUSIONS

The SHAPE-LVB program demonstrated community-level scale-up integrating FP commodities distribution and messaging into routine environmental conservation. Program outcomes may be strengthened by tailoring the session types, increased mobilization of integrated services among men, widows, and those without prior FP, and assessment of organization-level barriers and facilitators.

## DATA AVAILABILITY STATEMENT

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

## ETHICS STATEMENT

The analysis of SHAPE-LVB program data was determined exempt (did not meet the definition of human subject research) by the University of Illinois at Chicago School of Public Health.

## AUTHOR CONTRIBUTIONS

EO, MO, HW, and DO were involved in program design. EO provided program oversight and drafted the manuscript. EO, KS, DO, and SM contributed to the design of exit survey measures. SM designed and advised on the statistical analysis. KS conducted statistical analyses and table preparation and presentation of data, and wrote statistical analysis section of manuscript. MO and HW provided quality control and developed and conducted trainings. GO led design and implementation of all data capture and performed data cleaning and coordination. All authors contributed to the article and approved the submitted version.

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## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fgwh.2021.559297/full#supplementary-material

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# Demand for Family Planning Satisfied With Modern Methods in Urban Malawi: CHAID Analysis to Identify Predictors and Women Underserved With Family Planning Services

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**Introduction:** Family planning progress under the SDGs is measured with a novel indicator, demand for family planning satisfied with modern methods (mDFPS), which provides a better indication of modern contraceptive coverage than unmet need and contraceptive prevalence rate. Yet, few studies have examined the predictors of mDFPS and the sub-groups of women with unsatisfied mDFPS in urban Saharan Africa. The objective of this study was to examine the predictors of mDFPS in urban Malawi and to identify the sub-groups of urban women underserved with modern contraceptives.

**Methods:** The study analysed data from the 2015–16 Malawi Demographic and Health survey. The sample was comprised of 2,917 women in urban Malawi who had a demand for family planning services. We used a Chi-square ($\chi^2$) Automatic Interaction Detector (CHAID) model to address the study objectives.

**Results:** The results show that the number of living children a woman had was the most significant predictor of mDFPS. Women with one or more children, who were of Chewa, Lomwe, or Tumbuka ethnic origin and who resided in the central region had the highest mDFPS (87%). On the other hand, women with no children, and who were not exposed to FP information on television, had the lowest mDFPS (41%). Among women in union, ethnicity was the best predictor of mDFPS. Ngoni, Yao, and other ethnic minority women in union who were aged 15–19 and 40 years and above and those who were Catholic, SDA/Baptist, or Muslim had the lowest mDFPS (36%).

**Conclusion:** This study demonstrates significant intra-urban disparities in demand for FP satisfied with modern contraceptives in Malawi. There is a need for policymakers and reproductive health practitioners to recognise these disparities and to prioritise the underserved groups identified in this study.

**Keywords: demand for family planning satisfied with modern methods, urban, Malawi, CHAID, underserved women**

## INTRODUCTION

Modern contraceptive use is effective for preventing unplanned pregnancies and helping individual women and couples to decide freely and responsibly if, when, and how many children they want to have (1, 2). Since the adoption of the Programme of Action of the International Conference on Population and Development (ICPD PoA) in 1994, the provision of safe, effective, and affordable methods of contraception has been an integral part of the efforts to promote sexual and reproductive health and empower women and girls, particularly in Low- and Middle-Income Countries (LMIC) (3). Access to modern contraceptives has also been shown to contribute to poverty reduction through improvement in educational outcomes and economic opportunities for women and girls (4–6). Given these extensive benefits, the global community and many national governments have, over the years, undertaken policy actions and made investments to increase access to family planning (FP) services. These efforts, including the Sustainable Development Goals (SDGs), the FP2020 Initiative, and the Maputo Protocol, have resulted in significant increases in contraceptive use in many parts of the world, with the global contraceptive prevalence rate increasing from 35% in 1970 to 63% in 2017 (1). Even though contraceptive use in Africa has increased steadily, prevalence is still only 36%, which is about half of the global average (1).

To monitor progress in contraceptive coverage, several indicators and measures have been adopted under various global development initiatives including contraceptive prevalence rate (CPR) and unmet need for FP. Contraceptive prevalence rate and unmet need were the main FP indicators used to measure progress in target 5B of the Millennium Development Goals (MDGs), to "achieve, by 2015, universal access to reproductive health." While these indicators remain useful, progress in FP targets under the SDGs is being measured with a novel indicator, demand for FP satisfied with modern contraceptive methods (mDFPS). This indicator is defined as the proportion of women using modern contraceptives among those in need of contraception (7, 8). Compared to unmet need and contraceptive prevalence, mDFPS provides a better indication of modern contraceptive coverage as the denominator for its estimation is limited to sexually active women of reproductive age in need of contraception (7).

Despite providing a better indication of modern contraceptive coverage and being the main FP indicator for measuring progress in the SDGs, very few studies have examined the predictors of mDFPS within LMICs and the women whose demand for FP is not being satisfied with modern methods (7, 9). Many of the studies on mDFPS have focused on macro-level analysis at the global level, among LMICs, and also at the sub-Saharan African regional level (1, 2, 7, 8, 10). The few studies at the country level have focused on rural areas where the mDFPS coverage is generally low (9). To the best of our knowledge, no study to date has examined mDFPS in an urban setting in sub-Saharan Africa where contraceptive coverage is fairly high relative to rural areas. Yet, such a study will contribute to understanding intra-urban disparities in modern contraceptive coverage and the categories of urban women whose demand for FP is not being satisfied with modern methods. With the majority of Africa's population projected to live in urban areas by 2050 (11), understanding and addressing intra-urban disparities in mDFPS will be critical for managing the adverse effects of having so many urban dwellers. Urban populations are also more diverse in terms of ethnicity, education, wealth, etc. than rural areas; therefore disparities in mDFPS are wide and complex.

This study examines mDFPS in an urban setting in sub-Saharan Africa, i.e., Malawi. The study will help policymakers and reproductive health practitioners in Malawi to identify and prioritise urban women underserved with modern contraceptives, in the spirit of "leaving no one behind." The study has two specific objectives: (a) examine the predictors of mDFPS in urban Malawi and (b) identify the sub-groups of urban women whose demand for FP is not being satisfied with modern contraceptives.

## CONTRACEPTIVE USE CONTEXT IN URBAN MALAWI

The Republic of Malawi is a landlocked country in southeast Africa, with an estimated population of 17.5 million in 2018 (12). The National Statistical Office (NSO) of Malawi defines urban areas on the basis of concentration of non-agricultural activities such as trading and manufacturing, population density, level of service delivery, and a minimum total population of 5,000 people (13). It is estimated that 16% of the total population of Malawi lives in urban areas, making it one of the least urbanised countries in the world (12, 14). Nevertheless, the country is urbanising rapidly at a rate of 4.2%, higher than the average for sub-Saharan Africa (15). The urban population has been projected to reach 12.4 million by 2050, from 2.7 million in 2014 (15). Malawi's urban population is concentrated in four major cities—Blantyre, Lilongwe, Mzuzu, and Zomba—which account for 75% of the urban population (12). The rapid urbanisation in Malawi is mainly driven by high fertility in urban areas and rural-urban migration. For example, the mean number of children ever born to women age 40–49 years in urban areas is 4.6 children (16).

Even though urban infrastructure and service provision in Malawi is less developed compared to countries such as Kenya and South Africa, the urban population still has better access to social services relative to their rural counterparts. For example, 42% of the urban population has access to electricity compared to just 4% in rural areas (17). Urban residents also have better access to healthcare services including reproductive health compared to rural residents. For instance, while the urban population makes up 16% of the total population, 40% of private health facilities are located there and a further 13% in peri-urban areas, with just 47% in rural areas (18). These rural-urban disparities in access to critical social services especially healthcare translate into an urban advantage in access to modern contraceptives. Approximately 78% of demand for FP among married women in urban areas is satisfied with modern methods compared to

**Abbreviations:** mDFPS, Demand for Family Planning Satisfied with Modern Methods; CHAID, Chi-square ($\chi^2$) Automatic Interaction Detector.

74% in rural areas (16). However, this apparent urban advantage represents aggregate levels that mask intra-urban differentials. Yet, little is known of the disparities in demand for FP satisfied with modern methods in urban Malawi. This study, therefore, sought to fill this knowledge gap and to help policymakers and reproductive health practitioners to identify the predictors of mDFPS and the sub-groups of urban women whose demand for FP remains unsatisfied with effective modern methods.

# METHODS

## Study Design and Data

The current study analysed data from the 2015–16 Malawi Demographic and Health Survey (16). This was a nationally representative survey conducted by NSO in collaboration with the DHS Programme. A two-stage stratified sampling technique was used to select a total of 25,146 eligible women for the survey. A detailed description of the sampling procedure for the survey is available in the final report of the survey (16). Of the 25,146 women eligible to be interviewed, 24,562 were actually interviewed. This comprised 5,247 women in urban areas and 19,315 in rural areas. In this paper, we analysed data from a sub-sample of 2,917 urban women who had a demand for family planning. This sample was made of 2,371 women currently in union (married/living with a partner) and 546 unmarried (never married/formerly married) women who had sex 1 month preceding the survey. For the bivariate analysis, we weighted the data to take into account unequal sampling probabilities, and we also took into account the complexity (clustering and stratification) of the DHS sampling design. In DHS surveys, the sample is usually selected with unequal probability to expand the number of cases available for certain areas or population sub-groups for which data is needed. Weights, therefore, need to be applied when tabulations are made to produce an accurate representation.

## Study Variables

The dependent variable for this study was the demand for family planning satisfied with modern contraceptives (mDFPS). This variable (mDFPS) was calculated based on the 2012 update of the indicator definition by MEASURE DHS (19). The numerator for mDFPS was the number of reproductive age women, who were either married or unmarried but reported sexual intercourse in the 1 month preceding the survey, and who were currently using any modern contraceptive method. The denominator was the total number of women in need of contraception. The women in need of contraception included the following:

a. Fecund women who wanted the next child after 2 years
b. Fecund women who wanted another child but were undecided on the timing or were undecided if they want another child
c. Fecund women who wanted no more children
d. Pregnant women who wanted the pregnancy later or did not want it at all
e. Post-partum amenorrheic women who wanted their last birth later or did not want it at all

Women were classified as infecund and therefore did not need contraceptive if they fell into the following categories:

a. Married for 5 or more years, had no children in the past 5 years, and never used contraception
b. Reported that they could not get pregnant
c. Reported that they were menopausal/hysterectomy or never menstruated
d. Had last period more than 6 months and are not post-partum amenorrheic

Modern contraceptive methods in this study included contraceptive pills, intrauterine devices (IUD), injectables, condoms (male and female), sterilisation (male and female), implants, and emergency contraceptives. It is important to note that while Standard Days Method and Lactational Amenorrhea are considered modern methods by the World Health Organisation (WHO) and the Demographic and Health Survey (DHS), we excluded these two methods from our definition of modern methods in this study. We limited our definition of modern methods to biomedical methods that are actively being promoted in Malawi's family policies such as in the Costed Implementation Plan (20). Because the use of these two methods is very negligible (<0.5%) in the sample, excluding them from the definition of modern methods did not affect our measurement and analysis in any way.

We classified the dependent variable into two categories (Yes/No): women using biomedical modern contraceptive methods among those in need of contraception were considered to have a demand for FP satisfied with modern methods (Yes) while those not using any method and those using traditional methods including periodic abstinence, withdrawal, standard days method and lactational amenorrhea among those in need of contraception were considered to have an unsatisfied mDFPS (No).

The predictor variables included socio-demographic and reproductive characteristics of the women as well as characteristics of their partners for those in union (**Tables 1**, **2**). These characteristics included age, number of living children, highest educational attainment, wealth quintile, religious affiliation, ethnicity, region of residence, employment status, and exposure to family planning information on radio, TV, in newspapers/magazines, or at health facilities. For the women in union, we also included as predictors the age at first marriage, age difference with their partners, partner's highest education, partner's employment status, and the partner's fertility preference.

## Statistical Analysis

We used descriptive statistics (percentages) to assess the dependent (mDFPS) and predictor variables that were used for the Pearson's $\chi^2$ and the $\chi^2$ Automatic Interaction Detector (CHAID) analyses. Pearson's $\chi^2$ test was performed to examine the associations between mDFPS and key background characteristics of the women. CHAID analysis was then used to examine the significant predictors of mDFPS, and to identify the subgroups of urban women whose demand for FP remains unsatisfied with effective modern methods. CHAID is a

**TABLE 1 |** Socio-demographic characteristics of women with demand for FP in Malawi.

| Socioeconomic and demographic characteristics | Percent (%) | | Urban number |
|---|---|---|---|
| | National weighted | Urban weighted | |
| **Demand for FP satisfied with modern methods** | | | |
| Yes | 73.9 | 76.2 | 2,229 |
| No | 26.1 | 23.8 | 688 |
| **Age groups** | | | |
| 15–19 | 9.2 | 7.5 | 242 |
| 20–24 | 21.6 | 19.1 | 574 |
| 25–29 | 19.3 | 22.0 | 648 |
| 30–34 | 19.1 | 21.6 | 573 |
| 35–39 | 15.4 | 15.5 | 452 |
| 40–44 | 9.5 | 9.7 | 273 |
| 45–49 | 6.0 | 4.7 | 155 |
| **Highest education** | | | |
| No education | 13.1 | 4.3 | 140 |
| Primary | 64.3 | 41.8 | 1,295 |
| Secondary | 20.1 | 43.1 | 1,233 |
| Higher | 2.5 | 10.8 | 249 |
| **Wealth quintile** | | | |
| Poorest | 19.8 | 19.5 | 708 |
| Poorer | 20.6 | 20.0 | 567 |
| Middle | 20.5 | 20.8 | 550 |
| Richer | 19.9 | 20.3 | 571 |
| Richest | 19.2 | 19.3 | 521 |
| **Religion** | | | |
| Catholic | 18.0 | 17.1 | 483 |
| CCAP | 16.8 | 21.6 | 592 |
| Anglican | 2.5 | 3.2 | 140 |
| Seventh day adventist/baptist | 6.6 | 8.4 | 249 |
| Other christian | 43.7 | 40.0 | 1,121 |
| Muslim | 11.7 | 9.2 | 320 |
| No religion | 0.6 | 0.4 | 11 |
| Other | 0.1 | 0.0 | 1 |
| **Ethnicity** | | | |
| Chewa | 35.8 | 24.5 | 715 |
| Tumbuka | 9.1 | 10.4 | 339 |
| Lomwe | 19.5 | 20.8 | 543 |
| Yao | 12.4 | 13.4 | 338 |
| Ngoni | 11.5 | 17.3 | 453 |
| Other | 11.7 | 13.7 | 529 |
| **Region** | | | |
| Northern | 11.8 | 10.3 | 604 |
| Central | 43.4 | 45.4 | 1,011 |
| Southern | 44.9 | 44.4 | 1,302 |
| **Employment status** | | | |
| Employed | 68.4 | 60.4 | 1,806 |
| Unemployed | 31.6 | 39.6 | 1,111 |
| **Marital status** | | | |
| Never in union | 5.9 | 9.3 | 276 |
| Currently married | 83.8 | 80.9 | 2,371 |
| Formerly in union | 10.4 | 9.8 | 270 |
| **Number of living children** | | | |
| No child | 5.4 | 7.3 | 226 |
| 1–2 children | 36.9 | 47.2 | 1,303 |
| 3–4 children | 33.1 | 32.6 | 965 |
| 5+ children | 24.6 | 12.8 | 423 |
| **Exposure to FP information on radio** | | | |
| Yes | 42.9 | 57.7 | 1,764 |
| No | 57.1 | 42.3 | 1,153 |
| **FP information on TV** | | | |
| Yes | 10.0 | 31.0 | 863 |
| No | 90.0 | 69.0 | 2,054 |
| **FP information in newspaper/magazine** | | | |
| Yes | 8.8 | 20.1 | 586 |
| No | 91.2 | 79.9 | 2,331 |
| **FP information by text messages** | | | |
| Yes | 5.7 | 14.0 | 360 |
| No | 94.3 | 86.0 | 2,557 |
| **FP information in health facility** | | | |
| Yes | 23.5 | 23.5 | 912 |
| No | 39.2 | 39.2 | 1,103 |
| Did not visit a health facility | 37.3 | 37.2 | 902 |

*Source: Malawi Demographic and Health Survey, 2015–16.*

methodological approach that is rarely used in family planning research. However, as a predictive model that outlines variables that have the strongest impact on group differentiation, CHAID is more sophisticated than conventional logistic regression which is often used in family planning studies. CHAID analysis also allows for the identification of characteristics that define groups and sub-groups (21, 22). It is these advantages of CHAID that informed the decision to use it, as it is more appropriate for the objectives of this study.

CHAID is a non-parametric and non-linear decision tree algorithm that makes no distributional assumption on outliers, collinearities, heteroscedasticity, or distributional error structures. The dependent variable in CHAID analysis can be nominal, ordinal, or interval. Unlike regression models where statistical effects are fitted simultaneously, CHAID uses a sequential fitting method where the effects of later statistical tests are dependent on earlier ones. At each stage in this sequence, the predictor variable(s) with the strongest association to the dependent variable is selected. The process continues until all significant predictors have been identified. The predictor

**TABLE 2 |** Socio-demographic characteristics of married women with demand for FP in Malawi.

| Socioeconomic and demographic characteristics | Percent (%) | | Urban number |
|---|---|---|---|
| | National weighted | Urban weighted | |
| **Demand for FP satisfied with modern methods** | | | |
| Yes | 74.5 | 77.4 | 1,827 |
| No | 25.5 | 22.6 | 544 |
| **Age groups** | | | |
| 15–19 | 5.9 | 3.3 | 101 |
| 20–24 | 21.5 | 18.2 | 431 |
| 25–29 | 20.4 | 23.9 | 568 |
| 30–34 | 20.1 | 22.5 | 496 |
| 35–39 | 15.8 | 16.8 | 405 |
| 40–44 | 10.1 | 10.5 | 239 |
| 45–49 | 6.2 | 4.9 | 131 |
| **Highest education** | | | |
| No education | 13.5 | 4.3 | 120 |
| Primary | 65.1 | 42.0 | 1,070 |
| Secondary | 19.1 | 43.1 | 982 |
| Higher | 2.3 | 10.6 | 199 |
| **Wealth quintile** | | | |
| Poorest | 18.6 | 19.8 | 575 |
| Poorer | 21.0 | 20.7 | 468 |
| Middle | 20.9 | 21.7 | 444 |
| Richer | 20.4 | 20.4 | 462 |
| Richest | 19.2 | 17.4 | 422 |
| **Religion** | | | |
| Catholic | 17.5 | 16.1 | 383 |
| CCAP | 17.1 | 22.3 | 491 |
| Anglican | 2.4 | 2.7 | 100 |
| Seventh day adventist (SDA)/baptist | 6.8 | 8.8 | 208 |
| Other christian | 44.1 | 40.0 | 916 |
| Muslim | 11.6 | 9.6 | 263 |
| No religion | 0.5 | 0.5 | 9 |
| Other | 0.1 | 0.0 | 1 |
| **Ethnicity** | | | |
| Chewa | 36.4 | 23.7 | 587 |
| Tumbuka | 9.7 | 10.9 | 289 |
| Lomwe | 18.5 | 20.6 | 422 |
| Yao | 12.0 | 13.6 | 264 |
| Ngoni | 11.5 | 17.2 | 382 |
| Other | 11.8 | 14.1 | 427 |
| **Region** | | | |
| Northern | 12.5 | 11.0 | 508 |
| Central | 44.3 | 45.7 | 839 |
| Southern | 43.2 | 43.4 | 1,024 |
| **Employment status** | | | |
| Employed | 68.8 | 61.0 | 1,501 |
| Unemployed | 31.2 | 39.0 | 870 |
| **Age at first marriage** | | | |
| <18 years | 50.8 | 37.0 | 952 |
| 18–24 years | 45.3 | 54.1 | 1,261 |
| 25+ years | 3.9 | 8.8 | 158 |
| **Number of living children** | | | |
| No child | 1.9 | 1.5 | 49 |
| 1–2 children | 37.3 | 49.3 | 1,085 |
| 3–4 children | 34.6 | 35.9 | 869 |
| 5+ children | 26.2 | 13.3 | 368 |
| **FP information on radio** | | | |
| Yes | 55.9 | 59.3 | 1,479 |
| No | 44.1 | 40.7 | 892 |
| **FP information on TV** | | | |
| Yes | 10.0 | 31.2 | 718 |
| No | 90.0 | 68.8 | 1,653 |
| **FP information in newspaper/magazine** | | | |
| Yes | 8.3 | 19.5 | 473 |
| No | 91.7 | 80.5 | 1,898 |
| **FP information by text messages** | | | |
| Yes | 5.7 | 14.5 | 305 |
| No | 94.3 | 85.5 | 2,066 |
| **FP information in health facility** | | | |
| Yes | 34.3 | 25.5 | 798 |
| No | 35.9 | 40.3 | 903 |
| Did not visit a health facility | 29.8 | 34.2 | 670 |
| **Age difference** | | | |
| 1–4 years | 43.4 | 41.0 | 973 |
| 5–9 years | 33.8 | 38.6 | 890 |
| 10/more years | 14.7 | 14.5 | 380 |
| Same age | 4.0 | 3.2 | 62 |
| Wife older | 4.1 | 2.8 | 66 |
| **Husband's education** | | | |
| No education | 9.3 | 2.3 | 72 |
| Primary | 54.2 | 26.1 | 693 |
| Secondary | 30.1 | 52.7 | 1,188 |
| Higher | 5.3 | 18.2 | 393 |
| Don't know | 1.1 | 0.7 | 25 |
| **Husband's employment** | | | |
| Unemployed | 8.6 | 3.2 | 112 |
| Employed | 90.6 | 96.3 | 2,240 |
| Don't know | 0.8 | 0.6 | 19 |
| **Husband's fertility desire** | | | |
| Both want same | 59.7 | 65.5 | 1,317 |
| Husband wants more | 18.0 | 15.6 | 354 |
| Husband wants fewer | 9.9 | 9.8 | 155 |
| Don't know | 12.4 | 9.1 | 208 |

*Source: Malawi Demographic and Health Survey, 2015–16.*

variable with the strongest association to the dependent variable is usually the first branch in a tree-like model, with leaves representing categories that are significantly different relative to the dependent variable. The dataset is then further categorised into subgroups according to this first predictor variable, with the most significant combination of variables selected.

The output of a CHAID prediction model is a hierarchical tree-like diagram, which consists of several levels of branches referred to as nodes: root node, parent node, child nodes, and terminal nodes. Node splitting is obtained by selecting and using the predictor variable with the most significant *p*-value as a node separator in each stage of the analysis. This is done by comparing *p*-values of each predictor variable in the previous stage. This process of node splitting continues until there is no predictor variable with the most significant *p*-value (21). The root node (node 0) is the dependent variable, in this study mDFPS. Parent nodes are in the upper level of the hierarchical structure compared to nodes in the subsequent lower levels. The lower level nodes are referred to as child nodes while terminal nodes are the last categories of the CHAID analysis tree. Terminal nodes do not have child nodes. Each node provides the number and percentage of people in a selected category or subgroup. Chi-square statistics and *p*-values associated with a statistical test at each level of the CHAID model are also calculated and presented in the tree-structured diagram. The *p*-values in this analysis were adjusted using a Bonferroni correction, meaning the level of significance has been corrected for the several tests of independence performed simultaneously between the predictor variables and the outcome (21). Using Bonferroni correction to adjust *p*-values reduces the likelihood of committing a type I error. All analyses for this paper were conducted using SPSS V.20.

# RESULTS

## Description of Women in Need of Contraception in Malawi, Nationally and in Urban Areas

**Table 1** presents the characteristics of all women with a demand for contraception nationally and in urban areas of Malawi. Nationally, ∼74% of women with demand for contraception were using modern methods. Demand for FP satisfied with modern methods was slightly higher in urban areas, with a little over three-quarters of the urban women using modern methods. The mean age of women with demand for contraception nationwide and in urban areas was similar: 30 years. The level of education of urban women with demand for FP was higher than the level nationally, with 4% of the urban women having no education compared to 13% nationwide. However, the percentage of unemployed women in urban areas (39.6%) was higher than the percentage nationwide (31.6%). The percentage of women with no children in urban areas was higher than the percentage nationally. About 13% of the urban women had five or more children compared to a quarter of all women in Malawi. The proportion of urban women exposed to FP information on radio, TV, in newspapers/magazines, or at health facilities was higher in urban areas than the proportion nationwide.

Given that marriage and sexual unions affect contraceptive use in various ways including through spousal influence, we anticipated that the predictors of mDFPS may be different for women in union. We therefore also conducted analyses with the sub-sample of women in union. **Table 2** presents the characteristics of women in sexual unions with demand for contraception nationally and in urban areas. Nationwide, approximately three-quarters of married women with demand for contraception were using modern methods. The percentage of married women in urban areas with demand for contraception using modern methods was slightly higher (77%) than nationally. More than half (51%) of the women in union nationally entered into their first union as children (below age 18 years) while 37% of the urban women in union were married as children. Approximately 60% of women nationwide had the same fertility preference as their partners compared to two-thirds of urban women. As high as 12% of married women with demand for contraception nationally did not know the fertility preference of their partners. Among married women in urban areas, that figure was 9%.

## Factors Associated With Demand for FP Satisfied With Modern Methods in Urban Malawi

**Table 3** presents the factors associated with demand for FP satisfied with modern methods among all women in urban Malawi. The results showed that seven factors were significantly associated with mDFPS; age, ethnicity, region, marital status, employment status, number of living children, and exposure to FP information in a health facility.

Demand for FP satisfied with modern methods was high among women aged 25–29 years (79%) and low among women aged 15–19 years (63%) and those aged 40–44 years (68%). With regards to ethnicity, mDFPS was higher among Chewa (82%), Lomwe (79%), and Tumbuka (79%) women and lower among Yao (70%), Ngoni (71%), and other minority women (71%). mDFPS was higher among women in the central region (79%) and lower in the northern region (70%). Women who had never been in a marital union (59%) had a lower mDFPS compared with those that were currently in union and those formerly married. Furthermore, 79% of women in employment had their demand for FP satisfied with modern methods compared with 72% among unemployed women. Moreover, mDFPS was highest among women with one or two children (79%) and very low among those with no children (49%). Contrary to expectation, mDFPS was higher among women that did not receive FP information in a health facility and lower among those that received such information in a health facility and those that did not visit health a facility.

## Results of CHAID Analysis for All Urban Women With Demand for Contraception

**Figure 1** presents results of the CHAID analysis for all urban women with a demand for contraception. The results showed that the number of living children a woman had was the most significant predictor of mDFPS ($X^2 = 75.56$, $p = 0.000$). This

**TABLE 3 |** Association between mDFPS and socio-demographic and reproductive characteristics of all urban women in Malawi.

| Background characteristics | Demand for FP satisfied with modern contraceptives | | | |
|---|---|---|---|---|
| **Age** | **Yes (%)** | **No (%)** | **$\chi^2$** | ***p*-value** |
| 15–19 | 62.5 | 37.5 | | |
| 20–24 | 78.9 | 21.1 | | |
| 25–29 | 79.2 | 20.8 | | |
| 30–34 | 78.7 | 21.3 | 40.58 | 0.023 |
| 35–39 | 76.8 | 23.2 | | |
| 40–44 | 68.1 | 31.9 | | |
| 45–49 | 77.0 | 23.0 | | |
| **Highest education** | | | | |
| No education | 79.2 | 20.8 | | |
| Primary | 79.4 | 20.6 | 15.09 | 0.168 |
| Secondary | 74.3 | 25.7 | | |
| Higher | 70.8 | 29.2 | | |
| **Wealth quintile** | | | | |
| Poorest | 77.2 | 22.8 | | |
| Poorer | 77.5 | 22.5 | | |
| Middle | 77.3 | 22.7 | 4.15 | 0.714 |
| Richer | 73.2 | 26.8 | | |
| Richest | 76.1 | 23.9 | | |
| **Religion** | | | | |
| Catholic | 73.3 | 26.7 | | |
| CCAP | 79.4 | 20.6 | | |
| Anglican | 80.3 | 19.7 | 21.59 | 0.136 |
| SDA/Baptist | 70.8 | 29.2 | | |
| Other Christian | 78.2 | 21.8 | | |
| Muslim | 68.8 | 31.2 | | |
| **Ethnicity** | | | | |
| Chewa | 82.3 | 17.7 | | |
| Tumbuka | 79.4 | 20.6 | | |
| Lomwe | 79.4 | 20.6 | 41.72 | 0.011 |
| Yao | 70.2 | 29.8 | | |
| Ngoni | 70.7 | 29.3 | | |
| Other | 71.2 | 28.8 | | |
| **Region** | | | | |
| Northern | 69.8 | 30.2 | | |
| Central | 79.2 | 20.8 | 14.76 | 0.006 |
| Southern | 74.7 | 25.3 | | |
| **Marital status** | | | | |
| Never in union | 59.0 | 41.0 | | |
| Currently married | 77.4 | 22.6 | 54.68 | 0.000 |
| Formerly married | 83.5 | 16.5 | | |
| **Employment status** | | | | |
| Employed | 78.8 | 21.2 | 16.67 | 0.007 |
| Unemployed | 72.3 | 27.7 | | |
| **Number of living children** | | | | |
| No child | 48.9 | 51.1 | | |
| 1–2 children | 78.7 | 21.3 | 95.33 | 0.000 |
| 3–4 children | 78.5 | 21.5 | | |
| 5+ children | 77.0 | 23.0 | | |
| **FP information on radio** | | | | |
| Yes | 74.6 | 25.5 | 6.24 | 0.084 |
| No | 78.5 | 21.5 | | |
| **FP information on TV** | | | | |
| Yes | 76.5 | 23.5 | 0.05 | 0.881 |
| No | 76.1 | 23.9 | | |
| **FP information in newspaper** | | | | |
| Yes | 77.0 | 23.0 | 0.22 | 0.757 |
| No | 76.1 | 23.9 | | |
| **FP information via text message** | | | | |
| Yes | 72.1 | 27.9 | 4.48 | 0.227 |
| No | 76.9 | 23.1 | | |
| **FP information in health facility** | | | | |
| Yes | 73.5 | 26.5 | | |
| No | 80.4 | 19.6 | 18.10 | 0.030 |
| Did not visit facility | 73.6 | 26.4 | | |

variable was spilt into two nodes. Node 1 consisted of women with one or more living child, while node 2 was made of women with no children.

## Node 1: Women With One or More Children

For this subgroup of women who constituted ∼93% of the sample, ethnicity was the strongest predictor of mDFPS ($X^2 = 30.60$, $p = 0.000$). About 79% of the demand for FP among these women was satisfied with modern methods. The next most important variable for this group of women, ethnicity, was spilt into subgroups: Chewa, Tumbuka, and Lomwe (node 3) and Ngoni, Yao, and Other (node 4). Women in the Chewa, Tumbuka, and Lomwe subgroup (node 3) had 84% of their demand for FP satisfied with modern contraceptives. However, those in the Ngoni, Yao, and other ethnic groups had 73% of their demand for FP satisfied with modern methods. For women in the Chewa, Tumbuka, and Lomwe subgroup, region of residence was the next best predictor of mDFPS ($X^2 = 13.30$, $p = 0.001$). Women in the northern and southern regions (node 7) had 79% of their FP demand satisfied with modern methods compared to 87% among those in the central region.

Among Ngoni, Yao, and women of other minority ethnic groups, exposure to FP information via text messages on phone was the strongest predictor of mDFPS ($X^2 = 16.04$, $p = 0.000$). Only about 58% of the women who received FP information via text messages on their phones (node 9) had their demand for FP satisfied with modern methods compared to ∼76% of those that did not (node 10).

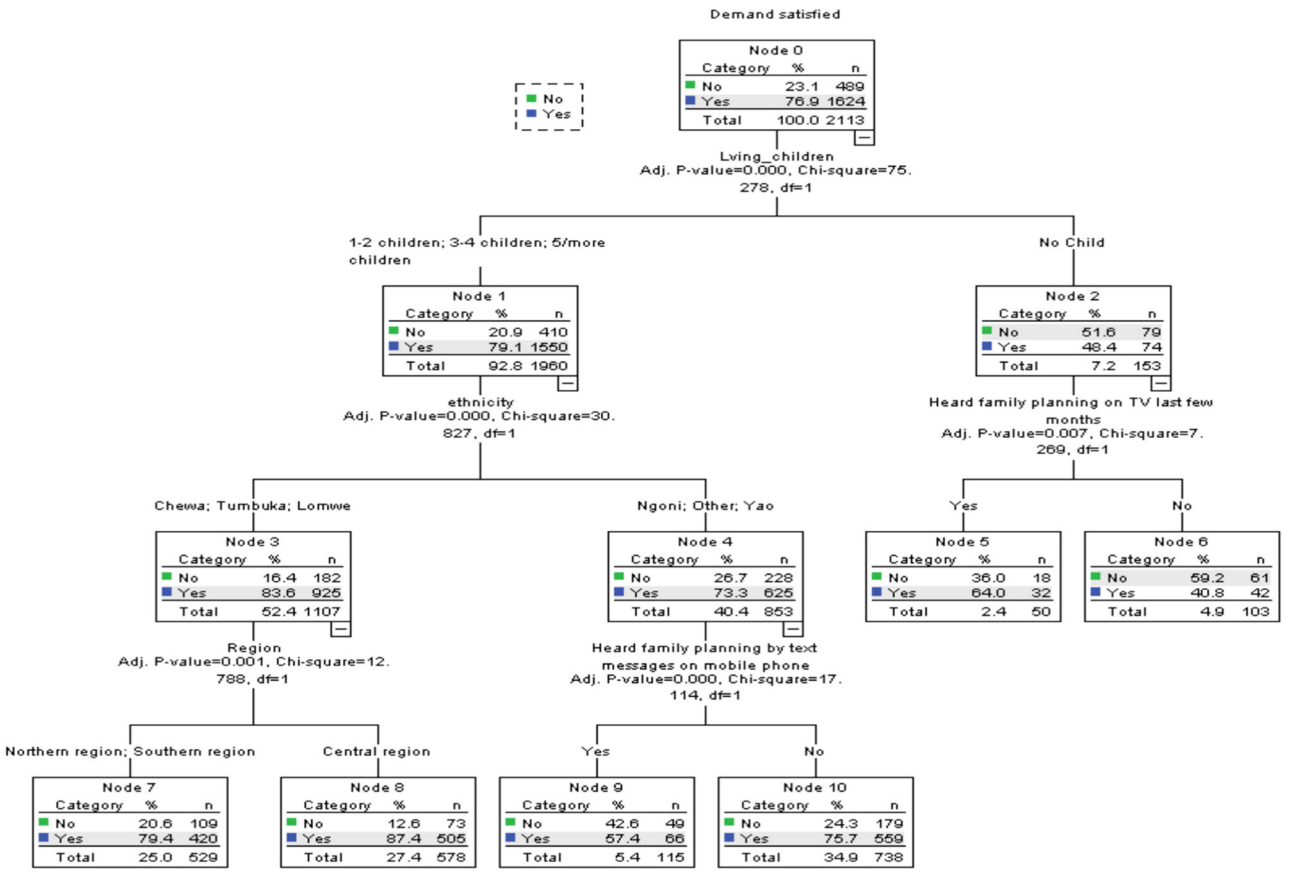


**FIGURE 1 |** Decision tree diagram for all urban women with demand for modern methods in Malawi.

### Node 2: Women With No Children

Only 48% of the women with no children had their demand for FP satisfied with modern contraceptives. Among these women, exposure to FP information on TV was the best predictor of demand for FP satisfied with modern methods ($X^2 = 7.27$, $p = 0.007$). Close to two-thirds (64%) of the women who watched FP information/messages on TV in the last few months had their demand for FP satisfied with modern contraceptives compared to about just 41% of those that did not. **Table 4** provides summary information of the specifications used to build the CHAID model for the full sample.

## Results of CHAID Analysis for Urban Women in Union With Demand for Contraception

The results of the CHAID analysis for urban women in union with demand for contraception are presented in **Figure 2**. The results showed ethnicity as the most significant predictor of mDFPS among urban women in union ($X^2 = 32.07$, $p = 0.000$). Chewa, Lomwe, and Tumbuka (node 1) women in union had 83% of their demand for FP satisfied with modern methods compared to about 72% among Ngoni, Yao, and women of other minority ethnic groups such as Nkhonde and Sena (node 2).

### Node 1: Chewa, Lomwe, and Tumbuka Women in Union

This sub-group of women constituted 56% of the total sample of women in union. Among these women, the highest educational attainment of their partner was the best predictor of mDFPS ($X^2 = 20.56$, $p = 0.000$). The educational attainment of their partners was further split into two sub-groups: women with partners of secondary and higher education (node 3), and those with partners of no education and primary education (node 4). Contrary to expectation, as high as 92% of women whose partners had no education or primary education had their demand for FP satisfied with modern contraceptives compared to about 80% of those whose partners had secondary and higher education.

Among women whose partners had secondary or higher education, the household wealth quintile was the best predictor of mDFPS ($X^2 = 23.26$, $p = 0.000$). In this sub-group, women in the richest, poorer, and poorest (node 7) households had a demand for FP satisfied with modern methods (86%) 15% higher than those in the richer and middle households (71%). For the women whose partners had no education or primary education (node 4), the fertility preference of the couple was the most significant predictor of mDFPS ($X^2 = 18.93$, $p = 0.000$). Women who had the same fertility preference as their partners had about 83% of their demand for FP satisfied with modern

**TABLE 4 |** Summary information of the specifications used to build the CHAID model for all urban women.

| Model Components | Model specification | Results |
|---|---|---|
| Dependent variable | Demand for FP satisfied with modern methods | % of women with demand satisfied = 76.9 |
| Independent variables | Age, highest education, wealth quintile, religion, ethnicity, region, employment, marital status, exposure to FP information on radio, exposure to FP information on TV, exposure to FP information in newspapers/magazines, exposure to FP information by text messages on mobile phone, exposure to FP information in health facility, number of living children | *Number of living children*, ethnicity, region of residence, exposure to FP information on TV, exposure to FP information by text messages on mobile phone. |
| Maximum tree depth | 3 | 3 |
| Minimum cases in parent node | 100 | 100 |
| Minimum cases in child node | 50 | 50 |
| Number of nodes | – | 11 |
| Number of terminal nodes | – | 6 |
| Overall predicted correct percentage | | 77.8 |

methods while women whose husbands wanted more and those whose husbands wanted fewer children had 94% of that demand satisfied. Unexpectedly, all the women (100%) who did not know the fertility preference of their partners had their demand for FP satisfied with modern methods.

### Node 2: Ngoni, Yao, and Other Women in Union

As indicated previously, about 72% of Ngoni, Yao, and other women of minority ethnic groups in union had their demand for FP satisfied with modern methods. Among these women, age was the most significant predictor of mDFPS ($X^2 = 26.83, p = 0.000$). Age was further split into two sub-groups: 20–24, 25–29, 30–34, 35–39 (node 5) and 15–19, 40–44, 45–49 (node 6). The mDFPS among women aged 20–24, 25–29, 30–34, and 35–39 years was about 76%. This reduced significantly to 54% among women aged 15–19, 40–44, and 45–49 years.

For the women aged 20–24, 25–29, 30–34, and 35–39 years, the most significant predictor of mDFPS was exposure to FP information through text messages on phone ($X^2 = 7.30$, $p = 0.007$). About two-thirds (64%) of the women who received FP information via text messages had their demand for FP satisfied with modern methods compared to more than three-quarters of those that did not. Among the women aged 15–19, 40–44, and 45–49 years, religious affiliation was the best predictor of mDFPS ($X^2 = 13.97, p = 0.006$). Approximately 68% of Anglican, CCAP and Other Christian women had their demand for FP satisfied with modern methods compared to just 36% among Catholic, SDA, and Muslim women. **Table 5** provides summary information of the specifications used to build the CHAID model for women in union.

## DISCUSSION

The objective of this study was to examine the predictors of demand for FP satisfied with modern methods (mDFPS) in urban Malawi and to identify the sub-groups of urban women underserved with modern contraceptives. The study analysed data from the 2015–16 Malawi DHS data, using a CHAID decision tree analytic technique. The results for the full sample showed that demand for FP satisfied with modern methods was higher among women with children, Chewa/Tumbuka/Lomwe women, and women residing in the central region. The least demand satisfied with modern methods was among women with no children, and who had not heard FP advertising on television.

The most significant predictor of demand for FP satisfied with modern methods was the number of living children women had. The women with no children had a lower demand satisfied with modern methods relative to those with children. This finding is consistent with the results of previous studies conducted in sub-Saharan Africa and LMICs (23, 24). One study in Zimbabwe found that women with no children were eight times less likely to use modern contraceptives compared to those with one or more children (24). A plausible explanation of the finding in this study is that the desire to postpone first birth is weakly held among women with no children. Thus, the motivation to use modern contraceptives to satisfy their demand for FP is low. It is also likely that most of the women with no children are younger, and therefore face several barriers to accessing modern contraceptives. Encouraging women to postpone first birth and addressing both the demand and supply factors that inhibit women with no children from using modern contraceptives need to be prioritised if Malawi is to close the mDFPS gap between these women and their peers with one or more children.

The results also showed ethnicity as a significant predictor of mDFPS, and ethnicity was significant for women with one or more children. Chewa, Lomwe, and Tumbuka women who had at least one living child had a higher mDFPS than Yao, Ngoni, and other ethnic minority women. Yaos ascribe to matrilineal descent and are predominantly Muslim, with conservative cultural norms that value sexual initiation ceremonies, early marriages, and large families (25). With regards to the Ngoni, patrilineal descent where children are affiliated to their fathers' kin group is a major cultural feature. It is known that women in patrilineal descent systems have limited autonomy in decision making regarding childbearing (26). The above cultural norms probably inhibit modern contraceptive use among Yao and Ngoni women. Women of minority ethnic groups such as the Nkhonde and Sena also probably face difficulties in accessing FP services due to language barriers or discrimination by contraceptive service providers. There is the need for further studies to investigate cultural norms, beliefs and other factors that constrain modern

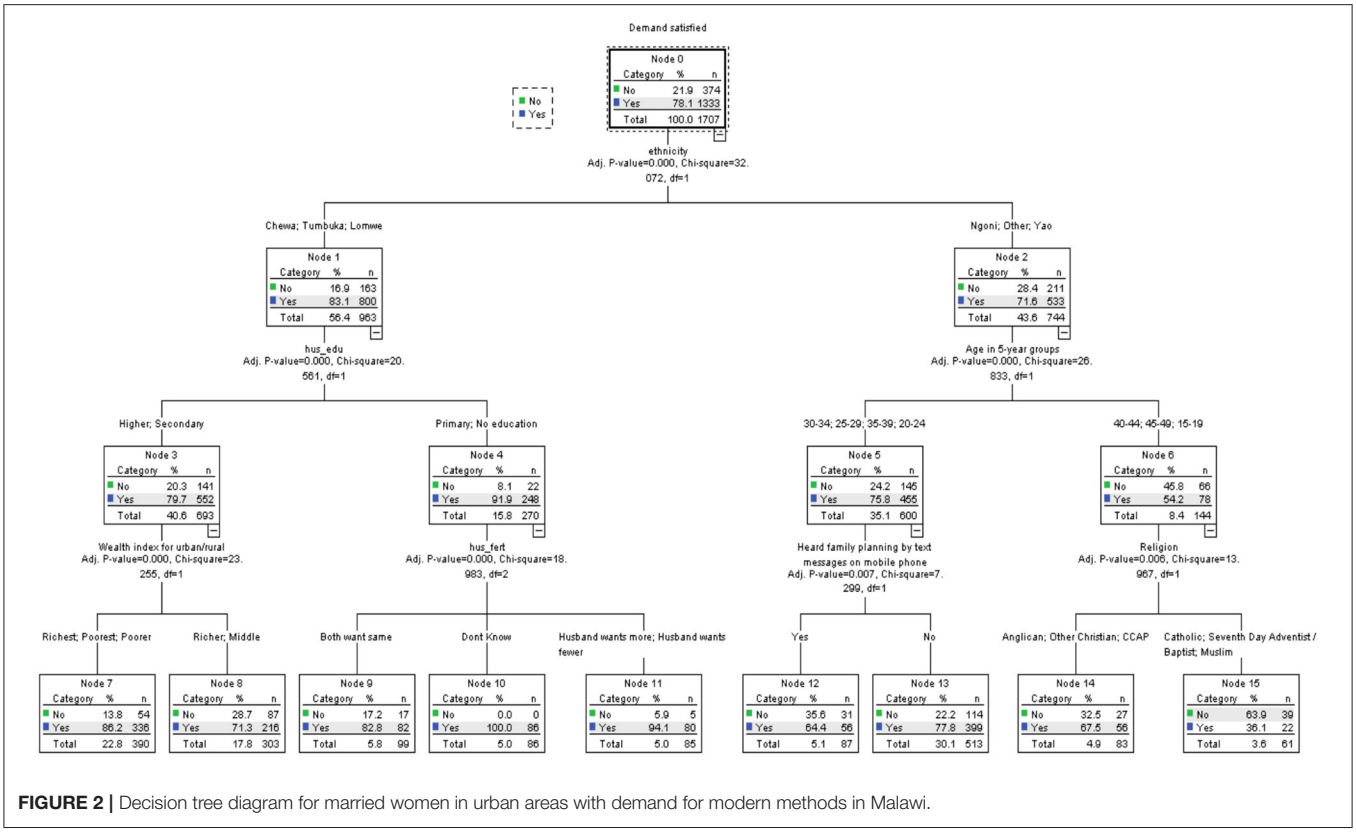


**FIGURE 2 |** Decision tree diagram for married women in urban areas with demand for modern methods in Malawi.

contraceptive use among Yao, Ngoni and other ethnic minority women in urban Malawi.

The analysis further showed region of residence as the most significant predictor of mDFPS among Chewa, Lomwe, and Tumbuka women. Women residing in the central region had a significantly higher mDFPS than those in the southern and northern regions. A plausible explanation of this finding is the low concentration of health facilities especially facilities that offer reproductive services in the northern and southern regions. For example, one study that mapped private health facilities, which are crucial for expanding access to FP services, in Malawi found that only 14% of private facilities with nurse midwives were located in the northern and southern regions, respectively, compared to 71% in the central region. Astonishingly, there were no private mobile clinics in the northern region and only 33% of such facilities were in the southern region compared to 67% in the central region (18).

Exposure to FP information via text message(s) on phone was the most significant predictor of mDFPS among Ngoni, Yao, and women of other minority ethnic groups. Unexpectedly, it was observed that the women that were exposed to FP information via text messages had a lower mDFPS than those that were not. Specifically, about 58% of the Ngoni, Yao, and women of other ethnic groups that had accessed FP information via text messages on phone had their demand for FP satisfied with modern methods compared to ∼76% of those that did not. Even though FP programmes are increasingly taking advantage of the ubiquity of mobile phones in sub-Saharan Africa to deliver contraceptive information via text messages to women and couples, there is little evidence of the effect of such interventions on contraceptive uptake. One study that evaluated the impact of a mobile reproductive health platform in Kenya (m4RH) which delivered contraceptive information via text messages found an increase in m4RH consumers' contraceptive knowledge, but there was no increase in contraceptive use among them (27). While we are not sure of the source(s) of the text messages delivered to the women in the current study, it is possible that these messages reinforce misconceptions about FP, and therefore discourage modern contraceptive use. It is known that the emergence of social media platforms, including WhatsApp and Facebook messenger, allow for the easy circulation of unreliable information from dubious sources including information on FP. It is also possible that this counterintuitive finding is a spurious one due to the omission of other important variables in the analysis, a common pitfall of CHAID and other multivariate analytic techniques (28). It is likely that most women that access FP information via text messages are those with a weak motivation to use modern methods due to fear of side effects. There is a need for further studies to investigate the content, sources, and effect of such messages in Malawi and Africa at large.

As shown in the results, women with no children are severely underserved with FP services, with only 48% of them having their demand for FP satisfied with modern methods. Among these women, exposure to FP information on TV was the best

**TABLE 5 |** Summary information of the specifications used to build the CHAID model for urban women in union.

| Model components | Model specification | Results |
|---|---|---|
| Dependent variable | Demand for FP satisfied with modern methods | % of women with satisfied demand = 78.1 |
| Independent variables | Age, highest education, wealth quintile, religion, ethnicity, region, employment, marital status, exposure to FP information on radio, exposure to FP information on TV, exposure to FP information in newspapers/magazines, exposure to FP information by text messages on mobile phone, exposure to FP information in health facility and number of living children, age at marriage, age difference between partners, husband education, husband employment, husband fertility preference | *Ethnicity*, husband education, wealth quintile, husband's fertility preference, age, exposure to FP information by text messages on mobile phone, religion |
| Maximum tree depth | 3 | 3 |
| Minimum cases in parent node | 100 | 100 |
| Minimum cases in child node | 50 | 50 |
| Number of nodes | – | 16 |
| Number of terminal nodes | – | 9 |
| Overall predicted correct percentage | | 79.1 |

predictor of mDFPS. Approximately two-thirds of the women with no children who were exposed to FP messages on TV had their demand for FP satisfied with modern methods compared to 4 in 10 of those that were not exposed to FP messages on TV. Contrary to the results on the effect of exposure to FP information via text messages, this finding suggests that viewing FP messages on TV improves the chances of using modern contraceptives. Television is a credible source of information in the Malawian context, thus FP information on TV is more likely to be accurate, create awareness, increase knowledge and induce contraceptive use.

For the women in union, the results showed that demand for FP satisfied with modern methods was highest among Chewa, Tumbuka, and Lomwe women whose partners had primary or no education, and who did not know the fertility preference of their partners. The least demand satisfied with modern methods was among Ngoni, Yao, and other ethnic minority women who were aged 15–19 and 40 years and above and were Catholic, SDA/Baptist, or Muslim.

Overall, ethnicity was the strongest predictor of mDFPS among women in union. Similar to the results for the full sample, Chewa, Lomwe, and Tumbuka women in union had a higher mDFPS than Ngoni, Yao, and women of other minority ethnic groups. The fact that ethnicity was the most significant predictor of mDFPS among women in union suggests that socio-cultural norms that influence women's contraceptive use behaviour are at their strongest in sexual unions. Efforts to address sociocultural norms inhibiting women's use of modern contraceptives in urban areas in Malawi need to prioritise those in union, especially Ngoni, Yao, and women of other minority ethnic groups.

Contrary to expectation, the results showed that Chewa, Lomwe, and Tumbuka women whose partners had no education or primary education had a significantly higher mDFPS than those with partners of secondary and higher education. Even though previous studies in LMICs show a strong positive association between educational attainment and modern contraceptive use, there is evidence that better-educated women in urban sub-Saharan Africa consistently report higher use of traditional methods than their less-educated peers (29). While most of the studies reporting high traditional method use among better educated urban women do not include the educational attainment of their partners, it is likely that partners with secondary and higher education disapprove of modern methods due to side effects. It is also possible that FP programmes in urban Malawi are focusing less on couples of higher socio-economic status including women with partners of secondary and higher education because of the wrong assumption that such women are already contracepting or have fewer barriers to accessing modern contraceptive methods.

Furthermore, the study found that household wealth status was the most significant predictor of mDFPS among women with partners of secondary and higher education. Counterintuitively, women in the poorer and poorest categories together with those in the richest category had an mDFPS that was 15% higher than their peers in the richer and middle categories. The bivariate analysis (**Table 3**) showed no statistically significant difference between rich and poor women in mDFPS, even though the percentages in the poorer and poorest categories were higher than richer and richest. Research in the slums of Kenya has shown that the gap between rich and poor women in terms of access to modern contraceptives has narrowed significantly to a point where there is virtually no difference (30). The narrowing of this gap in Kenya is explained by the increasing focus of family planning and reproductive health programmes on poor, marginalised, and hard-to-reach urban women. Malawi's Family Planning Costed Implementation Plan also identifies urban poor women as one of special sub-groups to focus on increased uptake of modern methods (20). It is possible that this programmatic focus on urban poor has resulted in them having a higher mDFPS. Furthermore, it is important to note that other factors including the motivation for contraceptive use and fear of side effects which were not included in this study determine women's capacity to satisfy their demand for FP with modern methods. It is therefore possible that the omission of these key factors has resulted in a spurious relationship between household wealth and mDFPS. There is a need for further studies to investigate the counterintuitive relationships between socio-economic status and mDFPS observed in this study.

For the women whose partners had no education or primary education, the fertility preference of the couple was the most significant predictor of mDFPS. Women who had the same fertility preference as their partners had a lower mDFPS relative to those whose partners wanted more or fewer children and those who did not know the fertility preference of their partners. Research on fertility preference in Malawi shows that couples with the same fertility preference are those who tend to want a child in the next 3 years (31). This suggests that the women reporting the same fertility preference as their partners in this study are those wishing to postpone or space pregnancy/childbirth but not to stop. In such instances, women are typically less likely to use modern contraceptives to satisfy their demand (31, 32). Interestingly, we also found that all the women that did not know the fertility preference of their partners had their demand for FP satisfied with modern methods. This suggests that when women do not know the fertility preference of their partners they assume a lack of or less opposition from those partners on modern contraceptive use and are therefore likely to have their demand for FP satisfied with modern methods.

As shown in the results, Ngoni, Yao, and other ethnic minority women in union who were aged between 20 and 39 years, the prime reproductive childbearing ages had a significantly higher mDFPS than those aged 15–19, 40–44, and 45–49 years. In general, reproductive health and family planning services in most sub-Saharan African countries including Malawi are not adequately oriented toward meeting the needs of adolescents. Thus, adolescents disproportionately face many barriers in accessing modern contraceptives including stigma, cost of services, and lack of adequate knowledge. The finding in this study is therefore consistent with the findings of previous studies in the sub-region.

With respect to relatively older women, those aged 40 years and above, studies show that they are among those with the highest demand for FP for stopping childbearing (33). It is likely that most urban women in Malawi aged 40 years and above have already attained their desired fertility, and would therefore like to use long-acting and permanent methods (LAPMs) to stop childbearing. Yet, short-term methods such as pills and injectables which are prone to discontinuation and may not satisfy the particular needs of these women are still the dominant modern contraceptive methods in Malawi, with <10% of all contraceptive users relying on LAPMs (34, 35). One study in the capital of Malawi, Lilongwe, found that majority of the FP clinics did not offer IUD or female sterilisation services (35). In addition, relatively older women at the end of their reproductive years are often left out of FP discussions and policies due to the perception, sometimes wrongly, that they are menopausal, have infrequent sex, or lack a regular partner. Family planning messages and services are therefore rarely targeted at these women to satisfy their demand.

Among the adolescents (15–19 years) and older women (40 years and above) in this study, religious affiliation was the most significant predictor of mDFPS. About 68% of Anglican, CCAP, and Other Christian women had their demand for FP satisfied with modern methods compared to just 36% among Catholic, SDA, and Muslim women. This finding is consistent with the results of previous studies in Malawi (36–38). Overall, fundamental Catholic, Muslim, and conservative protestant denominations, such as the SDA, believe that it is God who controls the number of children women have. Therefore, modern contraceptive use is viewed as violating or interfering with God's law on procreation. In Malawi, even in urban areas, where upwards of 90% of women are affiliated with either Christianity or Islam, it is likely that such conservative religious views inform women's reproductive behaviour, especially contraceptive use. The fact that religion significantly predicted mDFPS among adolescents and older women suggests that religious constraints to modern contraceptive use are particularly severe among these already vulnerable and underserved groups.

## LIMITATIONS OF THE STUDY

Even though this study is one of the few studies to examine mDFPS among urban women in sub-Saharan African using CHAID analysis, it has two key methodological limitations. Firstly, the study uses cross-sectional data from the 2015–16 Malawi Demographic and Health Survey which does not allow for causal inferences to be made from the findings. Secondly, the CHAID analytic technique used does not take into account the hierarchical structure of the Demographic and Health Survey data. In addition to these methodological limitations, the study did not include other factors such as the motivation for contraceptive use and fear of side effects which are known to determine women's capacity to satisfy their demand for FP with modern methods (39). Furthermore, the results of this study are limited to the Malawian context and representativeness of the 2015–16 DHS survey. Despite these limitations, the method used in this study revealed a complexity of interactions in the predictors of mDFPS that may be difficult to tease out in conventional regression analysis.

## CONCLUSION

This paper examined the predictors of mDFPS and identified the sub-groups of urban women in Malawi with unsatisfied mDFPS. The results showed that the number of living children, ethnicity, region of residence, exposure to FP information via text messages on phone, and exposure to FP information on TV were the significant predictors of mDFPS among women in urban Malawi. Among these factors, the number of living children a woman had was the most significant predictor of mDFPS. The findings also revealed that the sub-groups of urban women with unsatisfied mDFPS included women with no children who were not exposed to FP information/messages on TV; Ngoni, Yao, and other ethnic minority women who were exposed to FP information via text messages on phone; and Chewa, Lomwe, and Tumbuka women living in the northern and southern regions.

The disparities in mDFPS observed in this study demonstrate that the apparent urban advantage in modern contraceptive use in Malawi is not uniform across all sub-groups of women.

There is therefore the need for policymakers and reproductive health practitioners to recognise these disparities and to prioritise the underserved groups identified in this study. As a matter of priority, policy and programmatic efforts in urban Malawi need to focus on women with no children, especially those without access to FP information on TV. Among women in union, adolescents, and women aged 40 years and above who are of Ngoni, Yao, and other minority ethnic groups, and who are also Catholic, SDA/Baptist or Muslim need to be prioritised as a matter of urgency. In addition to the policy implications, the study findings raised important and unexplored research questions such as the effect of exposure to FP information via text messages on mDFPS and the effect of partner's education on women's contraceptive uptake in urban Malawi. We therefore suggest further studies to address these research gaps.

## DATA AVAILABILITY STATEMENT

Publicly available datasets were analysed in this study. This data can be found here: https://dhsprogram.com/data/.

## ETHICS STATEMENT

This study used data involving human participants, and was reviewed and approved by the National Health Sciences Research Committee in Malawi and ICF Institutional Review Board. Written Informed Consent was obtained from adult participants (18 years and above). For women below 18 years (15–17), consent to participate in the study was provided by their legal guardian in addition to the participant's own assent.

## AUTHOR CONTRIBUTIONS

NA and NM conceptualised the study and decided on the data analysis. NA drafted the manuscript. Both authors contributed to the article and approved the submitted version.

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# Exploring Experiences Responding to the Individual Level Abortion Stigma Scale: Methodological Considerations From In-depth Interviews

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**Background:** The Individual-Level Abortion Stigma (ILAS) scale is a tool to measure multiple dimensions of stigma among people who have abortions. Despite use of the scale globally, little is known about participant experiences completing the scale. We assessed reactions to and experiences with the scale among women who obtained abortions in Mexico, exploring how the items made them feel about themselves and their abortion.

**Methods:** We conducted 10 in-depth interviews with women approximately 6 months after their abortion. We explored experiences answering the ILAS overall as well as each sub-scale (self-judgement; worries about judgement; isolation; community condemnation). We used thematic analysis to examine overall experiences with the ILAS and framework analysis to summarize responses by sub-scale.

**Results:** Many respondents reported positive experiences responding to the scale or said it served a therapeutic purpose. Other participants said the scale caused strong or mixed emotions or generated doubts. Women generally described mixed and negative reactions to the "worries about judgement" and "community condemnation" sub-scales, and more neutral or positive reactions to the "isolation" and "self judgement" sub-scales. Nearly all respondents hypothesized that completing the ILAS at the time of their abortion would be more difficult than responding months after their abortion.

**Conclusions:** People can experience both positive and negative effects when responding to abortion stigma scales. Use of the scales may cause discomfort and introduce concepts that further perpetuate stigma. This study highlights the importance of carefully considering when it is appropriate to implement the scale and exploring safeguards for participants.

**Keywords: individual-level abortion stigma scale, abortion stigma, methodology, Mexico, ILAS, research participation effects**

## INTRODUCTION

It is well-documented that stigma exists in association with abortion in a range of legal and cultural settings (1). Drawing on Goffman's foundational work on stigma (2), abortion stigma has been defined as "a negative attribute ascribed to women who seek to terminate a pregnancy that marks them, internally or externally, as inferior to ideals of womanhood" (3). More recently, scholars have challenged the notion that stigma is primarily located at the individual-level, expanding conceptions of stigma as "a socio-cultural process tied to the categories of difference upon which power relations are produced and legitimated" (4). Researchers have developed strategies to measure the extent and nature of this complex phenomenon with a range of methodologies; primarily focusing on individual-level perceptions, beliefs, and experiences. Stigma scales that examine abortion stigma have been developed and validated in a range of settings (5–8). These scales aim to assess perceptions and experiences with stigma among abortion clients, abortion providers, as well as attitudes among community members.

The Individual-Level Abortion Stigma (ILAS) scale was developed and validated in the United States to measure multiple dimensions of stigma among people who had abortions. The ILAS has four subscales: self-judgement (e.g., I felt guilty), worries about judgement (e.g., my abortion would negatively affect my relationship with someone I love), isolation (e.g., I can talk to the people I am close with about my abortion), and community condemnation (e.g., abortion is the same as murder) (6). The authors of the ILAS used it to examine associations between socio-demographic factors and stigma levels overall and by sub-scale and proposed it could "be used to evaluate the efficacy of initiatives aimed at reducing stigma [. . . ] [or for] research on women's mental health outcomes associated with abortion." Researchers since have demonstrated use of the ILAS scale in countries around the globe to examine the impact of policies on stigma (9), factors associated with stigma (10, 11), the correlation between stigma and access to safe abortion care (12, 13), how stigma might influence negative health outcomes (14), and the extent of stigma, allowing for comparison between settings (15). Additionally, service-delivery organizations and civil society organizations, particularly in low- and middle-income countries, have reported using the ILAS scale to assess stigma among people who seek abortion care (11), or to evaluate stigma-reduction programming (16). Despite widespread use of the ILAS, little is known about the experience of research participants when completing the scale.

We can turn to other fields to better understand how research participants may be impacted by responding to items about negative perceptions and experiences. In psychology, this has been conceptualized as "reactivity" – the idea that "measurement results in changes in the people being measured" (17). Some research shows that asking questions regarding negative feelings or experiences can increase negative emotions in the short term (17). Other studies have shown that negative feelings after being asked about violence or trauma dissipated quickly, and found that participants ultimately reported positive feelings toward and benefits from participating in the research (18–20). Previous writing on the ethics of stigma research has largely not engaged with the possibility that research may have an effect on participants, instead focusing on whether research on stigmatized issues risks disclosing information about research participants to their communities (21). Some studies in the fields of mental health and HIV stigma (22, 23) mention the possibility of bias due to the Hawthorne effect – wherein participants may change their behavior when they know that they are being observed or studied (24). Across research areas and disciplines, there is an "obvious need for further study of whether, when, how, how much, and for whom research participation may impact on behavior or other study outcomes" (24). It is important to understand the research participation effects of abortion stigma studies in order to safeguard participants.

The authors have worked closely with a range of service-delivery organizations in Latin America and the Caribbean and in the African region to implement research addressing abortion stigma in their communities. When considering the ILAS, many of our partners raised concerns about whether the items in the scale might have a detrimental impact on the people seeking their care. For example, they suggested that the negatively worded statements in the ILAS could inadvertently introduce or reinforce negative or stigmatizing concepts about abortion, or might imply that their own organization held negative beliefs about abortion. We were motivated to gain deeper insight directly from people who had an abortion about their response to each item in the scale. In this exploratory study, we assessed the reactions to and experiences with the ILAS among people who obtained abortion in Mexico, focusing on how the items made them feel about themselves and their abortion.

## MATERIALS AND METHODS

In this qualitative study, we conducted 10 in-depth interviews with women who had obtained abortion in diverse parts of Mexico with different legal contexts. All participants had obtained an abortion with the support of the MARIA Abortion Fund for Social Justice (Fondo MARIA), an abortion accompaniment organization operated by Balance, an organization based in Mexico City dedicated to promoting and defending the reproductive and sexual rights of women and young people throughout Mexico. Women were eligible to participate if they were aged 18 and older, had an abortion in the prior 6 months, reported having support from someone close to them at the time of the abortion, and had previously consented to receive invitations for research studies. In collaboration with Fondo MARIA, we chose to recruit women who had already completed their abortion in order to reduce the burden on people who were in the midst of seeking information or obtaining care. We recruited participants who visited a clinic in Mexico City for either a medication or surgical abortion, or self-managed an abortion using medication at home. We also chose to sample participants who had some social support network based on the hypothesis that the ILAS would not impose substantial stress or harm. These sampling decisions limit the range of experiences captured in our findings which we discuss in the limitations.

Fondo MARIA staff invited eligible women to participate in the study by telephone and provided contact information of those that expressed interest to the research team to schedule a telephone interview. The trained interviewer completed a verbal consent process with each participant, signing the consent form on their behalf, before audio recording the call. Interviews took between 30 and 90 minutes. All participants received 100 pesos in mobile phone credit (equivalent to 1 month of mobile service, or ∼$5 USD) to compensate for their time. The study was approved by the Allendale Investigational Review Board.

The interview guide included questions about women's abortion experience in general, followed by the items from each ILAS sub-scale adapted for interviews rather than self-completion. After each sub-scale, we asked participants to reflect on that set of items. Further questions explored women's experiences answering the ILAS overall, participating in the interview, and how they felt their experience might have differed if the ILAS had been implemented immediately before or 1 month after their abortion. The interviews were transcribed word-for-word by professionals with expertise in transcription, and analyzed in Spanish. We coded the transcripts in Dedoose, with the codes reflecting the sections of the interview guide (abortion experience, responses to each sub-scale, reflections about ILAS overall). We used thematic analysis to examine women's general experience with and reflections about the ILAS and the interview process. We then extracted the relevant data and conducted framework analysis (25, 26) in Excel by creating matrices to consolidate and summarize responses by sub-scale. Quotes are identified by the age and Mexican state of residence of the participant.

## RESULTS

The 10 respondents ranged from 18 to 40 years of age (mean 26.8) and resided in different states of Mexico (Coahuila, Mexico City, Nuevo León, Puebla, Tlaxcala, and Veracruz). Nine of the 10 respondents visited a clinic in Mexico City for their abortion and one respondent self-managed their abortion at home. Seven of the 10 respondents reported having positive experiences answering the questions on the ILAS, such as feeling "comfortable," "good," or "calm." Some women said they enjoyed the interview process or that it served a positive therapeutic purpose for them, as in the case of a woman who felt "relieved, like to be able to talk a little bit more about it [her abortion]" (23 years old, Coahuila). Some said the questions made them reflect about their abortion, sometimes helping reaffirm their decision. As one woman said, "it made me think, too, that really, I made a good decision, even though it [abortion] is not something that I think that anyone likes [to do]" (32 years old, Nuevo León). One respondent provided a more neutral response when asked about her experience with the ILAS, saying "I didn't feel uncomfortable" (22 years old, Tlaxcala).

Three participants, however, said the ILAS caused strong emotions, generated doubts about their abortion decision, or left them with mixed feelings. One woman said the ILAS included "questions I hadn't considered […]. It awakened various feelings […]. A sensation of sadness, […] [but also] the comfort of knowing I am accompanied" (32 years old, State of Mexico). Another described the ILAS questions as "somewhat uncomfortable" and "suddenly put[ting] myself in doubt regarding […] the decision I made" (40 years old, Puebla). One participant described a range of emotions in response to different ILAS questions.

> With most of the questions I felt calm, I felt good. With the other questions, well, yes, I felt uncomfortable, I had contradictory feelings. I began to wonder if what I did [having an abortion] was good, if what I did was bad, and what would have happened if I hadn't done it. So yes, like, I felt a bit […] emotionally out of control. (30 years old, Veracruz)

Women generally described mixed and negative reactions to the "worries about judgement" and "community condemnation" sub-scales, and more neutral or positive reactions to the "isolation" and "self judgement" sub-scales (**Table 1**). Based on participant narratives, it was sometimes difficult to disentangle the effects of the interview process from those of responding to ILAS scale items – for example, when participants spoke in broad terms of their feelings about their abortion but did not explicitly associate their emotions with an item(s) in the ILAS, or when interviews included extensive discussion of the participant's emotions beyond direct responses to the ILAS items. Regardless, many women said they were motivated to participate in the study in order to ensure other women could have positive abortion experiences.

Nine of the 10 respondents hypothesized that completing the ILAS at the time of their abortion would have been different from – and more negative than – their experience in the study. They said that if they had been asked the questions at the time of their abortion, it would have been emotionally challenging and might have made them feel anxious, worried, and "very questioned, very uncomfortable." As one woman said, "in an important moment, well, it could have been invasive." Several women also said they thought the scales, if asked at the time of their abortion, would have led them to doubt themselves or their decision. One said, "if it [the ILAS] had been before [the abortion], it would have made me […] doubt whether to go ahead [with the abortion], or [I might have] become depressed more easily, even though I was already sure of the decision" (22 years old, Tlaxcala).

## DISCUSSION

This exploratory study demonstrates the range of emotions that can emerge when abortion clients complete the ILAS scale – contributing to our understanding of the mechanisms and implications of research participation effects for abortion stigma research. The uptake of the ILAS has grown since the scale was first published in 2013 (6), and it is used for a range of purposes. As such, it is a priority to take stock of the benefits and drawbacks of this approach. Our findings suggest that most women were not negatively impacted by the questions in the scale when participating 6 months after their abortion. In fact, some found the interview process and participation in the scale to be

**TABLE 1 |** Women's reported experiences, by ILAS sub-scale.

| Sub-scale | ILAS scale items | Summary of reported experiences with the scale |
|---|---|---|
| Worries about judgement | Other people might find out about my abortion.<br>My abortion would negatively affect my relationship with someone I love.<br>I would disappoint someone I love.<br>I would be humiliated.<br>People would gossip about me.<br>I would be rejected by someone I love.<br>People would judge me negatively. | Nearly all of the respondents (nine of ten) said these items stood out to them, made them reflect, or made them feel "sensitive" – often reflecting that participants had family members or friends who did not support abortion. Some women said the questions made them feel confusion, anger, or sadness at the lack of support for abortion in their community. While most of the participants said this sub-scale did not provoke strong feelings, one woman said it made her feel uncomfortable and led her to question her decision and feel differently about her abortion. |
| Isolation | I have had a conversation with someone I am close with about my abortion.<br>I was open with someone that I am close with about my feelings about my abortion.<br>I felt the support of someone that I am close with at the time of my abortion.<br>I can talk to the people I am close with about my abortion.<br>I can trust the people I am close to with information about my abortion.<br>When I had my abortion, I felt supported by the people I was close with. | The majority of respondents (seven of ten) reported a positive experience answering the items from this sub-scale. They said the process made them feel relieved, grateful, or happy that they had been supported by family or friends, and one woman said it made her feel more confident about her abortion decision. However, this sub-scale brought up uncomfortable or negative feelings among three women who said they had felt less supported during their abortion process, as well as one woman who had supportive friends but not family members. |
| Self-judgement | I felt like a bad person.<br>I felt confident I had made the right decision.<br>I felt ashamed about my abortion.<br>I felt selfish.<br>I felt guilty. | Reactions to these items were mixed. Half the participants said the process of answering the self-judgement sub-scale was positive, e.g., making them feel "tranquility" or helping them realize they now felt comfortable about their decision despite having had negative feelings such as guilt at the time of their abortion. In contrast, the other half of participants said the self-judgement sub-scale was difficult to answer, led them to feel sad or emotional, or brought up unresolved or negative feelings about their abortion, such as not having processed their feelings, wishing they hadn't needed an abortion, doubting their decision, or believing they took a life. Two of these women said the subscale influenced them negatively, one because it made her consider if she was a bad person, and another because it called her decision into question. The use of the terms "*egoista*" (selfish), "*culpa*" (guilt), "*mala persona*" (bad person), and "*avergonzada*" (ashamed) in the sub-scale items stood out to multiple participants. |
| Community condemnation | Abortion is always wrong.<br>Abortion is the same as murder. | Most of the women said these items made them reflect about their community being uninformed about and opposed to abortion, and some said the sub-scale made them feel anger or frustration at the beliefs of their community. Women said the item about murder stood out or elicited emotions. Two women said the sub-scale influenced how they felt about their abortion – one described a positive influence, saying it made her feel "a bit more sure about her decision," while the other described a negative influence, saying it made her feel guilty and wonder if she should have taken more time before deciding to have an abortion. |

beneficial or therapeutic. Yet for others, responding to the items contributed to self-doubt, feelings of guilt, or strong negative emotions. This study has implications for future studies, both in design and implementation, highlighting the importance of carefully considering when it is appropriate to implement the ILAS and exploring safeguards for those participants who may have negative reactions.

Most participants described positive feelings overall about their experience in this study despite responding to questions about potentially negative or stigmatizing aspects of their abortion. This is similar to research in the fields of violence and trauma, in which participants said there were benefits to participating in studies that explore emotional or difficult topics (18–20). There are a number of reasons that participating in

abortion research may have benefits. First, abortion experiences are often positive. There is ample evidence that obtaining an abortion is not associated with psychological distress or mental health concerns (27, 28). In fact, one study found that being denied an abortion can result in more short-term psychological distress compared to those that receive an abortion (29). Second, given the silence around abortion in many communities, talking about past abortion experiences during a study may bring relief, a feeling of solidarity, or even joy.

Women who felt emotional or uncomfortable while taking the ILAS were most impacted by items in the worries about judgement subscale ("I would be humiliated," "People would gossip about me," etc.) and community condemnation ("Abortion is the same as murder" and "Abortion is always wrong") subscale. The items in these two subscales relate specifically to how respondents feel they are perceived by community members or society generally, and tend to portray abortion in a negative light. Our results suggest that participants may not have considered their abortion using framing such as "murder" or "wrong" before the interview. By posing these questions to participants, we risk introducing stigmatizing notions about abortion and placing the burden on individuals to manage these narratives during the research process (4).

Given the potential for negative reactions to the ILAS, researchers, and practitioners should assess the ethics of implementing the scale for their population of interest. In the study design phase, it is critical to weigh the risks and benefits of incorporating the scale by explicitly articulating the purpose and added value of using the instrument and ensuring it is the best approach to address the research questions. When use of the ILAS is determined to be appropriate and essential, researchers can consider strategies to mitigate potential negative experiences when implementing the scales. First, the negatively phrased questions, which predominate three of the ILAS sub-scales (self-judgement, worries about judgement, and community condemnation), can be rearranged or interspersed with positively phrased questions to provide a more balanced tone. These items should be included as additional items and analyzed separately, rather than rewriting the validated scale items, recognizing that the wording of questions has an impact on how research participants answer (30). Second, for some research objectives, it will be sufficient to administer one or more validated ILAS sub-scale(s) independently. For example, researchers or practitioners could choose to implement only the self-judgement items, or to omit the community condemnation items. This minimizes the number of negatively worded items for participants while still offering comparability of the subscales to published literature. Third, it may be useful to provide a clear, empathetic description of why a set of questions are being asked and how responses may inform future interventions. Research has documented that participants in studies about sensitive topics acknowledge that despite being difficult, they see value in participating in studies because of societal benefit (19), a similar motivation to what was shared by participants in this study. Finally, it may be important to assess the timing of administration of the scale. Based on our findings, we hypothesize that conducting the ILAS scale at the time of abortion, or immediately prior, may be more difficult for some clients as compared to months after. However, more exploration is needed to understand participants' reactions to the ILAS at the time of their abortion.

In some cases, researchers or practitioners may find it necessary to adapt the ILAS scale for their own context. It can be important to assess and tailor each item relative to the legal context, social norms, and particular circumstances of participants. Positively worded items were originally part of the longer list of items ($n = 66$) tested in the validation of the ILAS scale in the US, but fell away during factor analysis. For researchers who want to adapt the scale, especially those who work in contexts outside the US where stigma may manifest differently, it may be useful to test additional items from the original list (6). Any such changes may modify the psychometric properties of the scale, making it less comparable with the published literature – but may make the scale more relevant to the context (31).

Our findings engage with the concern voiced by other researchers that studies focused on measuring stigma may reify the centrality of stigma in the abortion discourse – potentially missing opportunities to amplify the ways in which people exhibit agency or resist abortion stigma and to document the range of all experiences with abortion – whether positive, negative or neutral (4, 32, 33). There is a risk that the use of abortion stigma scales can inadvertently make stigma appear in response to the inquiry, or may overstate the extent of stigma. It is important for researchers who aim to center abortion clients or providers in stigma research to grapple with the places in society where stigma is generated and perpetuated. Understanding stigma as a social process, and not only a relationship between the stigmatized and stigmatizer, suggests that measuring stigma on an individual level may only provide a limited lens through which to understand it. Future research should test ways to incorporate this conception of stigma as structural, contextual, and socially constructed (34, 35) alongside the individual-level measurements of stigma in order to better understand such a complex phenomenon.

This study had various limitations. First, for some of the questions, it was difficult to ascertain to what extent women's responses reflect the experience answering the ILAS itself as opposed to their experience participating in a supportive interview about their abortion experience. We took this into account in analysis and interpretation of the data. Second, only participants who reported having support from someone close to them at the time of their abortion were eligible for this study, in order to reduce the risk of emotional distress or other negative effects of participating. It may be that people with less social support would have more negative experiences responding to the ILAS than the women in this study. Third, with 10 participants we may not have reached saturation on all experiences. However, the aims of the study were exploratory and our sample was sufficient to begin to elucidate participants' reflections on and experiences with the ILAS. Future studies could build on this work by including a larger sample and

by comparing the experiences of completing the ILAS scale in different legal and social contexts and completing the scale at different times in the abortion process. Such research may provide additional and less ambivalent information to guide use of the ILAS scale.

We have shown that women can experience both positive and negative effects when responding to the ILAS scale, and that use of the scales may cause discomfort at times and introduce concepts about stigma that participants may not have considered – which may further perpetuate stigma. There is value in evaluating individual-level stigma in some circumstances, yet we must also address the larger political, social, and cultural contexts that play into individual experiences of stigma (34, 35), and the intersecting stigma people may face due to their social position. Researchers can consider mixed or multimethod studies that can capture the nuances and multiple facets of abortion stigma and how it plays a role in access to abortion care and quality of care. Whether using stigma scales or a broader range of methodological approaches to understand abortion stigma, it is critical for those that conduct research and implement programs to engage in careful consideration of the utility and ethical implications of their research and build in ways to support the well-being of their research participants.

## DATA AVAILABILITY STATEMENT

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

## ETHICS STATEMENT

The study was approved by the Allendale Investigational Review Board. All participants provided oral informed consent. Data collection was carried out in accordance with relevant guidelines and regulations.

## AUTHOR'S NOTE

People around the world experience abortion-related stigma, which can exacerbate barriers to access. The Individual-Level Abortion Stigma (ILAS) scale was developed to measure multiple dimensions of stigma (self-judgement, worries about judgement, isolation, and community condemnation) among people who had abortions. The ILAS scale has been increasingly used around the globe to understand how stigma manifests in different contexts and evaluate programs or policies addressing stigma. While the ILAS scale is used widely, little is known about the experience of research participants when completing the scale. Research in other fields explores whether research participants may be impacted by responding to items about negative perceptions and experiences. It is similarly important to understand research participation effects of abortion stigma studies. In this study, we explore the reactions to and experiences with the ILAS scale among people who obtained abortion in Mexico, focusing on how the items made them feel about themselves and their abortion. We find women can experience both positive and negative effects when responding to abortion stigma scales. This study has implications for study design and research implementation for future abortion research around the globe, and can inform the development of further stigma measurement strategies.

## AUTHOR CONTRIBUTIONS

AW and SB designed the study. SM coordinated data collection, led analysis, and prepared the table. All authors wrote and approved the manuscript for publication.

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# Factors Associated With the Use of the Contraceptive Implant Among Women Attending a Primary Health Clinic in Cape Town, South Africa

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**Background:** Long-acting reversible contraceptives (LARCs), which include the subdermal contraceptive implant and intrauterine contraception, offer women safe, highly effective, long-term pregnancy prevention, and have expanded contraceptive options. The implant greatly expands LARC options for South African women as it is available free of charge at public health facilities, but little is known about factors associated with its uptake. This study describes factors associated with the intention to use the implant, including knowledge and beliefs about the implant and perceived outcome expectancies of implant use among women in Cape Town, South Africa.

**Methods:** Between 2015 and 2016, the authors conducted a quantitative, cross-sectional survey among adult women attending a public, primary health clinic in Cape Town, South Africa. Using a structured questionnaire, they measured knowledge, awareness, and attitudes, perceived outcome expectancy, and the intention to use the contraceptive implant in future among the women.

**Results:** The authors surveyed 481 women (mean age 29.1 years). Most of the participants ($n$ = 364, 75.6%) had heard about the implant, 45 (9.4%) were currently using it, and 97 (20.2%) intended to use it in the future. Knowledge about the safety of the implant, beliefs about its effectiveness, and the ease of insertion and removal, and support from intimate partners were positively associated with the current use and intentions to use the implant in the future.

**Conclusions:** Limited knowledge of the implant, having completed secondary schooling, support from partner for women to use implant and the perceived outcome expectancies of using the implant were factors significantly associated with the intention to use the implant. Ensuring that the contraception information is available in all South African languages, regardless of education levels in women, and that comprehensive

contraception education and counseling is provided during all family planning might help improve the uptake of contraceptives, including the use of the implant in the country.

**Keywords: long-acting reversible contraceptives, subdermal contraceptive implant, contraception, family planning, South Africa**

## BACKGROUND

Long-acting reversible contraceptives (LARCs), which include the subdermal contraceptive implant and intrauterine contraception (IUC), offer women safe, highly effective, long-term pregnancy prevention, and expanded contraceptive options. The South African Department of Health (DoH) 2012 policy and guidelines emphasized the importance of expanding contraceptive choice, and in particular increasing access to the LARC options (1). The implant, which has been widely available at no cost to clients in South African public sector clinics, since its introduction in 2014 was part of the implementation of these policies, and greatly expanded LARC options for South African women (1). LARCs are the most effective methods of contraception available with considerably lower unintended pregnancy rates compared to the shorter-acting contraceptives, such as oral contraceptive pills or injectables because of their long duration of contraceptive effect and because regular adherence is not required by the user (2–4). The use of LARCs has been shown to reduce unintended pregnancies among women in general, reduce repeat pregnancies among adolescents, and reduce repeat medically induced abortions (5–7). Studies of the cost-effectiveness of different contraceptive methods in high-income countries (HICs) have favored the use of LARC methods (2, 3, 8–10). However, promotion of any specific method of contraception, including LARCs, as effective as they are, has been cautioned by reproductive health and rights advocates as it undermines the reproductive autonomy of women.

The US-based National Women's Health Network (NWHN) argues that we should not only fight for improving access to contraception and abortion care services but also fight for reproductive autonomy and eliminate coercive behaviors in family planning programs and practices (11). This is in line with the National Integrated Sexual and Reproductive Health and Rights (SRHR) Policy of South Africa, which addresses cross-cutting issues relating to sexual and reproductive health (SRH) service provision that underpin quality, comprehensive, and integrated SRHR service provision in the country (12). However, barriers to contraception access persist in the country, and the implant is no exception. Despite being freely available and more effective, there has been low uptake of the implant among South African women (13, 14). Studies from different settings around the world have identified factors attributed to low uptake of LARCs, such as limited knowledge and training of healthcare providers with LARC methods, method cost, and the limited number of healthcare providers trained to provide LARCs (6, 7, 14–16). Globally, factors attributed to the low uptake of LARCs among women themselves include the limited knowledge and awareness of the LARC methods, and cost (5, 17–19). In South Africa, limited awareness and knowledge of the implant, and awareness of other different contraceptive methods, have been identified as the attributing factors to the low uptake (14). Additionally, it is reported that myths and misconceptions about the side effects and risks associated with the LARC methods exist among South African women (6, 7, 20).

Few studies, however, have examined the factors associated with the use of, and intentions, to use the implant in the future among women in South Africa. It has been reported that most women use the implant because of its convenience as no user action required for several years after insertion, whereas side effects, in particular altered bleeding patterns, have been reported as the main reason for discontinuation (13). Furthermore, insufficient pre-counseling on implant side effects is thought to contribute to method discontinuation in South Africa and elsewhere in the world (13, 14, 21, 22). The aim of this study, therefore, was to describe the factors associated with the intention to use the implant in the future and investigate the perceived outcome expectancies of using the implant among women of reproductive age attending a primary health clinic in Cape Town. Outcome expectancies are defined as anticipated consequences, positive or negative consequences resulting from doing something (23). We investigated the intention to use the implant to assess whether women have any consideration of ever using the implant in the future, given the effort and investment made by the South African government in making this typically costly method of contraception freely available. We also investigated perceived outcome expectancies for using a contraceptive implant to understand what would make women want to use the implant or not in the future. This information may help family planning programs to better understand the low uptake of the implant and where to direct their efforts on improving the uptake of the implant.

## METHODS

### Research Design and Study Setting

This cross-sectional survey was conducted among adult women attending a primary health clinic in Cape Town, South Africa. The clinic was selected because it is a typical public clinic in a poor, peri-urban setting. It offered a range of public primary health services with a primary focus on sexually transmitted infection (STI), HIV, and TB, and also SRH services.

**Abbreviations:** Cu IUD, copper intrauterine device; HIV, human immunodeficiency virus; HIC, high-income countries; IUD, intrauterine device; LARC, long-acting and reversible contraceptives; LMIC, low- and middle-income countries; STI, sexually transmitted infections; SPSS, Statistical Package for the Social Sciences; TB, tuberculosis.

## Participant Sampling

We invited all women age 18 years and older who were receiving family planning and STI services at the clinic between February 2015 and February 2016 to complete a brief anonymous survey while waiting to see the clinic nurse. To be eligible to participate, women had to be able to read and write in English or isiXhosa; and women who were able to give consent. As this was a specific clinic for family and STI treatment, 500 women were eligible and were invited to participate, with 481 completing the survey. Those who declined to participate cited time constraints.

## Data Collection Tool

We used a paper–pencil questionnaire format, requiring approximately 10 min for completion, which participants self-completed in their preferred language (either English or Xhosa). Because of the sensitive nature of the questions, we offered self-administered survey completion to give participants privacy to answer the questions as truthfully as possible. Demographic questions included questions regarding their relationship status. Main sexual partner was defined as a sexual partner one has for 6 or more months and included husbands (for those who are married), whereas, casual partner was defined as a "secret" sexual partner one has sex with occasionally and included the one-night-stand sex partners. In the South African context, a casual partner is known as "*umakhwapheni*" and the term is used to describe any person whom a man or woman has sex with occasionally with their sexual relationship kept "secret" from others. For this study, we translated the commonly used term for a casual partner (*umakhwapheni*) into "secret" sex partner, which participants are used to and can relate to. We included reproductive health questions, such as number of pregnancies and reproductive intentions.

We included questions on ever and current use of contraceptives, and awareness and knowledge of, and attitudes toward the contraceptive implant, in particular. To assess ever use of contraceptives, women were asked the following question: "have you ever used any method of modern contraception?" (see **Table 1**). We asked about knowledge of different types of contraceptive methods, the sources of information about the methods, and whether a health worker had ever offered them the method.

To assess knowledge of the implant, participants were provided with a set of seven statements regarding the safety (e.g., "Most women can safely use the implant") and effectiveness of the implant (e.g., "The implant is very effective at preventing pregnancy") (see **Table 2**). A three-point Likert scale was used (agree, disagree, and unsure). The internal consistency of the knowledge composite was good, given that our intent was to assess a broad range of information and misinformation about the implant (Cronbach's α: 0.64; 95% CI: 0.60–0.69).

To measure perceived outcome expectancies of the use of the contraceptive implant, participants were asked to imagine how it would be for them if they were to use the implant (see **Table 2**). The women were provided with 11 statements, each reflecting a positive and a negative outcome expectancy [e.g., "I think that if I were to use the implant it would be very good because it lasts for a long time" (positive) and "I think that if I were to use the implant, the implant would move around my body" (negative)]. A three-point Likert scale was used (agree, disagree, or unsure). The items of this composite were used as specific attitudinal indicators of perceived outcome expectancies of personal use. Finally, to measure the intention, participants were asked whether they thought they might use the contraceptive implant in the future (response options: yes, no, or unsure). We measured the intention to assess whether women have any future plans of using the implant as a preferred long-term method of contraception (**Tables 1**, **2**). A copy of the questionnaire with the full statements is provided as an additional file [**Supplementary Material 1**: Questionnaire].

## Procedure

A research assistant approached the women who were attending and receiving family planning and STI services at the clinic and briefly informed them about the study. Those interested were then screened for eligibility and enrolled upon meeting the eligibility criteria described above. The research assistant conducted the informed consent process with interested participants in their preferred language, which was mainly isiXhosa. Participants were then given a copy of their signed consent form with an information sheet containing details of the principal investigator, ethics committee member, and the study coordinator whom they contact if they need further information about the study or they want to report any misconduct about the study procedures. Participants were given the paper survey on a clipboard, and they sat at some distance from others in the waiting room while they completed the survey. The survey was translated into isiXhosa, a native language spoken by the majority in the community surrounding the clinic. An instruction was provided before every question (which was also translated) to help participants understand how to respond to the questions. They used a paper folder to shield the survey they were completing from the view of others. This is not ideal, and we have acknowledged this as another limitation of this study.

The study was approved by the South African Medical Research Council's Ethics Committee (EC018-10/2013) and the University of Connecticut Institutional Review Board (H12-340).

## Data Analyses

Data were analyzed using SPSS version 25 (IBM Corp, Armonk, New York) and the R Program version 3.0 (R Core Team, Austria). Prior to analysis, items were rescored so that the valid statements and positive attitudes scored the highest. A score was composed of the seven items of knowledge composite and used in the multivariate analysis. We did not compose a score for the perceived outcome expectancy composite, as we used each item as a specific indicator of outcome expectancies.

Descriptive statistics were generated to get an overview of the sample characteristics. Univariate ordinal regression was then conducted to determine the associations between knowledge, and perceived outcome expectancies, and the intention to use the contraceptive implant in the future. Multiple ordinal regression was performed to examine the factors independently associated with the intention of women to use the contraceptive

**TABLE 1 |** Cross-tabulation of demographic characteristics, reproductive intentions, and contraception use by intention to use the contraceptive implant in the future among women in Cape Town, South Africa.

| | Intend to use contraceptive implant in future? | | | | |
|---|---|---|---|---|---|
| **Variables** | **Yes *n* (%)[#]** | **Unsure *n* (%)** | **No *n* (%)** | **Total *n*** | ***p*-value (Chi squared)** |
| Total | 97 (21) | 131 (28) | 235 (51) | 463 | |
| **Demographics** | | | | | |
| Age | | | | | |
| <24 years | 28 (20) | 37 (27) | 73 (53) | 138 | 0.83 |
| >24 years | 69 (21) | 94 (29) | 162 (50) | 325 | |
| Employed | | | | | |
| Yes | 30 (18) | 50 (30) | 84 (51) | 164 | 0.50 |
| No | 67 (22) | 80 (27) | 151 (51) | 298 | |
| Education | | | | | |
| Completed high school | 44 (29) | 44 (29) | 64 (42) | 152 | **0.01** |
| Did not complete high school | 53 (17) | 85 (28) | 171 (55) | 309 | |
| Main sexual partner | | | | | |
| Yes | 78 (20) | 109 (29) | 196 (51) | 383 | 0.86 |
| No | 17 (23) | 22 (29) | 36 (48) | 75 | |
| Casual sexual partners | | | | | |
| Yes | 20 (29) | 20 (29) | 28 (42) | 68 | 0.09 |
| No | 72 (19) | 110 (28) | 204 (53) | 386 | |
| Marital status | | | | | |
| Yes | 14 (21) | 19 (28) | 34 (51) | 67 | 1.00 |
| No | 82 (21) | 110 (28) | 199 (51) | 391 | |
| Living with sexual partner or husband | | | | | |
| Yes | 31 (21) | 47 (31) | 72 (48) | 150 | 0.60 |
| No | 66 (21) | 84 (27) | 162 (52) | 312 | |
| **Reproductive intentions and contraceptive use** | | | | | |
| Ever been pregnant | | | | | |
| Yes | 70 (21) | 85 (26) | 176 (53) | 331 | 0.12 |
| No | 26 (20) | 46 (35) | 59 (45) | 131 | |
| Currently pregnant | | | | | |
| Yes | 5 (28) | 4 (22) | 9 (50) | 18 | 0.34 |
| No | 89 (21) | 116 (28) | 211 (51) | 416 | |
| Unsure | 2 (7) | 11 (41) | 14 (52) | 27 | |
| When do you intend to have a(nother) child | | | | | |
| >36/unsure/don't want a child | 82 (20) | 115 (28) | 207 (52) | 404 | 0.65 |
| In the next 12–36 months | 14 (26) | 15 (27) | 26 (47) | 55 | |
| HIV status | | | | | |
| Positive | 28 (27) | 29 (28) | 46 (45) | 103 | 0.19 |
| Negative | 62 (19) | 86 (27) | 171 (54) | 319 | |
| Unsure/refuse to answer | 7 (17) | 16 (39) | 18 (44) | 41 | |
| Main sexual partner or husband want child | | | | | |
| No | 61 (22) | 75 (28) | 134 (50) | 270 | 0.64 |
| Yes | 36 (19) | 56 (29) | 98 (51) | 190 | |
| Ever used any modern family planning method[$] | | | | | |
| Yes | 77 (22) | 96 (27) | 179 (51) | 352 | 0.56 |
| No | 20 (18) | 35 (32) | 55 (50) | 110 | |
| Partner's feelings about contraceptive use | | | | | |
| Supportive | 56 (20) | 74 (26) | 157 (54) | 287 | 0.10 |
| Other* | 40 (23) | 56 (32) | 77 (45) | 173 | |

*(Continued)*

**TABLE 1** | Continued

| Variables | Intend to use contraceptive implant in future? | | | | |
|---|---|---|---|---|---|
| | Yes *n* (%)[#] | Unsure *n* (%) | No *n* (%) | Total *n* | *p*-value (Chi squared) |
| Ever had implant | | | | | |
| Yes | 28 (43) | 9 (14) | 28 (43) | 65 | **0.01** |
| No | 69 (17) | 122 (31) | 206 (52) | 397 | |
| HCW ever offered implant | | | | | |
| Yes | 57 (30) | 40 (21) | 95 (49) | 192 | **0.01** |
| No | 40 (14) | 91 (34) | 140 (52) | 271 | |
| Currently have implant | | | | | |
| Yes | 22 (41) | 6 (11) | 26 (48) | 54 | **0.01** |
| No | 75 (18) | 124 (30) | 208 (52) | 407 | |

**Not supportive, neutral/don't know, HCW, healthcare worker.*
*[#]Row percentages rounded to add up to 100%.*
*[$]Modern family planning method was defined as injectable, birth control pill, and LARC methods. Bold value indicates significant.*

implant in the future. The regression model was fitted under the assumption of proportional risk. All variables that were significant in the univariate analysis together with the knowledge scale score were included in the multiple regression analysis to further explore the associations. The variables were entered in a stepwise approach, both in the univariate and multivariate analyses with complete case analysis applied. The level of significance for the statistical tests in the study was set at $p \leq 0.05$). The proportion of missingness in this study was <4% and occurred at an item level. According to Schafer (24), a missing rate of 5% or less is considered not significant. Thus, no missing data mechanism was used to impute the missingness.

# RESULTS

## Description of Participants

A total of 481 women completed the survey, representing an approximately 80% response rate. The age of participants ranged from 18 to 48 years, with the mean age of 29.1 years and SD of 6.8, and with 28.7% ($n = 138$) below the age of 24 years. About 34% of participants were employed. The majority (64.2%, $n = 309$) of participants did not complete secondary schooling. About 79.6% ($n = 383$) of participants reported having a main sexual partner (sex partner whom one has sex with for 6 months or more) and 15.6% ($n = 75$) reported having a casual sexual partner. A casual sex partner, also known as a "secret" sex partner, is a partner whom one has sex with occasionally. About 14% of participants were married. Among women who reported having a main partner and those that reported being married, 31.2% were living with the partner. About 71% of the participants had ever been pregnant before, and 3.7% ($n = 18$) were currently pregnant. About 12.5% ($n = 55$) of the participants reported intending to have a child or become pregnant in the next 1 to 3 years. With regard to HIV status, 21.4% ($n = 103$) of the women reported being HIV positive, whereas 8.5% ($n = 41$) were either unsure or declined to answer.

## Contraceptive Use and Intentions

Nearly all women (99.8%) reported having ever used a modern contraceptive method defined as injectable, oral contraceptive pill, and the LARCs. Among the women who ever used modern contraception, injectable contraception was reported as the most common method ever used at 90.1% followed by the oral contraceptive at 27.0%. Ever use of LARCs was lower, with the implant at 11.6% and the intrauterine device at 10.8% among those who had used a method. With regard to condom use, among those who ever had sex, 77.8% have used a male condom and 16.3% have used a female condom.

With the current use of contraceptives, most women (71.1%) reported currently using the injectable, followed by the oral contraceptive at 15.8%. About 9.4% of women were currently using the implant, and 4.2% were using an intrauterine device (IUD). Condoms were currently used by 57.8% of all the women in this study. Only 9.2% of all women were currently not using any method of contraception. Among all participants, 75.6% have heard about the contraceptive implant and 21.0% intended to use the implant in the future, and 28.3% were unsure whether they would use it, and 51.0% did not intend to use it.

**Table 1** presents the demographic characteristics, reproductive intentions, and contraceptive use by the intention to use the implant among participants in the future. Intentions to use the implant were positively and significantly associated with having completed high school, having used the implant before, ever having been offered the implant by a health worker, and currently having the implant (see **Table 1**).

## Factors Associated With the Intention to Use a Contraceptive Implant

**Table 2** presents a univariate analysis between the items in the knowledge and the perceived outcome expectancy composites, against the intention to use the implant among all women in the study. All variables under the knowledge composite were significantly associated with the intention to use the contraceptive implant (see **Table 2**). Women who had better knowledge about the safety of the implant were more likely to

**TABLE 2 |** Ordinal regression and cross-tabulations of knowledge and perceive outcome expectancies of the contraceptive implant with the intention to use the implant in the future among women in Cape Town, South Africa.

| | Intention to use contraceptive implant in future | | | | | |
|---|---|---|---|---|---|---|
| **Variables** | **Yes *n* (%)** | **Unsure *n* (%)** | **No *n* (%)** | **Total** | **OR (95% CI)** | ***P*-value** |
| **Knowledge** | | | | | | |
| Most women can safely use the implant | | | | | | |
| Disagree (ref) | 19 (23) | 19 (23) | 44 (54) | 82 | **2.17 (1.66–2.87)** | **0.01** |
| Unsure | 26 (12) | 75 (35) | 116 (53) | 217 | | |
| Agree | 51 (31) | 37 (23) | 74 (46) | 162 | | |
| Teenagers can safely use the implant | | | | | | |
| Disagree (ref) | 9 (16) | 9 (16) | 37 (67) | 55 | **1.76 (1.38–2.25)** | **0.01** |
| Unsure | 19 (10) | 69 (36) | 105 (54) | 193 | | |
| Agree | 69 (32) | 53 (25) | 93 (43) | 215 | | |
| Women who have not yet had a baby can safely use the implant | | | | | | |
| Disagree (ref) | 12 (22) | 14 (25) | 29 (53) | 55 | **1.30 (1.05–1.63)** | **0.02** |
| Unsure | 13 (11) | 51 (44) | 53 (45) | 117 | | |
| Agree | 72 (25) | 66 (23) | 150 (52) | 288 | | |
| Women with HIV can safely use the implant | | | | | | |
| Disagree (ref) | 5 (12) | 11 (27) | 25 (61) | 41 | **1.34 (1.05–1.72)** | **0.02** |
| Unsure | 8 (8) | 36 (35) | 60 (58) | 104 | | |
| Agree | 83 (26) | 84 (27) | 149 (47) | 316 | | |
| The implant is very effective at preventing pregnancy | | | | | | |
| Disagree (ref) | 39 (29) | 30 (23) | 64 (48) | 133 | **1.89 (1.44–2.51)** | **0.01** |
| Unsure | 33 (14) | 79 (33) | 129 (54) | 241 | | |
| Agree | 24 (28) | 21 (24) | 41 (48) | 86 | | |
| The implant protects against STIs and HIV | | | | | | |
| Disagree (ref) | 45 (27) | 32 (19) | 90 (54) | 167 | 0.92 (0.70–1.21) | 0.56 |
| Unsure | 33 (15) | 80 (37) | 105 (48) | 218 | | |
| Agree | 19 (25) | 18 (24) | 39 (51) | 76 | | |
| **Perceived outcome expectancies [I think that if I were to use the implant…]** | | | | | | |
| It could be easily inserted | | | | | | |
| Disagree (ref) | 19 (23) | 19 (23) | 44 (54) | 82 | **1.31 (1.01–1.68)** | **0.04** |
| Unsure | 26 (12) | 75 (35) | 116 (53) | 217 | | |
| Agree | 51 (31) | 37 (23) | 74 (46) | 162 | | |
| It could be easily removed | | | | | | |
| Disagree (ref) | 9 (16) | 9 (16) | 37 (67) | 55 | **1.82 (1.39–2.40)** | **0.01** |
| Unsure | 19 (10) | 69 (36) | 105 (54) | 193 | | |
| Agree | 69 (32) | 53 (25) | 93 (43) | 215 | | |
| It will be very convenient | | | | | | |
| Disagree (ref) | 12 (22) | 14 (25) | 29 (53) | 55 | 1.06 (0.82–1.36) | 0.66 |
| Unsure | 13 (11) | 51 (44) | 53 (45) | 117 | | |
| Agree | 72 (25) | 66 (23) | 150 (52) | 288 | | |
| It would be very good, because it lasts long | | | | | | |
| Disagree (ref) | 5 (12) | 11 (27) | 25 (61) | 41 | **1.54 (1.17–2.05)** | **0.00** |
| Unsure | 8 (8) | 36 (35) | 60 (58) | 104 | | |
| Agree | 83 (26) | 84 (27) | 149 (47) | 316 | | |
| I'd worry about gaining weight | | | | | | |
| Disagree (ref) | 39 (29) | 30 (23) | 64 (48) | 133 | 0.95 (0.73–1.23) | 0.71 |
| Unsure | 33 (14) | 79 (33) | 129 (54) | 241 | | |
| Agree | 24 (28) | 21 (24) | 41 (48) | 86 | | |
| I'd worry about bleeding changes | | | | | | |
| Disagree (ref) | 45 (27) | 32 (19) | 90 (54) | 167 | 1.04 (0.80–1.34) | 0.78 |

*(Continued)*

**TABLE 2 |** Continued

| Variables | Intention to use contraceptive implant in future | | | | | |
|---|---|---|---|---|---|---|
| | Yes *n* (%) | Unsure *n* (%) | No *n* (%) | Total | OR (95% CI) | *P*-value |
| Unsure | 33 (15) | 80 (37) | 105 (48) | 218 | | |
| Agree | 19 (25) | 18 (24) | 39 (51) | 76 | | |
| I could get pregnant soon after it's been removed | | | | | | |
| Disagree (ref) | 28 (34) | 18 (22) | 36 (44) | 82 | 1.05 (0.81–1.35) | 0.74 |
| Unsure | 28 (12) | 74 (31) | 133 (57) | 235 | | |
| Agree | 41 (28) | 39 (27) | 66 (45) | 146 | | |
| It could stop me from getting pregnant and make it harder in future | | | | | | |
| Disagree (ref) | 29 (24) | 28 (24) | 62 (52) | 119 | 1.16 (0.89–1.51) | 0.27 |
| Unsure | 40 (16) | 81 (32) | 133 (52) | 254 | | |
| Agree | 28 (31) | 21 (24) | 40 (45) | 89 | | |
| It could move around my body | | | | | | |
| Disagree (ref) | 21 (25) | 27 (32) | 37 (44) | 85 | 1.01 (0.79–1.31) | 0.91 |
| Unsure | 32 (14) | 75 (33) | 123 (53) | 230 | | |
| Agree | 44 (30) | 29 (20) | 75 (51) | 148 | | |
| It would be painful | | | | | | |
| Disagree (ref) | 30 (22) | 35 (25) | 73 (53) | 138 | 1.20 (0.94–1.53) | 0.14 |
| Unsure | 29 (14) | 73 (35) | 107 (51) | 209 | | |
| Agree | 38 (33) | 23 (20) | 55 (47) | 116 | | |
| It could harm future babies | | | | | | |
| Disagree (ref) | 12 (24) | 8 (16) | 29 (59) | 49 | 1.28 (0.97–1.70) | 0.08 |
| Unsure | 34 (14) | 88 (36) | 121 (50) | 243 | | |
| Agree | 51 (30) | 35 (20) | 85 (50) | 171 | | |

*P is significant at p ≤ 0.05. Bold value indicates significant.*

intend to use it than those with poor safety knowledge of the implant. Similarly, women who had better knowledge about the safety of implants for use by teenage girls, and for women infected with HIV were more likely to intend to use it. With regard to perceived outcome expectancy composite, women who believed that using the contraceptive implant is good because it lasts longer, the implant can be easily removed, and it can be easily inserted were more likely to have the intention to use the implant.

The multiple ordinal regression analysis (**Table 3**) shows that women who had completed high school were more likely to intend to use the implant than women who had not (OR: 2.04; 95% CI: 1.35–3.11, $p < 0.01$). Women who had ever been pregnant (OR: 1. 62; 95% CI: 1.00–2.62, $p = 0.05$), and women who felt they had the support of their partner to use contraception (OR: 1.51, 95% CI: 1.01–2.27, $p = 0.05$) were more likely to intend to use the implant compared to women who had not been pregnant and women whose partners were not supportive of contraception use, respectively. Participants who thought that the implant could easily be removed were more likely to intend to use it than those who did not believe it could be (OR: 1.59, 95% CI: 1.15–2.23, $p = 0.01$).

## DISCUSSION

This study examined factors associated with the intention to use the contraceptive implant, including knowledge and beliefs about the implant and perceived outcome expectancies of implant use among women of reproductive age in a primary health clinic in Cape Town, South Africa. The findings indicate that the intention to use the contraceptive implant is significantly associated with the correct knowledge about the implant, having completed secondary schooling, having been pregnant before, support of partner for women to use an implant, and the perceived outcome expectancies of using the implant. These findings are not surprising as limited knowledge of the different contraceptive methods in general, not only of the implant but also low levels of education and lack of partner support to use contraceptives have been reported in a number of studies, both locally and globally (5, 17–19, 25–29). Limited knowledge and awareness of the implant, in particular among women in the country, is thought to contribute to its low uptake (14). The majority of the participants in this study did not complete secondary school education, and this finding is similar to other research in the country where a substantial proportion of women with an unmet need for contraception were those with low levels of education and not in professional employment (26).

Given that most women know more about injectable and oral contraceptives and are more likely to use these methods of contraception, it is likely that they may not be using the implant and other methods of contraception because they are not well-informed about them. It is also possible that women are not receiving comprehensive contraception education and

**TABLE 3 |** Multiple ordinal regression of intent to use contraceptive implant in future on selected socio-demographic, knowledge, and perceived outcome expectancy variables among women in Cape Town, South Africa.

| | | Intention to use contraceptive implant in future | | | |
|---|---|---|---|---|---|
| **Variables** | | **OR** | **95% CI** | | ***p*-value** |
| **Demographics** | | | | | |
| Age | (≤24* vs. >24) | 1.49 | 0.92 | 2.44 | 0.11 |
| Living with sexual partner or husband | (Yes vs. No*) | 1.21 | 0.79 | 1.83 | 0.42 |
| Education | (Completed high school* vs. not completed) | **2.04** | **1.35** | **3.11** | **<0.01** |
| **Childbearing, fertility intensions, and contraception** | | | | | |
| Previous pregnancy | (Yes* vs. No) | 1.62 | 1.00 | 2.62 | 0.05 |
| When do you intend to have a(nother) child | (<36 vs. >36 months) | 1.21 | 0.66 | 2.21 | 0.46 |
| Husband want child | (Yes vs. no*) | 0.75 | 0.50 | 1.10 | 0.11 |
| Clinic visit for family planning | (Yes vs. No*) | 0.81 | 0.53 | 1.24 | 0.26 |
| Partner's feeling about contraceptive use | (Supportive* vs. other) | **1.51** | **1.01** | **2.27** | **0.05** |
| HCW ever offered implant | (Yes vs. No*) | 1.14 | 0.76 | 1.71 | 0.39 |
| Ever had implant | (Yes vs. No*) | 1.70 | 0.91 | 3.16 | 0.07 |
| **Knowledge** | | | | | |
| Knowledge about the implant | (composite score) | 1.70 | 0.91 | 3.16 | 0.07 |
| **Perceived outcome expectancies [I think that if I were to use the implant…]** | | | | | |
| It could be easy to remove | (Disagree* vs. unsure vs. agree) | **1.59** | **1.15** | **2.23** | **0.01** |
| I could get pregnant soon after removing it | (Disagree* vs. unsure vs. agree) | 1.60 | 1.16 | 2.22 | 0.40 |
| It could harm future babies | (Disagree* vs. unsure vs. agree) | 1.03 | 0.74 | 1.45 | 0.12 |

**Reference category, Bold = significant.*

counseling during their family planning visits, an opportunity to provide accurate and consistent information about all available methods of contraception to all women. Patel et al. (22) highlighted the need to educate women before providing them with the implant as its side effects, such as the change in bleeding pattern leads to early removal and discontinuation of the implant. A study conducted by Brown (21) in the UK also concluded that adequate counseling for women and adolescents about the side effects of the implant is extremely important to reduce the rate of discontinuation. Additionally, limited knowledge and awareness of the implant was associated with poor uptake by women, including adolescent girls in the US (27). It has also been highlighted in South Africa that education and counseling during family planning visits are limited, particularly on the effectiveness of the different methods available (13, 28). If women are not well-informed about the contraceptive implant and are unprepared for the side effects, then they have negative perceived outcome expectancies of the implant use and are unlikely to intend to use it, undermining efforts to improve accessibility and availability of the method. The limited knowledge of the implant could be improved by ensuring that all information related to contraceptives, including the implant, is available in the different South African languages where most women can easily access it regardless of their education level and ensure comprehensive contraception education and counseling during all family planning visits. Knowledge and awareness about the different methods of contraception, including the implant, can also help improve the perceived outcome expectancies, eliminate the misconceptions about them, particularly those who can have serious unintended consequences, such as increasing the rates of STIs among some implant users due to the belief that it prevents them. Therefore, tailored interventions to specifically meet the needs of all women, regardless of their level of education, should be prioritized when designing interventions to improve knowledge about, and attitudes toward the implant and other contraceptives, while increasing their intentions to use them.

Improved knowledge of contraceptive methods may improve the uptake of other methods, such as the uptake of the implant in the country. This is not to encourage the promotion of the implant or other LARC methods but to highlight the importance of comprehensive contraception counseling where all methods are discussed with all women seeking family planning to enable them to make informed decisions on the method most suitable for them. Furthermore, comprehensive contraception education and counseling will help align the specific reproductive needs and desires of an individual with the ideal contraceptive method of her choice. As stated in the 2012 contraception policy and guidelines, LARCs provide women with more contraceptive options in which they can choose based on their reproductive needs and intentions (1), and they must be viewed and offered in that way and not promoted over other methods as that compromises the women's reproductive rights. Therefore, family planning program and interventions in the country must place

women at the center of the service and provide them with all relevant information about contraceptive methods available to them, in line with their reproductive needs and desires to ensure that no woman is steered or coerced to use any method of contraception.

The finding on partner support being associated with the intention to use the implant is not unfamiliar in the family planning services, and in South Africa as gender inequalities continue to disproportionately affect women. Pillay et al. (13) also reported on lack of partner support as another reason some women removed or discontinued the implant. In our previous study, we found that limited knowledge of contraceptives among men was the main factor contributing to lack of support of men for use of contraceptives of female intimate partners (29). Although, engaging men in family planning programs has received some attention recently, this finding highlights that more efforts are needed to alleviate gender inequalities and empower women to make their own reproductive choices and not fear for their partners in taking such decisions.

There are some important limitations to be considered in interpreting the findings of this study. The first limitation is the cross-sectional nature of the study, which cannot infer causality, i.e., improving the knowledge and attitude of women about the contraceptive implant will not necessarily result in the increase of the intention to use the implant, and the uptake thereof. The second limitation is the setting in which this study was undertaken, limiting the generalizability of study findings. The clinic was a family planning and STI treatment clinic only, and therefore, only women who were coming to seek family planning services and/or receiving STI treatment were included in the study. We acknowledge the limitations of privacy within this public facility in which we as researchers did not have control of, although, we did our best to ensure participants complete the questionnaire in the safest and most private way the facility could afford us. We also acknowledge that the intention to use a method is not a simple straightforward concept to understand, and the fact that the response is for the future in that it is a possibility rather than a certainty, is another limitation for this study. Despite these limitations, the findings of this study highlight the factors that need to be addressed in order to increase the knowledge and intention of women to use the contraceptive implant and ultimately improve the overall uptake of contraceptives among women in the country.

## CONCLUSIONS

The findings of this study show that knowledge and attitude play an important role in the intention to use any family planning method among women, but more so toward the implant. The support of the partner for contraceptive use is also an important factor for the intention of women to use contraceptives, and thus partners need to be included as well when planning and rolling out interventions to increase knowledge and awareness, and the intentions to use contraceptives including the LARCs. Our study highlights the importance of comprehensive contraception education and counseling provision during family planning visits to empower women to make informed decisions about contraceptives that best suit their needs and preferences. This may also aid in improving their overall knowledge and attitudes toward contraceptive methods and eliminates the existing myths and misconceptions around contraceptives. Provision of comprehensive contraception education and counseling during family planning consultation is an important step toward improving the knowledge and awareness about different contraceptive methods, including the implant among women, and subsequently the uptake thereof. These findings are valuable and offer a better understanding of the reasons behind the low uptake of, and the discontinuation of the contraceptive implant among women in the country, as the government has invested in the provision of the implant at no cost. More research is needed to explore ways in which contraceptive education can be incorporated in the school curriculum to improve knowledge and awareness of adolescent girls on various contraceptive methods and help improve their uptake. Efforts to train health providers in the provision of education and counseling about LARCs in general and encourage them to advocate for the LARCs first need to be escalated to improve the implant uptake among women in South Africa.

## 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 South African Medical Research Council's Ethics Committee (EC018-10/2013) and the University of Connecticut Institutional Review Board (H12-340). The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

KJ and MM performed the data analysis and interpretation of the data. KJ prepared the first draft of the manuscript. CMo, MK, SK, CL, and CMa contributed to the analysis, interpretation of results, and writing of the manuscript. All authors participated in the conception and design of the study, participated in the reviewing of the content for submission, and approved the final version of the manuscript.

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## SUPPLEMENTARY MATERIAL

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# The Potential of Self-Managed Abortion to Expand Abortion Access in Humanitarian Contexts

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Refugees and displaced people face uniquely challenging barriers to abortion access, including the collapse of health systems, statelessness, and a lack of prioritization of sexual and reproductive health services by humanitarian agencies. This article summarizes the evidence around abortion access in humanitarian contexts, and highlights the opportunities for interventions that could increase knowledge and support around self-managed abortion. We explore how lessons learned from other contexts can be applied to the development of effective interventions to reduce abortion-related morbidity and mortality, and may improve access to information about safe methods of abortion, including self-management, in humanitarian settings. We conclude by laying out a forward-thinking research agenda that addresses gaps in our knowledge around abortion access and experiences in humanitarian contexts.

**Keywords: abortion, self-managed abortion, humanitarian contexts, refugees, self-care interventions, safe abortion care, humanitarian crises**

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## INTRODUCTION

The ability to control one's fertility is a fundamental human right (1, 2). Unfortunately, this right is not universally enjoyed or accessible to all people, and reproductive oppression—the control and exploitation of women, girls, and individuals through their bodies, sexuality, labor, and reproduction—persists globally. The consequences of this oppression are inequitably magnified by statelessness, disrupted communities, and health systems. The World Health Organization (WHO) estimates that almost all of the annual 25.1 million unsafe abortions globally occur in low and middle income regions; unsafe abortion is responsible for an estimated 8–13% of global maternal deaths, with low and middle-income country-specific rates frequently much higher (3). Little is known about the magnitude of unsafe abortion and its associated outcomes in humanitarian settings, although both are thought to be much worse (4). While the need for abortion services likely increases during humanitarian crises, the abortion needs and experiences of people living in humanitarian settings are often ignored. Expanding access to abortion information, support, and services is critical to ensuring the reproductive autonomy of individuals in crisis settings, yet it is rarely prioritized.

Interventions that support people who are self-managing an abortion with misoprostol alone, or in combination with mifepristone, have the potential to dramatically increase safe abortion access (5). This type of autonomous management is commonly

referred to as self-care. Self-care is defined by the WHO as "the ability of individuals, families and communities to promote health, prevent disease, maintain health, and cope with illness and disability with or without the support of a healthcare provider," and includes self-managed abortion with medications (SMA) as one of its recommended interventions (6). However, further research is needed to fully understand the scope of barriers and facilitators to increase access to self-managed abortion information and support for refugees and displaced people. This paper addresses the research gaps in our current understanding of abortion access in humanitarian contexts, explores existing barriers to safe abortion care in these settings, highlights the potential of SMA as a person-centered strategy to increase reproductive autonomy, and proposes priorities for future research in humanitarian contexts.

## ABORTION IN HUMANITARIAN CONTEXTS

There is little to no published data documenting the incidence of or experiences with abortion among individuals living in refugee camps or settlements. Given what we know about the nature of humanitarian emergencies, the need for abortion services likely increases due to the collapse of health systems, disruptions in contraceptive use and access, and increased exposure to sexual violence or transactional sex (4). As a result, displaced and conflict-affected people may be at increased risk of the consequences of lack of abortion care access, including forced childbearing, and morbidity and mortality related to unsafe abortion. An estimated 61% of maternal deaths occur in fragile states, many of which are affected by conflict and recurring natural disasters. However, accurate estimation in individual conflict-affected areas remains a challenge. Recent studies have documented a nearly 2-fold increase in post-abortion care utilization between 2012–2013 and 2015–2017 in the Democratic Republic of Congo, Somalia, and Yemen, highlighting the critical role that comprehensive safe abortion services could play (7, 8).

Despite the confluence of factors that highlight the need to prioritize abortion access, lack of research on the need for abortion services, misconceptions about the legality of abortion provision, lack of funding and donor attention, limited trained providers, and misperceptions around the technical difficulty of abortion care all serve as barriers to abortion provision from humanitarian organizations (4). Gaps in the health system, lack of commodities, lack of knowledge about the legal status of abortion and where to obtain safe services (particularly for those who are displaced across country borders), and high stigmatization of abortion are additional barriers specific to displaced people. In light of these challenges, the Inter-Agency Working Group on Reproductive Health in Crisis (IAWG) has developed a comprehensive field manual on sexual and reproductive health, which has included stand-alone chapters on safe abortion since 2010, and successfully advocated to include safe abortion in the Minimum Initial Service Package (MISP) for Sexual and Reproductive Health in 2018 (9, 10). While the MISP includes safe abortion as a priority activity, safe abortion services are routinely excluded from reproductive health service provision in humanitarian settings, and research has shown that abortion care is almost non-existent in humanitarian programming or proposals (11, 12). Citing their professional and moral responsibility to reducing maternal mortality, some humanitarian agencies, such as Médecins Sans Frontières, have explicitly stated their commitment to providing comprehensive abortion care in spite of global policy and legal barriers (13), and the International Rescue Committee has prioritized SMA in humanitarian settings as an organizational research and innovation priority. While there is some momentum in the provision of abortion care in these settings, progress has been slow, even as more nations expand the legal indications for abortion. Given these unique challenges, targeted interventions designed to increase abortion access are needed.

Research conducted among Congolese refugees in Uganda suggest many were unable to navigate the legal restrictions on abortion in that country and were instead engaging in unsafe abortion practices, such as ingesting detergents or pain medications or inserting crushed bottles and sticks into the uterus; legal restrictions on induced abortion also posed a barrier to the provision of post-abortion care (14). Additionally, recent studies on the experience of training and implementing safe abortion services in Bangladesh to Rohingya refugees highlights the immense need for abortion services: less than two years after the influx of refugees, almost 8,000 people had received abortion-related care, over 75% of which were legal induced abortions (15, 16). This case study from Bangladesh translates evidence-based findings into common practice and documents the first time legal induced abortion care, in the form of menstrual regulation in Bangladesh, has been offered and brought to scale during an acute emergency, showing both the demand for and feasibility of such a response.

Despite the evidence suggesting the need for safe abortion services and consensus in the humanitarian community about the importance of providing comprehensive abortion care, only three peer-reviewed papers published in the past 10 years documenting detailed individual-level abortion experiences of those living in refugee camps or settlements were identified; data from all three papers are drawn from the same research study. In this study on women from the Democratic Republic of Congo who experienced sexual-violence related pregnancies, barriers to termination among those who carried these pregnancies to term included: fear of death from unsafe abortion procedures, lack of knowledge of where to access services, or a failed abortion or ongoing pregnancy after attempting to terminate with herbal remedies (17). Among those who did terminate their pregnancies, the majority used medications (most commonly, quinine) or traditional herbs (most commonly, cimpokolo, or *Phytolacca dodecandra*) obtained on their own or through family, friends, or traditional healers (18). Many reported seeking medical care as a result of their symptoms; it is unknown whether the methods they used were successful on their own, or if participants obtained surgical procedures or other post-abortion care treatment in order to terminate their pregnancies after inducing bleeding. Findings from these studies corroborate other qualitative findings that have found a lack of access to information on abortion in humanitarian settings, and highlight

the need for interventions that increase access to information on self-managed safe abortion.

## POTENTIAL OF ABORTION SELF-CARE IN HUMANITARIAN CONTEXTS

Within the humanitarian field, many of the calls for action have focused on overcoming barriers to facility-based abortion care provision (19). While these efforts are critical, this view often centers clinic-based care as the gold standard of abortion provision and ignores the reality that for many, "safety" of abortion care involves more than the location or provider involved (20). Evidence from other settings where SMA is common indicates that fear of mistreatment and stigma from providers, as well as concerns around privacy, are primary drivers for why people choose to self-manage despite the availability of abortion services within the formal healthcare system (21–23). Such concerns are likely heightened during displacement, where known caregivers and community intermediaries are replaced by systems managed by new state actors or international non-governmental organizations.

As a result of misconceptions about the legality of abortion provision, as well as perceived loss of funding or donor unwillingness to support abortion provision, humanitarian organizations responsible for provision of health care services in refugee camps, settlements, or conflict-affected areas, either do not provide abortion services, or are unable to meet the full need for abortion services in these contexts (4, 24). Logie et al. have highlighted the potential of self-care interventions in advancing sexual and reproductive health in humanitarian settings, as they can increase lay health worker capacity and potentially better serve the needs of individuals who face additional marginalization such as adolescents, lesbian, gay, transgender, and gender expansive people, and people with disabilities (25). A growing body of evidence suggests that individuals can safely and effectively manage their abortions if they have access to WHO-approved medications for abortion (misoprostol alone, or misoprostol in combination with mifepristone) and information is available about how to take the pills, confirm abortion completion, and how to recognize warning signs that might warrant follow-up medical care (23, 26). Indeed, the WHO has highlighted the potential of self-care interventions, including SMA, as a strategy that gives individuals greater control over their experience and privacy, while also overcoming challenges such as healthcare worker shortages and high out-of-pocket-costs (6).

Global evidence has demonstrated the safety and effectiveness of a range of models for providing information and support for SMA. *Harm reduction* programs are based within the formal healthcare system, where medical providers provide individuals with information before and after SMA, but do not directly provide individuals with the medications (27). Individuals might access medication from *pharmacies* or informal drug sellers; though the quality of the information that they receive can be variable (28). *Abortion accompaniment networks*, along with *safe abortion hotlines*, are run by lay counselors and feminist activists, and offer individualized evidence-based counseling and support, including information on how to self-assess eligibility for medications, how to procure medications, how to take the medications, how to manage abortion symptoms and assess completion, when to seek healthcare, and offer virtual or in-person guidance and support throughout the process (29, 30). In *community-distribution programs,* community health workers, midwives, or lay providers are trained in providing counseling and support around medication abortion and directly distribute the medications to individuals to ensure quality of the drugs provided. While work by Foster et al. on the Thai-Burma border (31) among Burmese migrants and refugees provides important evidence for the safety, effectiveness, feasibility, and acceptability of this model of abortion care, it is one of the only research studies evaluating any abortion access intervention in a humanitarian context. Additional research is urgently needed to develop appropriate, context-specific interventions that provide information and support to people who are self-managing their abortion through a variety of different models of support (32, 33).

There are many advantages to SMA—such as privacy, confidentiality, and affordability—that contribute to its potential to revolutionize safe abortion access in humanitarian settings. SMA interventions can be tailored to improve access for specific populations who are often not centered in intervention design or service provision, such as young people, LGBTQI individuals, and people with disabilities. Additionally, SMA can reduce the reliance on overburdened health systems, which may further increase access by providing people with an additional option for abortion care. The de-medicalization of this care is likely to be appealing to those who may have been persecuted or discriminated against prior to displacement and are still building trust in their new environments. Although the stigma of abortion is felt in both legally liberal and restrictive settings (34), additional cultural barriers and a loss of power and autonomy experienced by displaced people certainly magnifies these concerns.

However, there are additional considerations that are specific to humanitarian contexts. Which abortion medications are available and how are they accessed? How does access to water and sanitation facilities—especially shared toilets, lack of clean water, sanitary pads or cloths, which may make managing the products of conception and bleeding onerous and difficult to hide—affect abortion experiences? What are the impacts of poverty and a lack of access to cash, which can make purchasing abortion medications, pain control medications and hygiene materials, difficult decisions when placed against other individual and household needs? How does crowded housing and lack of privacy from other members of the household influence individual decisions around abortion methods and care seeking? What are the legal contexts, how are they understood and what are the contextual effects? These and other issues highlight the critical importance of empirical research on direct abortion experiences to understand the needs, barriers, and facilitating factors around abortion self-care.

## DISCUSSION

Despite the many calls for additional research, funding, and attention toward provision of safe abortion services for those living in humanitarian contexts, little is known about the abortion experiences of individuals in these contexts. No peer-reviewed evidence exists on the incidence of abortion in any humanitarian context, nor have any studies sought to rigorously assess the information needs, knowledge gaps, or experiences with abortion among those living in protracted humanitarian emergencies, an increasingly common situation as most displaced people now spend over 17 years of their lives in displacement. Limited evidence has suggested that women in humanitarian settings often resort to using unsafe methods to terminate their pregnancies, and that a substantial proportion of maternal mortality in such settings may be related to complications from unsafe abortion. Even in contexts where health-implementing organizations are providing comprehensive abortion services, lack of knowledge, fear of legal repercussions, and abortion stigma may prevent people from accessing care from these providers.

Given the potential of SMA to revolutionize access to abortion in a variety of settings, including in humanitarian settings, additional research exploring the barriers and facilitators for SMA is sorely needed. For example, inclusive research should seek to understand what information people need, how it should be delivered, what their preferences are around support during their process, how to support linkages to formal healthcare systems when needed or desired, how to center concerns about privacy and individual legal considerations depending on the context, and how and where people are sourcing the medications and the medication quality, among others.

Efforts to increase information and support for SMA should occur in tandem with efforts to strengthen facility-based abortion care. While SMA interventions can reach multitudes of people with lifesaving information long before humanitarian agencies have the political will and technical abilities to provide this care, humanitarian agencies and advocates should renew and strengthen their efforts to make facility-based abortion care accessible, as individuals not only deserve the right to have an abortion, but to decide where, how, and with what support their abortion takes place.

There is a human rights imperative to expanding and ensuring global abortion access—and those living in humanitarian contexts should not be overlooked. Interventions that support people who are self-managing their abortion have the potential to increase both the extent and the quality of abortion access in these settings; future research efforts should focus on centering the information needs and priorities of individuals in need of safe abortion care in these contexts to inform the development of person-centered interventions.

## DATA AVAILABILITY STATEMENT

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

## AUTHOR CONTRIBUTIONS

RJ, BP, TF, CG, RO, YW, EW, and UR conceptualized the perspective presented in this manuscript. RJ, BP, and TF drafted the manuscript. CG, EW, JK, RO, YW, and UR provided critical reviews and additions to the manuscript. All authors contributed to the article and approved the submitted version.

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REVIEW
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# Acceptability and Satisfaction of Contraceptive Vaginal Rings in Clinical Studies: A Systematic Review and Narrative Synthesis

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**Introduction:** Acceptability of and satisfaction with contraceptive methods are paramount for uptake and continuation. In the current context of multipurpose prevention of pregnancy and sexually transmitted diseases/HIV development, it is critical to have a better understanding of acceptability of and satisfaction with the contraceptive vaginal ring (CVR) including sexual satisfaction. The objective of this study was to review the evidence about acceptability of CVRs and general and sexual satisfaction of users.

**Methods:** We searched PubMed, CINAHL, and Web of Science (until December 31, 2020) and selected original studies documenting actual use of hormonal CVR and explicitly addressing any of the 3 outcomes.

**Results:** Of a total of 1,129 records screened, 46 studies were included. Most studies ($n = 43$, 93%) were prospective, conducted in high-income settings ($n = 35$), and reported on NuvaRing® use ($n = 31$). Overall, 27 (59%) studies included a comparison group, 38 (82%) studies used exclusively quantitative questionnaires, with qualitative only ($n = 4$, 9%), or mixed methods ($n = 4$, 9%) studies being less common. Ease of CVR insertion/removal/reinsertion was high in all the settings and improved with time of use, with qualitative studies supporting these findings. When mentioned, ring-related events were associated with discontinuation, and results on continuation of use were mixed. Among NuvaRing® studies, general satisfaction (being satisfied or very satisfied) was between 80 and 90% and tended to mirror continuation. Sexual satisfaction was less commonly reported and results were mixed. Overall, limited information was provided on actual CVR experiences of women (and men) and cultural norms that may affect sexuality and CVR use.

**Conclusion:** Positive aspects of acceptability of and satisfaction with CVRs were reported, but ring-related events and factors, which may affect long-term CVR use, deserve further study. More information is needed on actual experiences of women using CVRs, relationship aspects, male partner opinions, and contextual norms to better understand the acceptability of and satisfaction with CVRs.

**Keywords: contraceptive vaginal ring, hormonal contraception, acceptability, satisfaction, sexual satisfaction**

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# INTRODUCTION

Contraceptive vaginal rings (CVRs) have been developed since 1970 and 3 CVRs are currently available: the etonogestrel and ethinyl estradiol ring (marketed as NuvaRing®), the progesterone ring for breastfeeding women (Progering®), and the recently approved segesterone acetate (previously called Nestorone) and ethinyl estradiol ring (Annovera™) (1, 2). Advantages of CVRs are multiple: they are user-initiated and controlled, independent of sexual acts, and can provide long-term effective protection (1). Moreover, vaginal rings could be designed to include several active ingredients that provide prevention for HIV, other sexually transmitted infections (STIs), and pregnancy (3).

Acceptability of and satisfaction with contraceptive methods impact uptake, adherence, and continuation and, therefore, contribute significantly to contraceptive effectiveness (4). In clinical studies, acceptability of contraceptive methods is often documented through the effect of the product on bleeding patterns/cycle control, its side effects, and the duration of use. Satisfaction tends to reflect the perceptions of the product of user and is assessed quantitatively through levels of satisfaction during actual use and/or indirectly assessed through willingness to use in the future or recommend the method (1). Both the concept of acceptability and satisfaction are in fact intertwined as illustrated by validated quantitative tools in which overall satisfaction is considered a dimension of acceptability (5, 6). Moreover, given vaginal administration, CVRs may affect sexual relationships. To this end, sexual satisfaction with CVR has been studied more specifically using sexual function assessment tools such as the Female Sexual Function Index (7). In reality, acceptability and satisfaction are complex concepts that are influenced by physical, behavioral, physiological, interpersonal, and structural factors. Recent studies documenting the effectiveness of vaginal products and devices in the field of HIV prevention have confirmed the key contribution of acceptability to adherence and theoretical frameworks presenting pathways from various acceptability dimensions toward satisfaction and then to adherence have been developed to aid further inquiry (8).

Given the current focus and importance of multipurpose technology for prevention of pregnancy and STIs/HIV, it is critical to have a better understanding of what is commonly considered as acceptability and satisfaction of CVR and main reported results with respect to these outcomes including sexual satisfaction. The objectives of this study were to review the overall evidence of acceptability of CVRs and general and sexual satisfaction of users.

# MATERIALS AND METHODS

## Protocol and Registration

This study protocol was registered on the international prospective register of systematic reviews (PROSPERO) (CRD42017079157).

## Literature Search

Databases searched were PubMed, cumulative index to nursing and allied health literature (CINAHL), and Web of Science with a cutoff date of December 31, 2020. The main search terms were "contraceptive vaginal ring" and "acceptability" or "satisfaction" or "sexual satisfaction" and synonyms of each of these terms were also included. Additional search terms included "qualitative methods," "mixed methods," and "trials." The search strategies were adjusted according to the specifications of each database. Additional relevant publications from other sources (reference lists) were also included (**Supplementary Material S1**_Search strategy). The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) framework guidelines, flow diagram, and checklist were utilized to undertake this study.

## Selection Criteria

Studies were eligible if they included *actual CVR use* by healthy women of reproductive age (15–49 years) and *explicitly* addressed acceptability, satisfaction, and/or sexual satisfaction. We did not use specific definitions of acceptability and satisfaction because we wanted to learn which definitions or concepts the various authors had used. Similarly, we did not select studies based on study methods used, but excluded reviews and opinion papers or commentaries, validation studies, studies that evaluated non-contraceptive vaginal ring use (such as rings for hormonal replacement therapy), or assessed acceptability or willingness to use hypothetically in the absence of actual user experiences. Studies that only enrolled women with a specific health condition (such as diabetes) and full texts in languages other than English, French, Dutch, Spanish, or Italian were also excluded ($n = 3$). In case of multiple articles presenting data from the same study with the same outcomes of interest, only the primary paper was included in this study (Excluded studies in **Supplementary Material S2**).

## Study Selection

Each title and abstract were screened by two independent reviewers (TD and VJ) using the inclusion criteria described above. Full texts of all the papers selected in title and abstract screening were checked by both the reviewers before inclusion and any discrepancies were discussed until consensus was reached.

## Study Quality Assessment and Data Synthesis

A standardized pretested form was used by TD to extract data from full texts on study characteristics: author names, year of publication, journal, study setting, study design, ring use and comparison group(s) (if any), research methods used and main findings related to acceptability, overall satisfaction and sexual satisfaction. Data on sample size, randomization process, and presence of a control group related to methodological quality assessment were also extracted, but were not considered a core component of this study, as we wanted to provide an overview of methods used to document acceptability and satisfaction.

## Patient and Public Involvement

No patient or public involvement took place in the design or conduct of this systematic review, which included 46 papers from many countries worldwide.

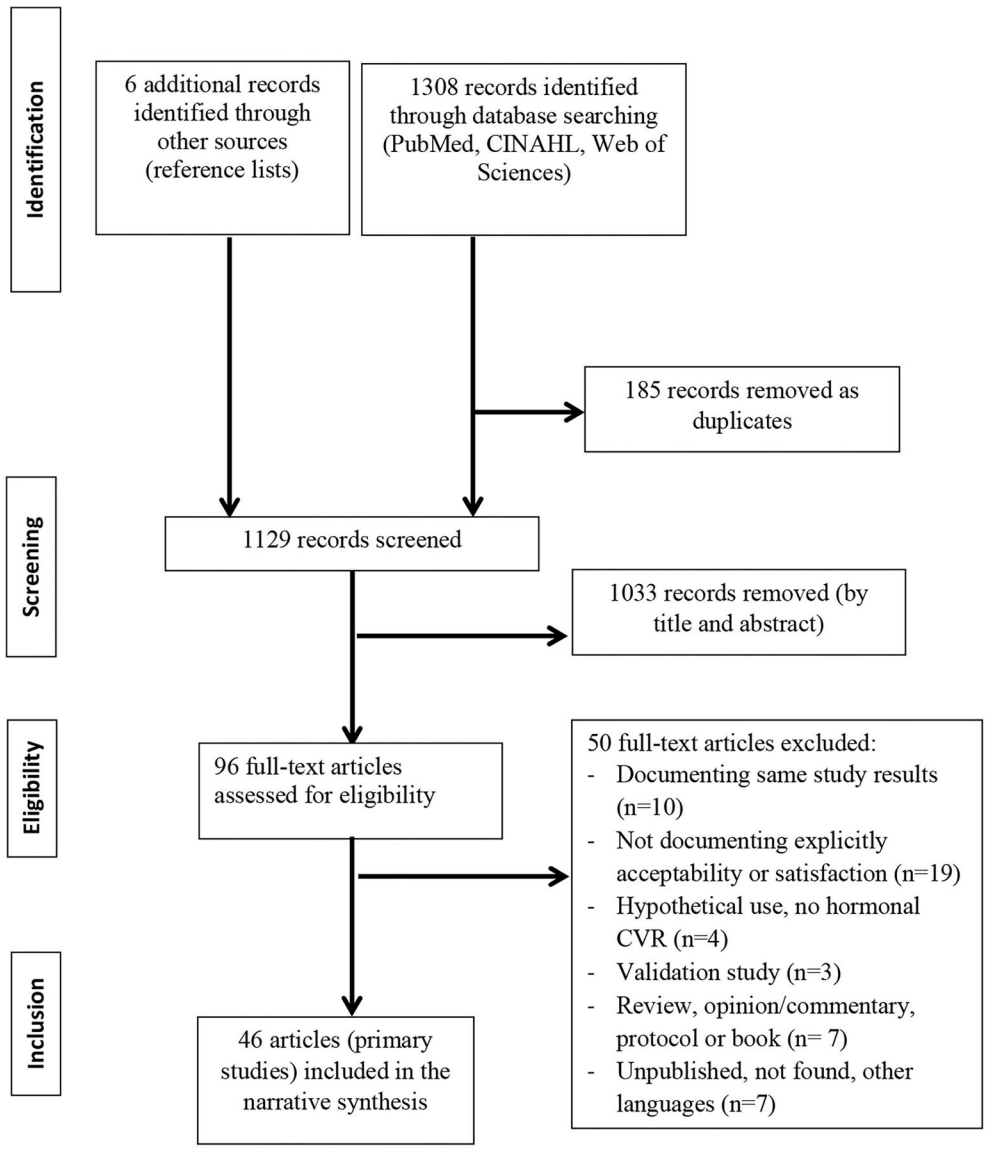


**FIGURE 1 |** The Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flowchart of the studies selection process for the review on contraceptive vaginal rings, acceptability, and general and sexual satisfaction.

## RESULTS

Of 1,308 publications that were identified through database searching, after removal of duplicates, 1,129 titles/abstracts and 96 full texts were reviewed and 46 articles (primary studies) were included (**Figure 1**).

### Studies Design, Methods, Characteristics, and Settings

A total of 19 studies (41%) were randomized clinical trials (9–27), 24 studies were prospective non-randomized studies (28–51), and 3 studies were cross-sectional studies (52–54) (**Table 1**). A total of 27 studies (59%) used a controlled design, comparing CVR users to users of other hormonal methods [such as a combined oral contraceptive (COC) pill or patch] or to non-hormonal contraceptive methods (such as the copper intrauterine device) or comparing users of CVRs containing different hormonal dosages or the same CVR for different durations. The remaining 19 studies did not include a comparison group (**Table 1**).

Most studies (42/46, 91%) used quantitative structured questionnaires and 8 (17%) studies used qualitative semi-structured or in-depth interviews (IDIs) and/or focus group discussions (FGDs) (**Table 1**). Overall, 38 (82%) studies used exclusively quantitative structured questionnaires (25, 26, 30, 36, 41, 44, 49, 52), while 4 (9%) studies used only qualitative methods and 4 (9%) studies used both the quantitative and qualitative

**TABLE 1 |** Types of study design, methods, participants, and study duration.

| Type of study *N* (%) | | Comparison group *N* (%, per study type) | Quantitative methods structured questionnaire | Qualitative methods * Semi-structured, IDI, FGD | Study participants *N* Range | Study duration *N* months Range |
|---|---|---|---|---|---|---|
| Prospective randomized (9–27) | **19 (41)** | 19 (100) | 19 (100) | 2 (11) | 14–983 | 1–13 months |
| Prospective non randomized (28–51) | **24 (53)** | 7 (30) | 21 (88) | 5 (21) | 27–5823 | 2–24 months |
| Cross sectional (52–54) | **3 (7)** | 1 (33) | 2 (67) | 1 (33) | 32–26,250 | - |
| **Total** | **46 (100)** | **27 (59)** | **42 (91)** | **8 (17)** | **14–26,250** | - |

**Four studies used both the quantitative and qualitative methods (mixed methods). IDI, in-depth interview; FGD, focus group discussion. Total rows and columns are presented in bold.*

**TABLE 2 |** Study settings and types of contraceptive vaginal rings.

| Types of contraceptive vaginal ring | *Study settings* | | | | | |
|---|---|---|---|---|---|---|
| | *Europe, USA, Canada, Australia $* *N* | *Latin America* *N* | *Israel* *N* | *Asia §* *N* | *Africa* *N* | All studies *N* (%) |
| NuvaRing$$ | 24 | - | 2 | 3 | 3 | **31* (67)** |
| Annovera™ | 2 | 2 | | | 1 | **2* (4)** |
| Progering® | - | 1 | | - | - | **2 (4)** |
| Levonorgestrel | 3 | | | 2 | 1 | **4* (9)** |
| Levonorgestrel/Estradiol | 1 | 2 | | | - | **3 (7)** |
| Other CVR | 4 | - | | | - | **4 (9)** |
| **Total, N (%)** | **35 (76)** | **5 (11)** | **2 (4)** | **5 (11)** | **5 (9)** | **46 * (100)** |

*High-income settings: Europe, USA, Canada, Australia, and Israel. * "All studies" column values are less than the sum of all column values, as some studies include several settings; $: Any of these settings or several of them; §: Including 3 studies in India; $$: including 3 study with a new etonogestrel/ethinyl estradiol ring (Kirkos®). Total rows and columns are presented in bold.*

methods (25, 26, 36, 49). The number of participants in the prospective studies ranged from 14 to 5,823, with an average 50 to 200 participants. In total, 1 cross-sectional study was larger with up to 26,250 participants. The duration of use in the prospective studies ranged from 1 to 24 menstrual cycles, with about a third ($n = 13$) covering 12 cycles or more, another third ($n = 13$) covering 6 to 12 menstrual cycles, and the remaining studies covering 3 menstrual cycles or fewer (**Table 1**).

Studies were performed in 1 or more high-income settings, i.e., countries of Europe, USA, Canada, or Australia ($n = 35/46$ studies, 76%); Latin America ($n = 5$); Israel ($n = 2$); Asia ($n = 5$, of which 3 were in India); and Africa [$n = 5$, including 1 study each in Rwanda, Kenya, South Africa, and 2 studies in several (mostly sub-Saharan) African countries] (**Table 2**).

NuvaRing® was the most studied CVR (31/46 studies, including 1 recent study testing a new etonogestrel/ethinyl estradiol—Kirkos®—against NuvaRing®), while 2 studies evaluated use of the Annovera™ ring and 2 other studies evaluated use of the Progering® among breastfeeding women. The remaining 11 studies investigated CVRs containing levonorgestrel (LNG) alone, combined with ethinyl estradiol or other progesterone regimens. These CVRs were not further developed and did not make it to the market (**Table 2**).

## Main Findings on Acceptability, Satisfaction, and Sexual Satisfaction

Overall definitions of acceptability and satisfaction or how these outcomes were described, varied across studies, over time and according to the type of CVR. Therefore, we will present main results on these outcomes by type of CVR.

### NuvaRing®

Studies documenting acceptability and/ or satisfaction of NuvaRing® commonly used structured questionnaires assessing the following similar dimensions: clarity of instructions; ease of use (including to insert/remove the ring); ease of package use; compliance or adherence (including removals and spontaneous expulsions); cycle-related characteristics (menstrual changes or pain); sexual comfort (whether the ring was felt by the woman or the male partner or whether the partner objected to the ring, without investigating sexual frequency, pleasure, or satisfaction); and overall satisfaction. These seven dimensions were included in a validated 21-item questionnaire by Novak et al. (5) and subsequently used in other studies (21, 31–33, 37, 38, 48). The IUD intra uterine device (ORTHO-BC-SAT) satisfaction questionnaire related to the use of hormonal contraception in general and including 8 dimensions similar to Novack et al. questionnaire that was used in 1 CVR study (19). Over 80%

**TABLE 3 |** Study characteristics, type of CVR and study, participants, comparison group, outcome(s), methods used, and main results, presented by type of CVR then chronologically.

| Authors, Public. year, Setting | Type of CVR | Type Study | Total sample | CVR users | Comparison | Follow-up | Outcomes | Methods | Main results: acceptability, satisfaction, sexual satisfaction |
|---|---|---|---|---|---|---|---|---|---|
| Gill et al., 2020, South Africa (19) | NuvaRing® | PR | 150 | 116 | 3 arms: Injectable, COC; Cross-over | 4 cycles | Acceptability satisfaction | Quantitative Questionnaire: including self-administered ORTHO birth control satisfaction (BC-SAT) | More NuvaRing® users (24/116; 20.7%) significantly requested to change to another contraceptive option compared to injection (1/73; 1.4% $p = 0.0002$) and COC users (4/49; 8% $p = 0.074$). Significantly more injection users (77/80; 96.3%) thought this delivery mode was convenient to use compared to NuvaRing® (74/89; 83.1%; $p = 0.0409$) or COC (38/50; 76.0%; $p = 0.0034$). Overall, the preferred contraceptive choice was injection, followed by the ring and lastly the pill. |
| Caruso et al., 2019 (20) | Kirkos® / NuvaRing® | PR | 58 | 29 (Kirkos®) | 29 (NuvaRing®) | 6 cycles | Sexual satisfaction | Quantitative: Questionnaire; Diary; Female Sexual Function Index (FSFI) self-administered; SF-36 and Female Sexual Distress Scale (FSDS); Quality sexual life; 0–100 Visual Analog Scale (pain) | Improvement of sexual function scores among women using Kirkos® vs. NuvaRing® both at the 1st (FSFI, $p < 0.009$; FSDS, $p < 0.001$) and at the 2nd (FSFI, $p < 0.001$; FSDS, $p < 0.002$) follow-up. QoL of Kirkos® users improved at the 1st follow-up ($p < 0.05$) and 2nd ($p < 0.01$) follow-up. NuvaRing® users improved their QoL at the 2nd follow-up ($p < 0.01$). |
| Kestelyn et al., 2018 Rwanda (26) | NuvaRing® | PR | 130 | 120, 10 males partners | 2 arms intermittent/ continuous CVR use | 3 cycles | Acceptability satisfaction sexual satisfaction | Mixed- methods: Questionnaire, In-depth Interviews; focus group discussion, diary, ballot box (self-administered anonymous), observation | Initial worries regarding CVR reduced over time with actual ring use; ring insertions and removals described as easy. Most women did not feel the ring during daily activities, appreciated the lack of perceived negative side effects. Sexual comfort (increased lubrication) played a significant role in ring acceptability of the participants and their partners. Rwandan cultural norms around sexuality positively influenced the acceptance of the NuvaRing® Overall satisfaction was high. |
| Guida et al., 2017, Italy (48) | NuvaRing® | CS | 556 | 76 | 5 groups (COC, implant; no contraception) | - | Sexual satisfaction | Quantitative: McCoy Female Sexuality Questionnaire (MFSQ)+ Ultrasound dorsal clitoral artery | Statistically significant lower McCoy value in CVR group vs. the implant group. |
| McLellan-Lemal et al., 2017, Kenya (30) | NuvaRing® | PNR | 44 | 24, 20 males partners | - | | Acceptability | Qualitative component in prospective clinical study: Ethnographic research- In-depth interviews women & male partners | Unease with vaginal insertion as well as potential slippage or expulsion created initial challenges requiring clinician assistance and practice for some participants. Minor side-effects were described. Awareness of the multiple contexts in ring users' experience may inform the development, education, and promotion approaches for future ARV rings. Experiences with CVR reflected a broader Family Planning (FP) paradigm (i.e. ring efficacy & future fertility issues, "feeling free" to stop, lack of side effects including negative effect on a woman's sexual desire). |
| Dam et al., 2015, India (45) | NuvaRing® | PNR | 45 | 45 | - | 3 cycles | Acceptability satisfaction sexual satisfaction | Quantitative: Questionnaire | 96% women were satisfied with the ring usage; 97% would recommend it to others; Sexual comfort: 30% women could feel the ring, 18% partners felt the ring during intercourse whereas in 21% cases partner minded that women were using the ring. |
| Guida et al., 2014,Italy (49) | NuvaRing® | PNR | 556 | 76 | 60 (Patch); 128, 88, 64 (COC); 140 (no hormonal) | 2 extended cycles | Sexual satisfaction | Mixed-methods: Quantitative & Semi structured Interview (Sexual life IRSF); 1–100 Visual Scale | Significant reduction in anxiousness relating to sexual activity, in all groups using contraception compared to controls. |
| Battaglia et al., 2014, Italy (10) | NuvaRing® | PR | 43 | 21 | 22 (COC), | 6 cycles | Sexual satisfaction | Quantitative: Questionnaire; McCoy Female Sexuality Questionnaire (MFSQ); self-administered Beck's Depression Inventory questionnaire (BDI); + Ultrasound clitoridal artery & Hormonal | Significant decrease of the two-factor Italian MFSQ score for COC & CVR users, which was more marked in OC users; Frequency of sexual intercourse and orgasm was reduced only by the use of OC. |
| Caruso et al., 2014, Italy (40) | NuvaRing® | PNR | 52 | 52 | - | 2 extended cycles | Sexual satisfaction | Quantitative: Questionnaire; diary; Self-administered Female Sexual Function Index (FSFI); SF-36 and Female Sexual Distress Scale (FSDS); Quality sexual life | Improvement of FSFI and FSDS scores obtained at the first and second follow-up appointments vs. baseline scores ($p < 0.05$). QoL measures of body pain, general health and emotional role improved at the first follow-up visit ($p < 0.05$); at the second one, all variables showed improvement ($p < 0.05$). |

*(Continued)*

**TABLE 3 |** Continued

| Authors, Public. year, Setting | Type of CVR | Type Study | Total sample | CVR users | Comparison | Follow-up | Outcomes | Methods | Main results: acceptability, satisfaction, sexual satisfaction |
|---|---|---|---|---|---|---|---|---|---|
| Pandit et al., 2014, India (34) | NuvaRing® | PNR | 252 | 252 | - | 3 cycles | satisfaction | Quantitative: Questionnaire; (5 items satisfaction Likert Scale) | 92% agreed that instructions for CVR easy to follow; Satisfaction: 94% very satisfied; 93% would recommend others. |
| Soni et al., 2013, India (43) | NuvaRing® | PNR | 184 | 184 | - | 13 cycles | Acceptability | Quantitative: Questionnaire and diary | Compliance was good (99%); 0.16% incidence of intermenstrual bleeding and 2% incidence of early withdrawal bleeding; " the ring is highly acceptable to users". |
| Elaut et al., 2012, Belgium (22) | NuvaRing® | PR | 55 | 55 | Consecutive use (CVR, COC, POP) | 3 cycles each method | Sexual satisfaction | Quantitative: including self-administered questionnaire (on relationship and psychosexual measures | Sexual desire higher among ring users ($P < 0.0001$); woman's mood positively impacted. |
| Peipert et al., 2011, USA (35) | NuvaRing® | PNR | 4,167 | 431 | $N = 1890$ LNG IUD; 431 IUD; 552 implant; 478 COC; 313 DMPA; 99 Patch | 12 cycles | Acceptability satisfaction | Quantitative: Questionnaire (phone survey) | At 12 months continuation rates were at 86% (for long-acting reversible contraception (IUD and implant) users), 57% (DMPA),55% (Ocs), 54% (CVR), and 49% for patch users. Satisfaction mirrored continuation. |
| Gilliam et al., 2010, USA (23) | NuvaRing® | PR | 273 | 136 | 137 (COC) | 3 cycles | Acceptability | Quantitative: online questionnaire survey and daily internet-based diaries | At 6 months, similar proportions (26 and 29% of CVR and COC users, respectively) had continued their assigned study method ($P = 0.61$). |
| Gracia et al., 2010, Italy (24) | NuvaRing® | PR | 499 | 249 | 250 (Patch) | 3 cycles | Sexual satisfaction | Quantitative: Questionnaire; Self administered Female Sexual Function Index (FSFI) | Mean scores at endpoint in subjects with a male partner were significantly lower in the CVR group (27.4 with contraceptive ring vs. 29.2 with contraceptive patch. |
| Merki-Feld, 2010, Switzerland (32) | NuvaRing® | PNR | 1,053 | 1,053 | - | 4 cycles | satisfaction | Quantitative: Questionnaire | Women were satisfied with changes in weight (92%), cycle control (94%) and Post Menstrual Syndrome (86%). Cycle regularity significantly imporved among starters compared to switchers. Adverse events were reported for 17.5% of women and were most frequently ring-related (such as feeling the ring *in situ*, vaginal discomfort, ring expulsion). |
| Lete et al., 2008, Spain (54) | NuvaRing® | CS | 26,250 | 23% | 77% other methods | - | Acceptability | Quantitative: Self-administered questionnaire; 1 to 5 or six-point Visual Analog Scale | A similar percentage of women in the pill and skin patch groups changed to CVR (31.6 and 32.9%, respectively), whereas among CVR users only 1% changed to the pill and 3% to the skin patch. |
| Creinin et al., 2008, USA (21) | NuvaRing® | PR | 500 | 249 | 251 (Patch) | 4 cycles | Acceptability | Quantitative: Questionnaire and Visual Analog Scale (VAS) for acceptability | More CVR users (71.0%) planned to continue their method after the study than Patch users (26.5%) ($P < 0.001$). Ring users preferred the ring to the combined OC ($p = 0.001$), and patch users preferred the combined OC to the patch ($p = 0.001$). |
| Epstein et al.,2008, USA (52) | NuvaRing® | CS | 32 | - | - | - | Acceptability sexual satisfaction | Qualitative: In- Depth Interviews ($n = 32$ adolescents) | An adjustment period (to become more comfortable using the ring) was reported by most participants. In total, 5 of 32 participants (16%) discontinued ring use, 3 of them because the ring could be felt in the vagina during intercourse, or always; 1 because she disliked touching her vagina. Participants said it was important to warn partners about the ring before sexual contact, not to "surprise" them if they felt the ring inside the vagina. In total, 4 of 32 participants reported removing the ring during sex (felt uncomfortable). Prior use of tampons did not seem to increase successful ring use. |
| Brucker et al., 2008, Germany (28) | NuvaRing® | PNR | 5,823 | 5,823 | - | 8 cycles | Acceptability satisfaction sexual satisfaction | Quantitative: Questionnaire | CVR well tolerated (Bleeding patterns, blood pressure), Most women expressed their satisfaction with CVR; 82% were "very satisfied/satisfied", 72% planned to continue using it and 82% would recommend it to others. More than 90% of women found NuvaRing1 "without problems/easy" to insert and to remove, and more than 80% of the women and their partners were not disturbed by its presence during intercourse. |

*(Continued)*

**TABLE 3** | Continued

| Authors, Public. year, Setting | Type of CVR | Type Study | Total sample | CVR users | Comparison | Follow-up | Outcomes | Methods | Main results: acceptability, satisfaction, sexual satisfaction |
|---|---|---|---|---|---|---|---|---|---|
| Stewart et al., 2007, USA (18) | NuvaRing® | PR | 130 | 130 | 130 (COC) Consecutive use | 3 cycles each | Acceptability | Quantitative: Questionnaire; Computer-assisted self-interviewing software | Overall approval higher among CVR users i.e. liked using method ($P = 0.015$), would recommend it to friends ($P = 0.012$), and not as hard to remember to use method correctly ($P \leq 0.000$). Participants were less worried about health risks while using the ring ($P = 0.006$), but reported that the ring was more likely to interfere with sex than the pill ($P \leq 0.001$) and that sex partners liked the pill ($P = 0.034$). |
| Merki -Feld & Hund, 2007, Switzerland (31) | NuvaRing® | PNR | 2,642 | 2,642 | - | 3–7 cycles | Acceptability satisfaction | Quantitative: Questionnaire | Overall 85% were satisfied/very satisfied, 58% were very satisfied with CVR use. 89% would recommend to others and 74% wished to continue. Satisfaction improved with duration of treatment. |
| Fine et al., 2007, USA (48) | NuvaRing® | PNR | 81 | 81 | - | 3 cycles | Acceptability satisfaction | Quantitative: Questionnaire | Overall satisfaction and acceptability of CVR among postabortion patients was high. 89 % participants elected to continue the CVR, nearly all would recommend this method to a friend. |
| Ahrendt et al., 2006, 10 European countries (9) | NuvaRing® | PR | 983 | 499 | 484 (COC) | 13 cycles | Acceptability | Quantitative: Questionnaire and diary | The vast majority of women found CVR easy to insert (96%) and remove (97%). Non significant difference in continuation with CVR (71%) vs. CoC (75%). Satisfaction was high (84% CVR vs. 87% COC); recommending to others (87% NuvaRing; 92% COC). |
| Roumen et al., 2006, The Netherlands (38) | NuvaRing® | PNR | 1,130 | 1,130 | - | 3 cycles | Acceptability satisfaction | Quantitative: including self-administered online questionnaire | 94% found CVR easy to insert and 97 easy to remove. 87% of women and 67% of partners never felt the ring during intercourse. (Very) satisfied users varied from 34% to 72%; (Very) dissatisfied varied from 44 to 16% over 3 cycles. |
| Sabatini & Cagiano, 2006 Italy (13) | NuvaRing® | PR | 280 | 94 | 94,92, (COC: group 1 20μEE; group 2: 15μEE) | 12 cycles | Sexual satisfaction | Quantitative: Questionnaire; Irritability, depression side effects 3-point scale; Diary | Sexual desire was increased or unchanged in 68% (COC group1), 59% (COC group2) and 91% (CVR group) of the cases. Better results related to desire and sexual satisfaction were obtained by CVR users. The analysis of adverse events revealed two crucial points for acceptability, compliance and continuation: poor cycle control and disturbance of sexual intercourse due to vaginal dryness and loss of desire. |
| Schafer et al., 2006, USA (14) | NuvaRing® | PR | 201 | 101 | 100 (COC) | 3 cycles | Acceptability satisfaction | Quantitative: including Self-administered questionnaire (on sexual story) | Higher satisfaction among CVR users (61%) vs. pill users (34%) ($p = 0.003$). No association between satisfaction at 3 months and report of previous genital touching (tampon etc.) at baseline. |
| Guida et al., 2005, Italy (25) | NuvaRing® | PR | 116 | 26 | 25 (COC) + 23, 25 (implant, non-hormonal) non-randomized | 6 cycles | Sexual satisfaction | Mixed-methods: Quantitative; & Semi structured Interview: Sexual life and Interviewer Rating Sexual Function (IRSF); (0-100) Visual Analog Scale | CVR seems to implement a further positive effect on the psychological aspect of both women and their partners, which is evident from an improved complicity and sexual satisfaction. |
| Miller et al., 2005, 4 countries Europe, USA (11) | NuvaRing® | PR | 429 | 429 | 4 arms extended use (with increased duration) | 12 cycles | Acceptability satisfaction | Quantitative: including Self-administered Questionnaire | One year treatment completion rates were higher with shorter regimens and ranged from 77% to 59%.The highest satisfaction was reported for the shorter (91%) and the lowest for the longest (77%) regimens. |
| Novak 2003, Europe, Israel, USA, Canada (33) | NuvaRing® | PNR | 2,393 | 2,393 | - | 13 cycles | Acceptability satisfaction | Quantitative: including self-administered Questionnaire (21-item acceptability | 85% and 90-of women were satisfied or very satisfied with the ring and would recommend the ring to others, respectively, increasing to 96 and 97%, respectively, for those who completed the studies. Overall 15% women and 30% partners felt the ring during intercourse (6% partners objected to CVR use). |
| Roumen et al., 2001, 11 European countries, Israel (37) | NuvaRing® | PNR | 1,145 | 1,145 | - | 13 cycles | Acceptability satisfaction | Quantitative: including 21-item self-administered questionnaire; Diary | 96 and 98% women were satisfied and would recommend the method to others (59–67% among women who discontinued, respectively). |
| Merkatz et al., 2014, Latin America, USA, Europe, Australia (27) | Annovera™ | PR | 1,036 | 1,036 | Several arms/ different dosages | 13 cycles | Acceptability satisfaction sexual satisfaction | Quantitative: Questionnaire (acceptability study in a clinical trial) | Satisfaction was high (89%) and related to higher method adherence [OR, 2.6 (1.3, 5.2)] and continuation [OR, 5.5 (3.5, 8.4)]. Attributes of CVR use representing items from the four domains - finding it easy to remove, not complaining of side effects, not feeling the CVR while wearing it and experiencing no change or an increase in sexual pleasure and/or frequency -were associated with higher odds of satisfaction. |

*(Continued)*

**TABLE 3 |** Continued

| Authors, Public. year, Setting | Type of CVR | Type Study | Total sample | CVR users | Comparison | Follow-up | Outcomes | Methods | Main results: acceptability, satisfaction, sexual satisfaction |
|---|---|---|---|---|---|---|---|---|---|
| Sivin et al., 2005, Latin Am, USA, Europe (15) | Annovera™ | PR | 150 | 150 | 3 arms different dosages | 13 cycles | Acceptability | Quantitative: including self-administered Questionnaire | Overall one-year continuation rates were at 73%. Medical conditions, mainly vaginal problems, personal reasons and device loss or repeated expulsion were the principal reasons given for study discontinuation. Clinical performance and adverse event profiles indicate that each of these 1-year NES/EE rings, used on a 21-day-in and 7-day-out regimen, provided women effective, acceptable and safe long-acting contraception under their own control. |
| RamaRao et al. 2015, Kenya, Nigeria, Senegal (36) | Progering® | PNR | 384 | 174 | 174 (non CVR users) | 2 cycles of 3 months | Acceptability | Mixed-methods: Questionnaire ($n = 174$); In-depth interviews ($n = 15$) | A majority reported the ring was easy to insert/remove/ reinsert at baseline. Perceptions of the ring's size or texture were of more importance than its color at baseline. However perceptions of all these physical aspects became more positive from the time the ring was first seen to the time it was used and there were no significant differences in perception on these 3 aspects between women who had used 2 rings and those who used one. Data indicate that the PVR has limited to no effect on sexual behavior in the post-partum period. |
| Sanchez et al., 1997, Chile (41) | Progering® | PNR | 78 | 63 | 15 (IUD) | 3–14 months | Acceptability | Qualitative methods only: Semi-structured interviews and focus groups discussions; (Acceptability study of a phase III trial) | Most women who used the ring found it highly acceptable and mentioned the following advantages: comfort, efficacy, ease of insertion and removal, user's control, safety, no negative effect on sex life, and prolonged amenorrhoea. Some women disliked these same characteristics or had fears regarding them, and a few women had negative experiences such as excessive vaginal discharge or frequent expulsion |
| Koetsawong et al., 1990, 13 countries in Asia, Africa, Latin America, Europe (51) | Levonorgestrel (20μ/day) | PNR | 1,005 | 1,005 | - | 3 cycles | Acceptability | Quantitative: Questionnaire and diary (bleeding pattern) | The principal reasons for discontinuation were menstrual disturbances (17% at 1 year), vaginal symptoms (6.0%) and single or repeated expulsion of the ring (7%). |
| Buckshee et al., 1990, India (29) | Levonorgestrel (20μ/day) | PNR | 96 | 50 baseline 46 FU | - | 12 & 24 cycles | Acceptability | Quantitative: Questionnaire and diary | Follow-up study revealed users to be happier with the ring than with any other method and no spouse complained of feeling the ring during coitus |
| Sahota et al., 1999, UK (39) | Levonorgestrel (20μg/day) | PNR | 1,710 | 1,710 | - | 24 cycles | Acceptability | Quantitative: Questionnaire | 435/1511 (29%) experienced at least 1 involuntary expulsion; 1-year discontinuation rate was 56% and the 2-year rate was 85%. Over 60% of users found the method to be acceptable at 12 months. |
| Elder et al., 1991, UK (46) | Levonorgestrel (20μg/day) | PNR | 150 | 150 | - | 12 cycles | Acceptability | Quantitative: Questionnaire and diary | Menstrual disturbance, vaginal problems (discharge, symptoms) and involuntary expulsion resulted in discontinuation rates of 8.9, 8.4 and 1.6 per 100 woman-years, respectively. |
| Spencer et al., 1986, UK (44) | Levonorgestrel/ Estradiol | PNR | 27 | 27 | - | 12 months | Acceptability | Qualitative: In depth Interviews before and during the WHO clinical trial | 7/27 women discontinued after 1 year (4, for related CVR reasons); positive features of CVR were that one can forget about it & less deleterious effects on health. |
| Hardy et al.,1983, Brazil, Dom. Rep. (50) | Levonorgestrel/ Estradiol | PNR | 432 | 207 | 225 (COC) | 6 cycles | Acceptability satisfaction sexual satis. | Quantitative; Questionnaire; Home interviews | 10% of CVR users complained of difficulty with insertion, 20% of difficulty with removal, 43% worried with correct placement, 33% reported vaginal pain, and 10% reported having expelled it at some time. 17% of ring users and 7% of pill users considered their experiences "very good" but the general level of satisfaction with both methods was similar; women liked having control over use of the method, inserting and removing the ring at will for intercourse or washing. Increased libido reported by both CVR and pill users (50% users) |
| Faundes et al., 1981, Brazil, Dom. Rep. (47) | Levonorgestrel/ Estradiol | PNR | 5,943 | 341 | 3,146 (COC) 2,456 (other methods) | 10–23 cycles | Acceptability | Quantitative: Questionnaire | Field acceptance rate of the CVR (among other methods) Ranged in 4 sites from 2.9 to 12.5%.Ease of use was the most "liked" characteristic of the CVR. |

*(Continued)*

**TABLE 3** | Continued

| Authors, Public. year, Setting | Type of CVR | Type Study | Total sample | CVR users | Comparison | Follow-up | Outcomes | Methods | Main results: acceptability, satisfaction, sexual satisfaction |
|---|---|---|---|---|---|---|---|---|---|
| Thiery et al., 1976, Belgium (16) | Medroxyprogesterone acetate | PR | 14 | 14 | 2 arms different regimens | 1 cycle | Acceptability | Quantitative: Questionnaire and diary | Not uncomfortable nor expelled or found displaced; no complaint on irritation or leukorrhea. $n = 3$ who had sexual intercourse reported "no interference with sexual relationship". |
| Mishell 1972, USA (12) | Medroxyprogesterone acetate | PR | 24 | 24 | 4 arms (initiation, ring) | 6 cycles | Acceptability | Quantitative: Questionnaire | After initial fitting by a physician, the subjects removed and reinserted the devices themselves without difficulty. Both the subjects and their spouses stated the devices did not cause discomfort during coitus. |
| Weisberg et al., 1995; USA, Australia (17) | Norethindrone acetate/ Ethinyl Estradiol (EE) | PR | 159 | 159 | 3 arms regimens | 6 cycles | Acceptability satisfaction | Quantitative: including self-administered Questionnaire | Ring expulsion at low frequency in all 3 insertion groups. 69% rated the method as very good. 72% of women in Los Angeles and 62% in Sydney liked the ring much more than their most liked previous method. 92% in Sydney and 89% in Los Angeles would recommend the ring to others. |
| Schindler et al., 1993, Germany (42) | 3-keto-desogestrel /EE | PNR | 50 | 50 | - | 8 cycles | Acceptability | Quantitative: Questionnaire | For 96 and 93.5% of the women CVR was easy to insert and remove, respectively. Most partners (91%) felt the ring, but 96% did not consider it a problem. |

*PR, prospective randomized; PNR, prospective non-randomized; CS, cross-sectional; UK, United Kingdom; USA, United States of America; CVR, contraceptive vaginal ring; COC, combined oral contraceptive; DMPA, depot-medroxy progesterone; IUD, intra uterine device.*

of NuvaRing® users in all the studies using the seven/eight dimensions showed that CVR instructions and packaging were clear and that the ring was easy to insert and remove (**Table 3**). In Kenya, a qualitative study showed that unease with vaginal insertion and ring placement issues (slippage and expulsion) created initial challenges requiring clinician assistance and practice for some participants (30). Similarly, an in-depth discussion with users in Rwanda showed that initial worries with respect to CVR insertion reduced over time with actual ring use and ring insertions and removals were, henceforth, described as easy (26). On the other hand, 2 studies reported that the previous use of tampons did not seem to influence satisfaction or successful ring use of CVR (14, 52). A number of studies reported spontaneous expulsions rates ranging from less than 2% (15, 17) to 5–20% (21, 36, 46, 51). A study in Switzerland showed that 17.5% of adverse events were ring related such as feeling the ring, vaginal discomfort, and vaginal expulsions (31). In a study in the Netherlands (38), women who felt the ring were more likely to remove it (sometimes, regularly, and always) during intercourse compared to those who did not feel it (22 vs. 6%) (**Table 3**). An in-depth study among adolescents in the US using NuvaRing® revealed that 5 of 32 participants discontinued because of ring-related events (52). In Kenya, minor side effects were described and concerns centered on ring efficacy, negative effect on a sexual desire of woman, future fertility issues, and non-suppression of menstruation, which were favored by most participants (30).

Overall satisfaction with NuvaRing®, measured on the 4–6-point Likert scale or using a dichotomous variable (Yes/No), ranged between 80 and 90%, with studies without a comparison group (other contraceptive method) more tending to report the highest satisfaction rates (**Table 3**). However, a high level of satisfaction ("being very satisfied") varied across studies and ranged between 30 and 94% (the highest proportion reported in a study conducted in India) (14, 32, 34, 38). In Rwanda, general satisfaction with NuvaRing® was high (over 80%) and concurred with qualitative findings and a ballot box (anonymous) survey at the end of the trial (26). In South Africa, more injection users (96.3%) significantly thought that this delivery mode was convenient to use compared to NuvaRing® (83.1%; $p = 0.0409$) or COC (76.0%; $p = 0.0034$). Overall, the preferred contraceptive choice was injection, followed by the ring and lastly the pill (19). Willingness to recommend NuvaRing® to others ranged from 60 to over 90% in the studies documenting satisfaction. NuvaRing® can be used for 3 weeks, then removed for 1 week before reinsertion, or used for an extended period (or continuous use). In total, 3 studies documenting extended use of NuvaRing® showed fair satisfaction/sexual satisfaction rates (11, 40, 49); although, in 1 study, satisfaction rates tended to be higher among women using shorter regimens (11). In a randomized study controlling for intermittent vs. continuous NuvaRing® use in Rwanda, most women in both the groups reported similar acceptability and satisfaction and appreciated the absence of negative side effects (26).

A number of studies reported "sexual comfort" as whether NuvaRing® was felt by partners (up to 30%), whether a number of partners found it bothersome or did mind (5–20%) (28, 31, 37, 45), objected its use (6%) (33), or did prefer the pill (5–30%)

instead of CVR (18). A multicenter NuvaRing® study in high-income settings pointed out that sexual comfort for the women who prematurely discontinued participation in the studies was only marginally lower than for those who completed them (33).

Sexual satisfaction while using NuvaRing® was reported in a total in 16 studies, exclusively ($n = 9$) or with acceptability and general satisfaction ($n = 7$). Through the use of female sexual function indexes, scales, or diaries, these studies showed mixed sexual satisfaction results with NuvaRing® use. In total, 2 studies (one without comparison group, another 1 comparing a new CVR Kirkos® to NuvaRing®) conducted in Italy reported an improvement of all the variables between baseline and follow-up (40). In total, 2 prospective controlled studies conducted by Guida et al. in Italy reported improved overall and sexual relationship ("complicity") among couples (27) and reduced anxiousness compared to COC users (55). Increased sexual desire (compared to COC or progestin-only pill) was reported among NuvaRing® users in a small study in Belgium (22) and increased or unchanged sexual desire in another study comparing NuvaRing® to low estrogen dose COC (13). In Rwanda, most women reported that ring use stimulated conversations with their partners about increased lubrication and sexual desire, but also about family planning and more general relationship topics. Most women (81%) reported at least once during ring use that the ring made sex feel better and this increased to 87% at the last study visit. Qualitative data confirmed this finding "this ring should be promoted as a sex enhancer" (26). The authors highlighted that Rwandan cultural norms around sexuality positively influenced the acceptance of the NuvaRing®. On the other hand, a randomized trial found that the McCoy Female Sexuality Questionnaire decreased significantly over treatment among COC and CVR users (10). A recent cross-sectional study reported significantly lower median values of female sexuality indexes in the CVR group compared to implant (53). In total, 2 studies found significantly decreased libido (3.3 vs. 0.8%) or mean female sexual function indexes with the ring compared to COC or patch users, respectively (21, 31).

Results with respect to continuation rates reported in our acceptability/satisfaction studies were mixed. Some NuvaRing® studies showed a higher willingness to continue the use of the method (71% for CVR vs. 26.5% for skin patch users) (21) or a higher continuation rate (1% CVR users changed to pill or patch vs. 32–33% COC and skin patch users who changed to CVR) (21, 54). Other studies showed similar (high or low) continuation rates compared to COC [71 CVR vs. 75% COC (9, 23); 26 CVR vs. 29% COC (10)]. In total, 12 months continuation rates were lower (54%) for CVR users compared to 86% among long-acting reversible contraception [intra uterine device (IUD) and implant], 57% for depot-medroxyprogesterone acetate (DMPA), and 55% for COC, but higher than for skin patch users (49%) in a study conducted in the US. A recent study conducted among adolescents in South Africa showed that more NuvaRing® users (24/116; 21%) significantly requested to change to another contraceptive option compared to injection (1/73; 1.4% $p = 0.0002$) and COC users (4/49; 8% $p = 0.074$) (19). Finally, 1 year treatment completion rates were higher (77%) with the shorter NuvaRing® treatment regimens compared to 1-year extended regimen use (59%) (11).

Finally, opinions of male partner about NuvaRing® were usually indirectly assessed by asking women about perception of the CVR of their partners (dimension and sexual comfort). Only 2 studies interviewed (qualitatively) the male partners themselves on perceptions and experiences with the ring (26, 30): In Kenya, experiences with CVR reflected a broader family planning (FP) paradigm: FP intentions and disclosure practices were influenced by partner support, socioeconomic factors, religion, cultural beliefs, and societal norms, including female sexuality (30). In Rwanda, finding from a limited number of interviews of male partners was in line with high acceptability and satisfaction reported by women (26).

### Annovera™ and Progering®

Acceptability of Annovera™ was reported as high in 2 studies. Similar acceptability dimensions than in NuvaRing® studies were used in an Annovera™ trial in Europe, USA, and Latin America and included in a theoretical framework presenting a pathway from acceptability to satisfaction then further to adherence and continuation (27). In the same study, satisfaction with Annovera™ was rated high (89%) and was associated to adherence and continuation ($p < 0.001$). Not feeling the ring while wearing it and experiencing no change or an increase in sexual pleasure and/or frequency was associated with higher odds of satisfaction (**Table 3**) (27). An earlier study showed an overall 1-year continuation rates at 73%. Medical conditions, mainly vaginal problems, personal reasons, and device loss or repeated expulsion, were the principal reasons given for study discontinuation (15).

Acceptability of the progesterone vaginal ring was rated high including ease to insert/remove/reinsert in African and Latin American settings and perceptions positively improved between the time the ring was first seen and the time it was used (36, 41) (**Table 3**). Perceptions of the size or texture of ring were reported of more importance than its color at baseline in African settings (36). In Latin America, 5–30% of women reported negative experiences (vaginal symptoms—excessive discharge or expulsion) (41), while in African settings expulsion reported rate was 5%. The study in sub-Saharan Africa included "family support" as an additional dimension of acceptability (36) and reported using a theoretical framework including other stakeholders such as healthcare providers, program managers, and policymakers, although the framework was not presented. In this study, data indicated that the CVR had limited to no effect on sexual behavior in the postpartum period (36).

### Other Types of CVRs

Earlier studies on other types of CVRs reported on acceptability often referring to clinical features and tolerability. Vaginal symptoms, expulsions, and menstrual disturbances led to discontinuation among LNG 20 μg ring users (46, 51). Similarly, results from a qualitative study with the same ring conducted in the UK (parallel to the WHO randomized trial) showed that overall 7 of 27 women discontinued after a year and 4 of them for ring-related reasons (44). In a study conducted in the early

80s in Latin America with a LNG/estradiol ring, 43% of women reported being worried about correct ring placement/insertion (50) (**Table 3**).

## DISCUSSION

Many studies using mostly quantitative structured questionnaires have documented acceptability and satisfaction of hormonal CVR, particularly NuvaRing®. The majority of these studies were conducted in high- or middle-income settings. Overall, CVR studies show that easiness to insert/remove/reinsert CVRs was high. Continuation rates, when reported, showed mixed results. Among NuvaRing® studies, general satisfaction (being satisfied or very satisfied) was between 80 and 90%, although limited information was provided on actual experiences of women while using CVR; relationship attributes (such as couple communication and decision to use CVR); and contextual elements such as community perceptions of contraception and the CVR, gender/sexual norms, and experience.

Ease of insertion/removal/reinsertion of CVRs was reported in most included studies and rated high including in Latin American or African settings. Among the included studies, qualitative data on actual experiences of women while using the ring showed that initial worries related to CVR itself or its use, such as aspect, insertion, removal, and feeling the ring inside the vagina, improved over time (26, 30, 52), as it is also reported in 1 qualitative systematic review of CVR and 1 systematic review of vaginal rings (55, 56). Initial concerns sometimes required additional support from the provider or practice from the user (30, 55) or benefited of an adjustment period as reported among adolescents and younger users in the US (52). In addition, 2 other CVR studies have shown that "ease of use" was a major reason reported by participants for either selecting or using CVR in Spain (57, 58).

Perception of the ring of user was sparsely documented and data on ring expulsions were limited in the identified studies. However, when documented, ring-related reasons (slippage, expulsion, vaginal problems, or discomfort) contributed for a proportion of women to discontinuation of all the types of CVRs and confirmed findings from previous studies (55, 59). Expulsions and mechanical properties of the ring were included as a specific dimension in acceptability theoretical frameworks that were used in 2 included studies (26, 27) and in vaginal ring HIV prevention studies (8) and deserve to be further addressed in future studies.

Among NuvaRing® studies, general satisfaction (being satisfied or very satisfied) was reported between 80 and 90%. However, as highlighted in our results, a comparison group (i.e., including the use of another contraceptive method or another regimen) was not present in about 40% of studies. Data triangulation between quantitative and qualitative data contributed to confirm or provide more information on satisfaction and factors, such as increased lubrication, leading to satisfaction and adherence (26, 36, 55).

Standard clinical trials in the field of CVRs mostly used structured questionnaires to assess acceptability, satisfaction, and/or sexual satisfaction. Mixed methods approaches combining quantitative and qualitative data collection were less commonly encountered. Clinical trial teams may be less familiar or reluctant to use qualitative approaches because this requires additional resources, time, and expertise over-and-above those required to carry out a clinical trial. Furthermore, qualitative study designs often use a purposive sampling strategy enrolling small numbers of participants, which is different from clinical trial designs based on representative sampling and statistical power calculations. Unlike CVR studies, HIV prevention vaginal rings studies often used mixed and qualitative methods and have documented acceptability of vaginal rings in low-income (high HIV prevalence) settings. These studies (8, 60) have highlighted the importance of using or incorporating qualitative study into clinical trial designs and the contribution of theoretical frameworks to better understand acceptability and satisfaction, as also shown in several studies of this study (25–27, 30, 36, 41, 44, 49, 52).

"Sexual comfort" usually referred to whether the ring was (reported) as felt either by women or partners during sexual intercourse or if the male partner "minded" the ring or its physical effects during intercourse (33). This issue raised concerns among less than a third of women in all the contexts studied. The regular set of acceptability dimensions used and information collected in NuvaRing® acceptability studies did not include measures of frequency of sexual encounters or sexual satisfaction. Sexual satisfaction investigated most of the time in separate studies using female sexuality indexes or other similar measures that showed mixed results. According to a study by Sabatini and Cagliano, they pointed out that the analysis of adverse events revealed that disturbance of sexual intercourse was a crucial point for acceptability, compliance, and continuation (13). This is in line with other studies documenting the relationship between contraception and sexuality (61). Some authors believe that sexual side effects are the best predictors of discontinuation of oral contraceptives among heterosexual adult women (62). Actually, contraceptives can affect sexuality of women in a wide variety of ways beyond sexual functioning alone, for example, they can affect communication between sexual partners and empowerment of women (63). Interestingly, as qualitative data showed in Rwanda, enhanced communication of couples (for instance because of CVR use and potential increased lubrication) contributed to the acceptability of the NuvaRing®. The use of female sexual function indexes and aspects related to sexual relationship may help to improve our understanding of the relationships between contraception and sexuality including for CVRs.

When reported as it was not the focus of this study, willingness to continue CVR use or continuation rates showed mixed results compared to contraceptive pill users and skin patch. Some evidence suggests that long-acting contraceptives (implants or IUD) have higher continuation rates compared to short-acting contraceptives such as COC, but also CVR and skin patch. In South Africa, injectables showed the highest continuation rates and satisfaction.

Overall, limited information was provided on actual experiences of women using CVR and cultural context,

which may affect CVR use (55). Further documenting actual experiences of women using the CVR and male partner opinions (including with respect to relationship and sexuality) can contribute to a better understanding of acceptability of and satisfaction with CVR (55). Awareness of the multiple contexts in experience of ring users and giving a strong voice to women with respect to their perception of contraceptive methods may inform the development and promotion approaches for CVR and more broadly vaginal rings (30, 64, 65).

This study has several limitations. First, given the lack of standardized definitions of acceptability and satisfaction, we may have missed articles documenting CVR acceptability or satisfaction that were not *explicitly* using this terminology and instead referred to continuation or adherence, which was not a specific outcome of interest in this study. Second, we could not always deduct from the methods sections of included studies whether interviews included open-ended questions. This may have led to under-recording of the use of semi-structured interviews. However in-depth qualitative techniques, such as IDIs or FGDs, were always clearly described in studies.

## CONCLUSION

Many studies using mostly quantitative structured questionnaires have documented acceptability and satisfaction of hormonal CVRs, particularly NuvaRing®. Despite the use of similar dimensions in a number of studies, there was a lack of standardized definitions of acceptability and satisfaction. Sexual satisfaction or pleasure was not typically included in acceptability dimensions and findings were not very informative in terms of actual experiences of women using CVRs and the cultural context that may affect sexuality and contribute to shape acceptability of CVRs. The use of mixed methods or qualitative approaches, including information on experiences of women using CVRs, relationship aspects, male partner opinions, and contextual sexual norms may lead to a better understanding of acceptability and satisfaction of CVRs. In addition, the use of theoretical acceptability frameworks highlighting the actual pathway from acceptability to satisfaction and adherence might also be useful.

## AUTHOR CONTRIBUTIONS

TD, VJ, LB, and JW conceived and designed the study and wrote manuscript. TD, VJ, and LB conducted data-based searches. TD and VJ conducted data screening, selected the studies, performed data analysis, and presentation of results. TD conducted data extraction. All the authors provided input in manuscript writing and approved the final manuscript.

## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fgwh.2021.799963/full#supplementary-material

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# Fertility Knowledge Among Women Struggling to Conceive Without Medical Intervention: A Brief Report

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**Introduction:** Approximately 1 in 6 women experience infertility. Though medical treatments for infertility exist, they are very costly and highly burdensome for women. It is therefore desirable to optimize women's chances of conception without medical intervention by ensuring that they have adequate knowledge of the female menstrual cycle and the timing of the fertile window. The current study therefore aimed to assess the degree to which women struggling to conceive without medical intervention are knowledgeable about these topics.

**Methods:** One hundred and two women of reproductive age (18–45 years old) in Canada and the United States who had been struggling to conceive without medical intervention for ≥12 months completed an online survey including a questionnaire assessing knowledge related to reproduction and fertility.

**Results:** Mean accuracy score on the Fertility Knowledge Questionnaire was 67%. Seventy-two women were not aware that the week before ovulation was associated with the highest chances of conception. Women using cervical mucus tracking to increase chances of conception were more knowledgeable ($p = 0.02$), as were women with more formal education ($p = 0.01$). Conversely, women who had been attempting to conceive for longer had lower fertility knowledge ($p = 0.03$). Age, number of children, and family income were unrelated to fertility knowledge ($p > 0.05$).

**Discussion:** Our findings suggest that women who are struggling to conceive would benefit from education related to the timing and identification of the fertile window. Reproductive and primary healthcare providers can play an important role in assessing fertility knowledge and addressing knowledge gaps to improve chances of successful conception.

**Keywords: fertility awareness, fertility knowledge, education, fertile window, infertility**

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## INTRODUCTION

One in 6 reproductive-aged couples experiences infertility (1), defined as being unable to achieve pregnancy despite ≥12 months of focused attempts to conceive. While most research on infertility focuses on women or couples undergoing assisted reproductive technologies (ART), such as *in vitro* fertilization or intrauterine insemination, less than half of all women with infertility ever pursue ART (2, 3), either because of financial constraints or personal preference. Among women who do pursue ART, stress is the most commonly-cited reason for premature discontinuation (4).

Remarkably, this is even true in countries where fertility treatments are government-funded: one study in Sweden found that of 450 couples offered three government-funded IVF cycles, 54% did not complete all three *in vitro* fertilization cycles despite not achieving a pregnancy, with "psychological burden" being the most-commonly cited reason for prematurely discontinuing treatment (5).

Given the lack of access as well as the high financial and emotional burden of ART, it is important that women attempting to conceive be armed with the necessary knowledge to maximize their chances of conceiving without the need for medical intervention. One important component of this knowledge is an understanding of a woman's fertile window in relation to other events of the menstrual cycle. Research has identified the 5 days prior to ovulation, in addition to the day of ovulation itself, as days during which conception could occur if unprotected intercourse were to occur (6, 7). In contrast, no case of conception has ever been documented more than 24 h *after* ovulation (8). Importantly, research furthermore identifies the 2 days before ovulation as the days of highest fertility, rather than the day of ovulation itself (6, 7, 9). In fact, the most recent study suggests that the day of ovulation is associated with a considerable drop in fertility relative to the days leading up to it (9). However, the extent to which this is known among women with infertility who are struggling to conceive without medical intervention remains unknown. The current study therefore aimed to assess fertility knowledge, including accurate knowledge of the fertile window, in this population.

# METHODS

## Participants

Reproductive aged women (18–45 years) from across Canada and the United States were recruited to participate in an online study examining the relationship between psychological coping strategies and infertility-related mood (10), advertised *via* social media. To qualify, women had to report having difficulty achieving pregnancy over the past 12 or more months, despite active attempts to conceive. They were also required to be planning to actively attempt to conceive during their next menstrual cycle. The only exclusion criterion was current use of ART, including *in vitro* fertilization, intrauterine insemination, and use of ovulation-enhancing medications. Individuals were compensated a $15.00 Amazon e-gift card for their participation in the baseline survey. All participants provided informed consent by reading an online consent form and clicking "I agree" prior to completing the survey. This study was reviewed and approved by the University of Regina Research Ethics Board (#2018-032).

## Procedure

While the entire study in which participants enrolled lasted one full menstrual cycle, the current study was a cross-sectional examination of self-reported fertility knowledge assessed at baseline. Prospective participants were instructed to make initial contact with researchers *via* Facebook messenger to express their interest in the study. The researcher then emailed a link to an online survey assessing study eligibility. Women deemed eligible to participate were invited to provide their contact information. The researcher then contacted these women, provided an overview of the study design, and obtained written consent to participate. Consenting women were sent a link to an online survey.

The survey included a section about demographic and reproductive health history. Participants were asked to report their age, relationship status, ethnicity and were asked to complete questions about reproductive health history, including previous pregnancies, miscarriages, abortions, fertility treatments, infertility-related diagnoses, and the fertility confirming methods they used to increase chances of conceiving. Additionally, twelve items assessing knowledge about basic human fertility were administered, including items pertaining to the fertile window. These questions were inspired by a "Fertility Knowledge Quiz" included on a governmental patient education website but is no longer publicly available. Specific items and response options are listed in **Table 2** and **Supplementary Table 1**.

## Statistical Analyses and Power Calculations

Descriptive statistics were used to examine participant characteristics and responses on the Fertility Knowledge Questionnaire. Pearson correlations were also used to examine the relationship between various baseline characteristics, such as education and reproductive history, and percentage of accurate responses on the Fertility Knowledge Questionnaire. Chi square analyses were also used to examine the use of various fertility tracking methods as predictors of responses to particular items on the Fertility Knowledge Questionnaire.

As this was a secondary analysis of data collected for another purpose, power calculations were conducted as sensitivity analyses. Using G*Power, it was determined that a sample of 102 allowed for the detection of a small correlation of $r = 0.27$ with 80% power, setting alpha at 0.05. For Chi-square analyses, the largest critical z score was calculated to be 1.96, setting power at 80% and alpha at 0.05. This value was lower for fertility tracking methods that were more moderately endorsed, however.

# RESULTS

## Participant Characteristics

While 1,006 women completed the eligibility survey, only 559 were deemed eligible to participate. Of those, 105 consented to participate and completed the baseline questionnaire. Data from 3 participants were excluded due to suspicious answer patterns, and data from the remaining 102 participants were analyzed. The demographic and reproductive characteristics of these women are reported in **Table 1**. Consistent with our exclusion of women pursuing (and who can afford) ART, our sample reported mean individual and household incomes well below the national averages for either Canada or the United States. The large majority had at least a high school diploma, though only 19% had a university degree. Participants reported that they had been actively trying to conceive between 12 and 156 months. More

**TABLE 1 |** Participant characteristics.

| | Mean (SD) or % |
|---|---|
| **Demographic characteristics** | |
| Mean age (*SD*) | 28.2 (6.2) |
| Race/ethnicity | |
| White/Caucasian | 69% |
| Black/African-American | 16% |
| Hispanic/Latina | 11% |
| Other | 4% |
| Education level | – |
| Some high school education | 12% |
| High school diploma | 35% |
| Some college education | 34% |
| Bachelor's degree | 13% |
| Master's degree | 6% |
| Mean individual annual income | $20,000–$34,999 |
| Mean annual household income | $35,000–$49,999 |
| **Reproductive health characteristics** | |
| Months trying to conceive (SD) | 35.3 (34.0) |
| Number of current children | – |
| None | 62% |
| 1 | 19% |
| 2+ | 19% |
| Previous pregnancy | 64% |
| Previous miscarriage | 58% |
| Prior fertility treatment | 13% |
| Diagnosis of endometriosis | 9% |
| Diagnosis of polycystic ovarian syndrome (PCOS) | 25% |
| Irregular menstruation or acne without PCOS diagnosis | 23% |
| Strategies for trying to conceive | |
| Cycle tracking | 82% |
| Timed intercourse during "fertile window" | 67% |
| Ovulation predictor tests | 47% |
| Monitoring cervical mucus | 40% |
| Basal body temperature measurement | 20% |
| Nothing | 7% |
| Mean number of conception strategies used | 2.7 (1.5) |

than half of the women had no live children and rates of prior miscarriage were high. When asked to report the strategies used to improve chances of conceiving, tracking one's menstrual cycle and timing intercourse during their fertile window were the most endorsed strategies, followed by using ovulation predictor tests, and measuring basal body temperature to confirm ovulation (**Table 1**).

## Fertility Knowledge

Responses to the Fertility Knowledge Questionnaire are reported in **Table 2**. Mean percentage accuracy score was $M$ ($SD$) = 67 (18). Although most women knew that the day of ovulation is not the only day during which conception could occur, it appeared that the majority of women (72%) were not aware that the week *before* ovulation was associated with the highest chances of conception. Conversely, only 22% of respondents were correct in identifying the week *after* ovulation as being associated with the lowest chances of conceiving. In examining conception method endorsement as a predictor of responses to the question about the week following ovulation, endorsement of cervical mucus tracking was significantly associated with a greater likelihood of correct responses ($\chi^2 = 5.2$, $p = 0.02$) such that 38% of women endorsing mucus tracking responded correctly to this answer, vs. 17% of women who did not. Pearson correlations revealed that respondent years of education was positively correlated with overall fertility knowledge quiz scores ($r = 0.25$, $p = 0.01$). A greater number of months spent trying to conceive was also correlated with lower fertility knowledge ($r = -0.22$, $p = 0.03$). Age, number of children, and family income were unrelated to fertility knowledge ($p > 0.05$).

# DISCUSSION

Basic fertility knowledge appeared to be relatively high in our sample of women struggling to conceive. For example, the majority of women were aware that intercourse did not have to take place on the day of ovulation for conception to occur and were able to recognize that a woman could have regular menstrual cycles in the absence of ovulation. However, there appeared to be confusion regarding the timing of a woman's fertile window in relation to ovulation: specifically, only 1 in 4 women recognized the week before ovulation as being associated with peak fertility. Women endorsing use of cervical mucus monitoring were more likely to have accurate knowledge related to the timing of a woman's fertile window and women with more education were more accurate in their fertility test scores overall.

This misunderstanding regarding the timing of the fertile window may have important consequences for women trying to conceive without medical intervention, especially women who are not using cervical mucus monitoring. In the current sample, nearly half of women endorsed the use of ovulation predictor tests, which identify the surge in luteinizing hormone (LH) that precedes ovulation by ∼12–36 h. Importantly, however, a positive urine test is often only obtained 12 h after the true LH surge (11), leaving little to no time to time intercourse before ovulation takes place. Among women relying on this method, the belief that fertility increases *after* ovulation could result in women missing the fertile window altogether, thereby increasing the time to successful conception. The observation that women who had been trying to conceive for a longer time were less knowledgeable about women's fertility may suggest that a lack of knowledge contributes to decreased chances of conception with each cycle, perhaps due to a failure to appropriately time intercourse during the fertile window. Future research prospectively recording acts of intercourse and the timing of ovulation will be well suited to confirming this proposed mechanism of action. These findings suggest that education about the fertile window by a healthcare provider would be of value for women expressing a desire to conceive.

To our knowledge, three prior studies have assessed fertility knowledge among North American women pursuing ART. In

**TABLE 2 |** Responses to fertility awareness quiz.

| | True | | False | |
|---|---|---|---|---|
| Pregnancy can happen the very first time a person has sex. | 95% | | 5% | |
| A woman will get pregnant only if she has sex on the same day she ovulates. | 12% | | 88% | |
| At age 17, men become fertile, which means they can get a woman pregnant. | 30% | | 70% | |
| Cervical secretions are one sign a woman is fertile. | 80% | | 20% | |
| The size of a man's penis affects his ability to get a woman pregnant. | 0% | | 100% | |
| It is normal for women to have menstrual cycles that are shorter or longer than 28 days. | 90% | | 10% | |
| After having a baby, a woman can only get pregnant again when her periods return. | 9% | | 91% | |
| When a woman gets pregnant, what determines whether she will have a boy or a girl? | **1** | **2** | **3** | |
| 1—The father's sperm<br>2—The mother's egg<br>3—Neither, it is random | 69% | 1% | 30% | |
| Which of the following is not a sign of ovulation? | **1** | **2** | **3** | **4** |
| 1– Increase in body temperature<br>2– Monthly period<br>3– Slight ache or pain in abdomen (near ovary)<br>4– Cervical secretions | 11% | 69% | 20% | 1% |
| Rank each response on the scale below from *least likely (1)* to *most likely (5)* to lead to pregnancy: | **1** | **2** | **3** | **4** | **5** |
| Having unprotected sex the week after ovulation | 23% | 26% | 20% | 11% | 21% |
| Having unprotected sex the day of ovulation | 2% | 4% | 11% | 18% | 66% |
| Having unprotected sex the week before ovulation | 5% | 10% | 28% | 26% | 30% |

*Gray cells indicate answers considered correct.*

one survey, 37% of women were deemed to have a moderate to high degree of fertility awareness based on their knowledge of the signs of ovulation, such as cervical mucus and basal body temperature increases (12). A second study of ART patients estimated that 26% of women had what was deemed to be adequate knowledge of the fertile window (13). These study findings are relatively consistent with our finding that 30% of women in the current study correctly identified the week leading up to ovulation as the time of highest fertility. In contrast, though, a Canadian study found that 76% of women pursuing ART had adequate knowledge of the fertile window. Like our study, though, they observed a significant negative correlation between years of formal education and fertility knowledge test scores (14), which would be consistent with the lower knowledge level in the current study given the lower socioeconomic status of our sample. Thus, our findings extend these earlier studies by focusing on a population that is largely understudied in the area of infertility: women with infertility but who are not intending to pursue ART, a sample that is likely to be socioeconomically disadvantaged compared to women with the financial means of pursuing fertility treatments. Despite this socioeconomic disadvantage, our sample was similarly knowledgeable about the fertile window compared to previously studied patient samples, perhaps because a large proportion of women in our study were actively monitoring their cervical mucus to track their fertility.

These findings should be interpreted in light of a few limitations. First, more details might have been asked regarding the sources of women's knowledge about human fertility. Second, while the current study examined the cross-sectional relationship between fertility knowledge and length of time spent trying to conceive, a longitudinal study of fertility knowledge, fertility-related behaviors, and time to conception, would better clarify the extent to which accurate fertility knowledge influences conception success. Third, there was a fairly small number of women (102) who consented to participate, despite 1,006 women completing the eligibility survey. Finally, we were unable to examine potential differences in knowledge between Canadians and Americans as participants were not asked to specify which of the two countries they lived in.

## CONCLUSION

While women struggling to conceive without medical intervention appear to have generally adequate fertility knowledge, there appears to be some misinformation regarding the exact timing of the fertile window, which may impede women's efforts at conception. Healthcare providers can play an important role in providing education to women attempting to conceive regarding the importance of timing intercourse in the week leading up to suspected ovulation to optimize

chances of conceiving. Women using ovulation predictor tests, especially, would benefit from the knowledge that the day of ovulation is associated with a significant decline in fertility and that intercourse should therefore precede a positive test to optimize conception success. At a public health level, primary and reproductive healthcare providers can play an important role in assessing fertility knowledge and educating women about how to optimize chances of conception without medical intervention.

## DATA AVAILABILITY STATEMENT

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

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by University of Regina Research Ethics Board. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

MH wrote the first draft of the manuscript. AC conceptualized the idea, collected the data, and edited the final draft. JG conceptualized the idea, supervised data collection, conducted data analysis, provided funding for the research, and provided critical edits to the final manuscript. All authors contributed to the article and approved the submitted version.

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## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fgwh.2022.828052/full#supplementary-material

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PERSPECTIVE
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# Are UK Policies and Practices for Regulated Donor Insemination Forcing Women to Find Unregulated Sperm Donors Online? A Perspective on the Available Evidence

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In recent years, there has been an increase in women obtaining donor sperm via unregulated websites and social media. In this article, we bring together the disparate evidence in this emerging field to consider whether restrictive UK policies and practices for regulated clinical donor insemination (DI) are a potential explanation for the growing use of the currently unregulated, online route to donor insemination. To this end, we examine the nature of the National Institute for Health and Care Excellence (NICE) guidelines, recent data provided by the Human Fertilisation and Embryology Authority (HFEA), and prior research on who uses online sperm donation and their reasons for doing so. In addition, we highlight why this issue is important by outlining some of the benefits and drawbacks of the unregulated route. We argue that, whilst there are many factors driving the unregulated route to DI, restrictive UK policies and practices for regulated DI might be one of these. We conclude that turning our attention to structural barriers, such as regulated DI policies and practices, is necessary to produce more definitive evidence of this potential issue, and that adopting a Reproductive Justice framework could lead to more equitable provision of regulated DI services.

**Keywords: donor insemination (DI), reproductive justice (RJ), online sperm donation, fertility treatment, LGBTQ +, health inequalities, NHS funding**

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## INTRODUCTION

In the United Kingdom (UK) and other countries with advanced healthcare systems, if an individual needs access to donor sperm to have a baby, they can do so via a regulated or unregulated route. In the UK, the regulated route is via the HFEA licensed clinics (1). The HFEA began regulating sperm donation in the UK on 1st August 1991. They regulate all fertility treatment by setting standards, licensing and providing guidance on how clinics and other projects involving human embryos can meet the legal requirements set out in the Human Fertilisation and Embryology (HFE) Acts (1990, 2008) through their Code of Practice (2, 3). A key requirement of the HFE Act 1990 was that sperm donors were legally protected, and infertile males could be recognized as the legal father of any children born through sperm donation (4). During the time that the HFE Act 1990 was being debated, the British media covered a high-profile case of a 40-year-old

lesbian woman who was receiving treatment with donor sperm in the UK (5–7). Steinberg has since argued that the media's framing of the woman's desire to have a child as "selfish and deviant" was an influencing factor in the subsequent creation of a clause which restricted treatment to those with male partners, known as the "need for a father" (8, 9). Despite the controversial 2008 amendment of the "need for a father" clause to the "need for supportive parenting"- which recognizes married or civilly partnered same-sex partners as the legal parents of children conceived through sperm donation- the early heteronormative framing of regulated fertility treatment has arguably had lasting effects on HFEA practices and guidelines for treatment, which we explore further in this article (9, 10).

The unregulated route to sperm donation involves obtaining sperm from a known donor (friend or family member), or from a donor met on a "connection" website or social media platform for self-insemination at home. There is evidence to suggest that unregulated sperm donation - also termed "private," "known," "informal" and "self-arranged" donation - has been practiced, primarily by same-sex female couples, since the 1970s (11). Sperm was obtained from a friend or family member, or via "self-insemination networks" (a group formed outside of medical structures, comprising anonymous and/or known donors and recipients) (12). In recent years, there has been an increase in individuals obtaining donor sperm online. While exact numbers on the size of the online sperm donation market are unknown, the preliminary findings of our environmental scan of these sites estimates that there are more than 350,000 potential recipients on over 60 English-language websites and social media pages around the world. The environmental scan [see (13) for information on this method] involved systematically searching Google and Facebook for websites and social media groups which facilitate contact between donors and recipients, and then recording the membership figures of these sites/groups. The full results from this study are yet to be published.

In this perspective article, we consider whether the UK policies and practices for regulated DI are potential reasons for individuals sourcing sperm online. In so doing, we bring together the disparate evidence in this emerging field: the nature of the NICE Guidelines for fertility treatment and recent data from the HFEA pertaining to regulated DI; and prior research concerning online, unregulated sperm donation, focusing on who is choosing this route and their reasons for doing so. On the basis of the available evidence, we argue that "stratified reproduction"- which sees less wealthy and more marginalized groups having reduced access to regulated treatment- is becoming increasingly apparent in the context of regulated donor insemination in the UK (14, 15). We propose that, as a consequence, increasing numbers of single women and women in same-sex couples from low-income households and proportionally more from ethnic minority backgrounds, are looking for unregulated sperm donors online. We highlight why this issue is deserving of attention by outlining some of the benefits and drawbacks of the online route, concluding by proposing potential solutions to address the inequity in provision of regulated DI services in the UK.

## POLICIES AND PRACTICES IN REGULATED DONOR INSEMINATION

The typical journey for a patient undergoing Donor Insemination (DI) at a HFEA-regulated clinic is depicted in **Figure 1**. In a regulated setting, sperm is procured from donors recruited by the clinic's "in-house" bank (if they have one), or from a commercial sperm bank in the UK or abroad. Once the sperm has been selected and the recipient is ready for treatment, they may then undergo either Intrauterine Insemination (IUI) or *In-vitro* Fertilisation (IVF) (see **Table 1**).

In England, NICE provides guidelines for healthcare professionals on diagnosing and treating all health—including fertility—problems. This involves setting out the criteria on who should be offered what treatments and why (18). **Table 1** displays the NICE guidelines on Assistive Reproductive Technologies (ARTs) using donor sperm, which are used by General Practitioners and fertility specialists at HFEA licensed clinics. The guidelines suggest that for mixed-sex couples to be eligible for NHS-funded treatment, they must have failed to conceive after regular unprotected intercourse for 2 years [depending on their local Clinical Commissioning Group (CCG)], although it is not clear how they provide proof of regularly trying for this time period. Despite same-sex couples not being able to conceive without assistance, NHS-funded treatment in England is only available to same-sex couples who first pay for six unsuccessful cycles of IUI with donor sperm (this number varies from 6 to 12, depending on the CCG) (19). For single women, it appears unlikely that they will be eligible for any NHS funding (19).

The cost of a single cycle of IUI at a private clinic varies from £800–1,600, plus the cost of donor sperm (∼£1,000 for one vial), consultations and health tests (20). Evidently, same-sex couples from low-income households will struggle to self-fund six cycles of IUI in order to become eligible for NHS funding, while single women must be able to afford, or take out loans for, private treatment from the start and throughout their entire assisted conception journey. Additionally, as each local CCG can decide how to allocate their funds, the "postcode lottery" of regulated fertility treatment means that, even if same-sex couples become eligible for NHS-funded treatment after self-funding the initial six IUI cycles, their access to funded treatment will vary dramatically according to their location (21).

A comparison of the NICE criteria (**Table 1**) for mixed- and same-sex couples, and single women, illustrates inequity in the distribution of NHS resources, where rationing and policy decisions create stratified reproduction (14). Stratified reproduction is defined by Ginsburg and Rapp (22) as:

> "The power relations by which some categories of people are empowered to nurture and reproduce, while others are disempowered... [and] arrangements by which some reproductive futures are valued while others are despised" (p. 3).

Other scholars from the UK and elsewhere have drawn attention to women's stratified access to ARTs based on divisions of sexuality, wealth, class and ethnicity (23, 24). The vast majority of research on regulated fertility treatment

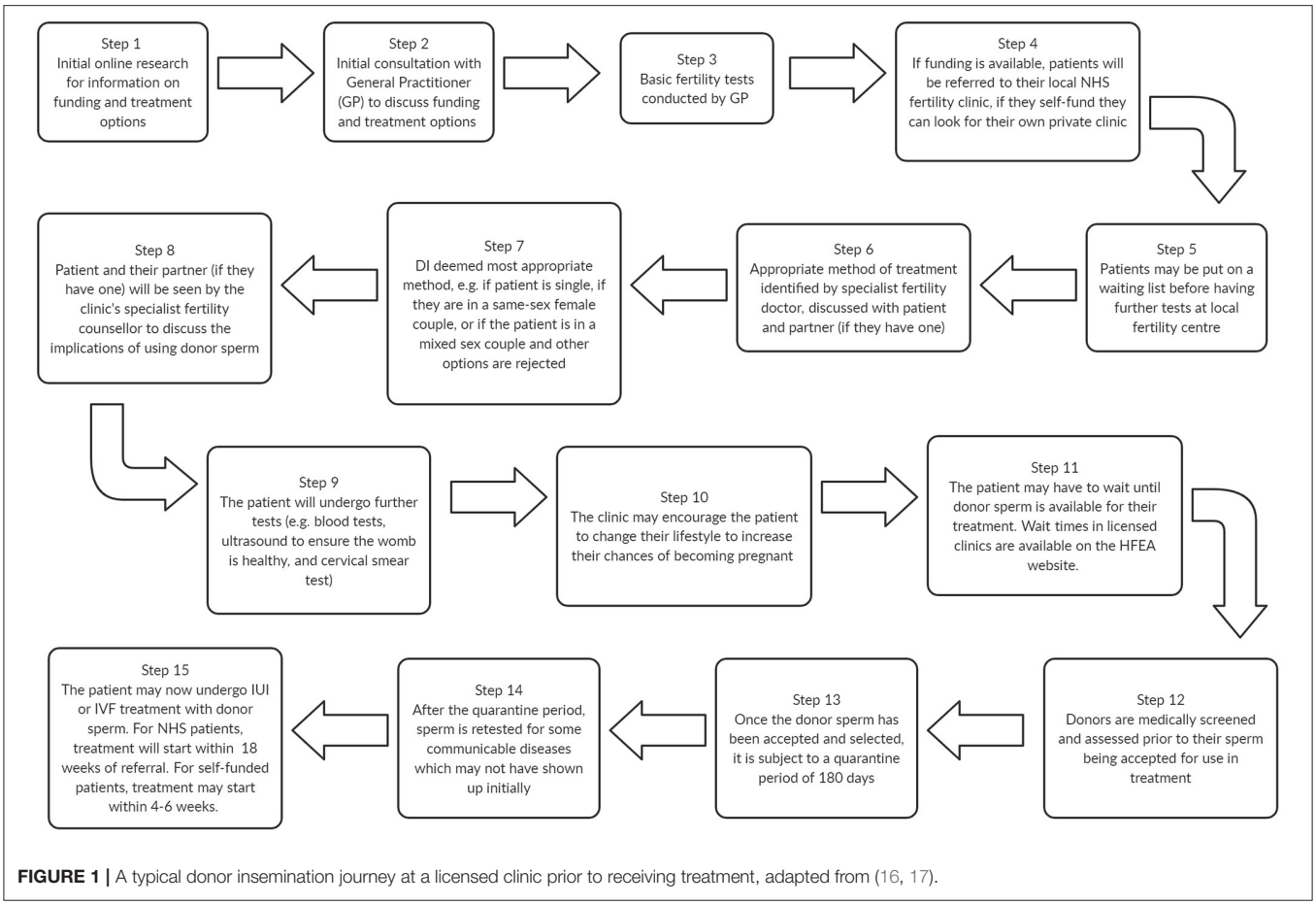


**FIGURE 1 |** A typical donor insemination journey at a licensed clinic prior to receiving treatment, adapted from (16, 17).

in industrialized countries has been conducted with white, middle-class, heterosexual women for whom ARTs are generally more available and/or affordable, leaving the experiences of minoritized women (e.g., LGBT+, poor, Black, Asian, and Indigenous) largely unexplored (24).

The HFEA report that in 2017, 5,603 DI cycles were performed via the regulated route (including both NHS and self-funded cycles) (25). There has been a slight upswing in overall regulated DI treatments in the UK, attributed to increases in same-sex couples and single women self-funding their fertility treatment, as well as Scotland's increase (from 22% in 2012 to 53% in 2017, up to 70% in 2018) in NHS-funded DI cycles (25, 26). The HFEA do not state why there has been an increase in same-sex couples and single women self-funding their treatment, but the lack of NHS funding for these groups is alluded to in the report (see below). The increase in NHS-funded DI cycles in Scotland has been attributed to increased NHS funding for all Scottish fertility services since 2012 (25, 27).

The state of funding in the rest of the UK tells a different story. In England, Wales and Northern Ireland there have been "dramatic changes" in NHS-funded DI cycles, which have been steadily decreasing since 2015 (25). In 2018, English mixed-sex couples received the highest levels of funded cycles (36% for IVF and 12% for DI), whilst there were lower levels of funding for female same-sex couples (11% for IVF and 3% for DI), and single women received the lowest level of funding overall (3% for IVF and 1% for DI) (26). Given the NICE guidelines, it is not clear why some (although very few) single women received funding. Compared with Scotland, which funded 61% of IVF and 47% of DI cycles for mixed-sex couples, 40% of IVF and 70% of DI cycles for female same-sex couples, and 28% of IVF and 16% of DI cycles for single women in 2018, England's figures are dismally low and consistently favor mixed-sex couples (26). The stringent NICE guidelines (**Table 1**), coupled with the localized CCG and Health Board criteria for DI, mean that fewer and fewer women—and same-sex couples and single women in particular—in England, Wales and Northern Ireland are eligible for NHS-funded treatment, that is, if DI is funded at all in their region (17, 25). The HFEA conclude that:

> "Criteria for DI can mean people do not get treatment for DI under the NHS. This particularly impacts women in same-sex relationships or with no partner who do not necessarily have an infertility diagnosis, and more significantly, are unable to try to conceive naturally with their partner" (25, p. 32).

During the same period as the results from the aforementioned report were being finalized, in July 2019, the UK Health Secretary

**TABLE 1 |** NICE guidelines on assisted reproductive technologies (ART) using donor sperm (16).

| **Method** | **Intracervical Insemination (ICI)**. A procedure in which sperm is placed inside a woman's cervix to help her conceive. This method is rarely used at regulated clinics due to IUI having higher success rates. | **Intrauterine Insemination (IUI)**. A procedure in which sperm is placed into a woman's womb to help her conceive. This method has higher chances of conception than ICI, even if the sperm has been frozen and thawed. IUI should be unstimulated in the first instance but can be stimulated (using fertility medicine) if a fertility problem has been diagnosed. | ***In vitro* Fertilisation (IVF)**. This treatment begins with stimulation of the ovaries through use of fertility medicine. Eggs and sperm are then collected and fertilized outside the body. One or two embryos are then selected and placed into the womb. This procedure can be used in combination with Intracytoplasmic Sperm Injection (ICSI) in severe cases of male infertility. |
|---|---|---|---|
| Donor or partner sperm | Either (only if partner sperm has to be washed) | Either | Either |
| Sperm type | • Fresh and unwashed (higher chances than frozen and thawed)<br>• Fresh and washed (for those with a viral infection that can be sexually transmitted)<br>• Frozen and thawed (e.g., imported from a sperm bank) | • Fresh and washed<br>• Frozen and thawed (e.g., obtained from a sperm bank) | • Fresh and washed<br>• Frozen and thawed (e.g., obtained from a sperm bank) |
| Setting | • Self-insemination at home (unregulated route)<br>• In a licensed clinic if sperm is being washed due to a viral infection | In a licensed clinic | In a licensed clinic |
| Suitable for | • Single women using donor sperm with no infertility diagnosis<br>• Same sex couples using donor sperm with no infertility diagnosis<br>• Mixed sex couples where the sperm-producing partner has a viral infection that can be sexually transmitted | • Single women using donor sperm<br>• Same sex couples using donor sperm<br>• Mixed sex couples using partner or donor sperm | • Single women using donor sperm<br>• Same sex couples using donor sperm<br>• Mixed sex couples using donor or partner sperm |
| NHS funding example (dependent on CCG) | ICI is not routinely funded by the NHS | • Same sex couples who have not become pregnant after 6 self-funded cycles of "artificial insemination" (not specified)<br>• Mixed sex couples where the sperm-producing partner has a viral infection that can be sexually transmitted and so sperm must be washed (if ICI not available at clinic)<br>• Mixed sex couples who are unable to have sexual intercourse (e.g., because of a physical disability or psychosexual disorder) | • Same sex couples who have not conceived after 12 cycles of artificial insemination (where 6 or more are by IUI)<br>• Mixed sex couples who have not conceived after 2 years of regular unprotected intercourse or 12 cycles of artificial insemination (where six or more are by IUI) |

stated that "sexual orientation should not be a factor in access to IVF" and committed to carrying out a review into LGBT+ access to regulated fertility treatment (28). In response to the perceived unequal treatment of LGBT+ individuals seeking regulated fertility treatment in the UK, a petition has been set up which urges the government to "stop discriminating against LGBTQ+ families", and to follow-up on its promise to conduct the review (29). The petition has gained over 30,000 signatories and the social media influencers who created it cite the "alternative and dangerous" online route that some of their followers are undertaking as a cheaper alternative (30). More recently, the British Pregnancy Advisory Service (BPAS) published the results of an investigation into NHS-funded fertility care across the UK for female same-sex couples, concluding that this group do indeed face "significant barriers" which have created a so-called tax on LGBT+ families wishing to access regulated fertility treatment (31).

A HFEA report, entitled "Ethnic diversity in fertility treatment 2018," also published in 2021, highlights disparity in access to, and outcomes of, fertility treatment for ethnic minorities (32). From the HFEA data, and a comparison with statistics from the general population (also contained within the report), it is evident that white patients are overrepresented in regulated DI treatments (87% of UK population but 92% of DI treatments); Black patients are slightly underrepresented (3% of UK population but 2% of DI treatments), Asian patients are also underrepresented (7% of UK population but 3% of DI treatments) and those of mixed ethnicity are equally represented (2% of UK population and 2% of DI treatments) (32). When sexuality and ethnicity are considered together, even more disparity is evident, with 96% of same-sex couples receiving DI being white (32).

Unfortunately, the HFEA data does not provide a breakdown of NHS-funded vs. self-funded regulated DI treatments by

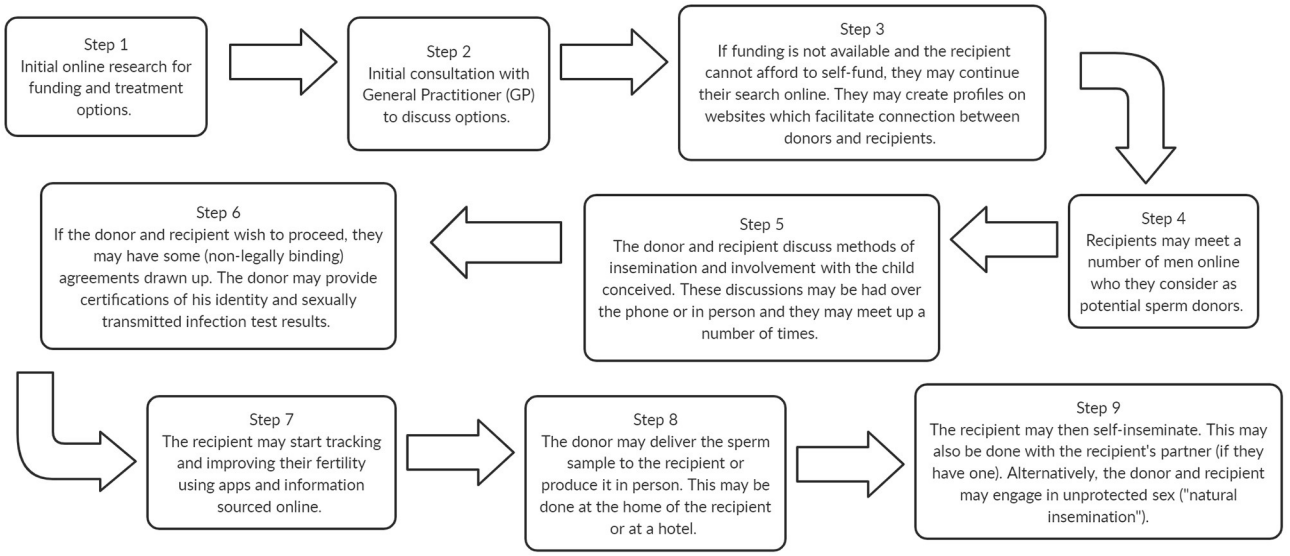


**FIGURE 2 |** A typical unregulated, online donor insemination journey informed by our Patient and Public Involvement (PPI) group and (32).

sexuality and/or ethnicity so it is not clear how those at the intersection of these identities are impacted by a lack of state funding. It is, however, evident that individuals from minority ethnic communities are over-represented among low-income households and often reside in areas which have been hardest hit by sustained disinvestment in fertility treatment in England (24, 33). As a result of the evidence on increasing disparities for ethnic minorities, the HFEA are urging commissioners to "review their funding eligibility criteria to consider whether these have an adverse impact on access to treatment among particular ethnic groups" (32).

While access to funded DI is certainly one of the most important factors for individuals choosing which conception route to go by (23, 34), other aspects also inform this decision. For example, drawing on the literature pertaining to cross-border reproductive care, recipients have reported choosing overseas fertility treatment over treatment in the UK owing to: shorter waiting times, availability of donors, quicker test results, and lower costs (35). Indeed, the shortage of sperm donors registered with regulated clinics has been cited as a disadvantage of regulated DI in the UK, and can mean that patients must pay more to purchase and ship imported sperm from banks overseas (36). Furthermore, there is evidence to suggest that lesbian recipients report experiencing discrimination in regulated settings, including feeling as though they must justify their right to be parents, and having to repeatedly "come out" to various healthcare professionals (37, 38). Finally, although the evidence on the experiences of Black and minority ethnic individuals is distinctly lacking, we know that they experience poorer outcomes of, and face considerable challenges in accessing, regulated fertility treatment (39). In the US, reasons for such disparity have been attributed to a mistrust of healthcare systems due to previously experienced or perceived racism, and biased assumptions by health professionals about sexual behavior and the cause of infertility in Black women (39).

## RESEARCH ON UNREGULATED SPERM DONATION

At the same time as we have seen a reduction in funding for regulated DI treatment, there has been a significant increase in single women and women in same-sex couples obtaining donor sperm online (15, 40–42). The typical journey for a person obtaining donor sperm online is depicted in **Figure 2**. At-home insemination can be achieved via Intracervical Insemination (ICI; see **Table 1**) performed by the recipient or their partner, or through sexual acts with the donor. Sperm donation through online platforms falls outside of the HFEA's regulatory control as it takes place outside of a clinic.

Whilst advances in internet technologies and the habitual use of social media platforms are likely to have partly driven the increase in single women and women in same-sex couples obtaining donor sperm online, these are not the only drivers (40). As a relatively new phenomenon, there has been limited research into online sperm donation to date, and of this limited research, only two studies have explored the characteristics of recipients who are undertaking this route (41, 42), and only one has explored their motivations (41).

Both of these studies recruited participants from *Pride Angel*— one of the largest and most well-known connection websites—, which is UK-owned but used worldwide [sample sizes were $N$ =429 and $N$ =74, respectively (41, 42)]. The majority of participants in both studies were either British (58%, 25%), American (18%, 32%), or Australian (8%, 25%); LGBT+ (78%, 65%, compared to 2% of the UK population); and in a relationship (76%, 66%, compared to 50% of the UK population), with a sizeable minority of participants being single [24%, 34%, compared to 32% of the UK population (41–43)]. When compared with the aforementioned figures pertaining to NHS-funded DI cycles in regulated clinics, these findings suggest that

women in same-sex female couples are underfunded by the NHS and proportionally over-represented in online sperm donation.

Furthermore, the majority of participants in both studies were white (84%, 91%); the other ethnicities in Whyte's study (42) are not recorded, but 6.5% of the participants in Jadva et al.'s study (41) were Black (compared to 3% of the UK population), followed by Asian (3%, compared to 7% of UK population), mixed race (4%, compared to 2% of the UK population) or another ethnicity (2%, the same as the UK population) (32). Again, these figures suggest that, while proportionally less Black and Asian patients are receiving DI treatment at regulated clinics, proportionally more individuals from Black and mixed-race populations are using online sperm donation.

Overall, the participant characteristics from the above studies suggest that LGBT+ women and those from Black and mixed minority ethnic backgrounds are proportionally more likely to use the online route. However, it is important to note that *Pride Angel* has a greater LGBT+ focus than some other "connection" websites or social media groups, which may present a misleading picture of how many sexual minorities use the online route. Furthermore, limited access to, or funding for, regulated DI services might not wholly explain the findings for online sperm donation. There is a lack of Black, Asian and mixed heritage donors in the regulated route. For example, 86% of sperm donors registered at UK clinics are white, which may lead to, for example, growing numbers of mixed heritage lesbian couples who are seeking donors who share their heritage, to turn to unregulated means of sperm donation, such as "connection" websites, or their own personal networks (32, 44).

Of the two studies, the Jadva et al. study (41) also surveyed recipients about their motivations for, and experiences of, searching for a sperm donor online, using multiple-choice and open-ended questions. Participants were asked to select their "main reason for seeking a sperm donor" from a predetermined list of options. The majority of recipients recorded their reason as "I am gay/lesbian" (64%), followed by "I do not have a partner to have children with" (10%). The list of options did not include "I cannot afford/did not qualify for funded treatment" (41). Over half of the sample (58%) reported that there were advantages to obtaining donated sperm via *Pride Angel*, and when asked to describe the advantages in their own words, these most commonly entailed: "being able to meet and connect with the donor" (24%), "fewer costs involved" (18%) and "availability of detailed information about donors" (13%) (41). Participants were also asked if they would consider obtaining donated sperm from other sources, including a sperm bank, fertility clinic, friend or other connection website. Of these, sperm bank (71%) and fertility clinic (63%) were most commonly selected (41). Overall, these findings suggest that recipients are aware that their sexuality and relationship status are factors influencing their decision to look for a donor and that "fewer costs" are an advantage of the connection website. Furthermore, given that the majority of participants would consider using a sperm bank or fertility clinic, but cite the "fewer costs" relating to the connection website, these findings allude to an awareness of the significant costs associated with private regulated treatment, suggesting that some participants had looked into the regulated route and found the costs prohibitive. However, it should also be recognized that increased information about the donor, and the opportunity to meet them, were also cited as benefits of the unregulated route.

Nevertheless, the limited evidence on recipients' motivations for taking the unregulated route is corroborated by (the also limited evidence on) unregulated donors. In two interview studies on their experiences of online sperm donation, unregulated sperm donors mentioned the prohibitive sociolegal context for marginalized groups of women as a motivation for donating (15, 45). For instance, one French donor described the recipients he donated to as "hard-working, non-affluent lesbian couples that were not able to access sperm through other channels due to unfavorable social and legal environments" [(15), p. 7]. In another study, a Canadian donor mentioned the substantial costs of regulated open-identity donation, which are not covered by state-funded programmes or private insurance, and the authors conclude that, "some single women or couples who want access to information about the donor turn to the Internet to meet this need" [(45), p. 8]. This demonstrates that motivations for online sperm donation are tied up with inaccessible regulated practices.

## THE BENEFITS AND DRAWBACKS OF UNREGULATED SPERM DONATION

As participants stated in the Jadva et al. (41) study in the previous section, online sperm donation, as well as being much cheaper than private regulated treatment, offers recipients the opportunity to meet up with and get to know their donor if they wish, and find out much more detailed information about the donor than that which is provided by clinics (41). The unregulated route is also much less medicalized, and some recipients would rather not unnecessarily involve clinics, doctors, nurses, appointments, medication and tests in their conception journey when they do not have a diagnosis of infertility (45). In this way, some recipients report that unregulated sperm donation enables them to have more control over the process: everything can be undertaken in the comfort of their own home, and their partner can be involved in the insemination process (37). It might be argued then, that the online sperm donation phenomenon has built upon the earlier known donation practices of the late 20th century and brought it into the globalized, online marketplace of today. These "DIY" approaches have been welcomed by those researching minority ethnic, LGBT+, and alternative families in the past, as they offer individuals the option of conceiving their children outside of the rigid medical structures and state regulation of ART, which arguably reinforce the aforementioned issues of stratified reproduction (46, 47).

However, while some recipients do prefer to conceive outside of regulated clinics, it is important to highlight that online, unregulated sperm donation is not for everyone, and individuals should be able to choose between the regulated and unregulated routes to conception. A number of scholars have started to explore the drawbacks of the unregulated route, highlighting some of the legal and health implications (37, 40, 48–50). Firstly, it has been noted that negotiating the legal issues of parenthood

in unregulated arrangements can be complex. While regulated clinics are able to separate the donor legally from any offspring conceived, different rules apply if conception takes place outside of a clinic. In unregulated arrangements, the sperm donor is not the legal father if he donates by artificial insemination to a married or civilly partnered couple (51). However, if there is no second legal parent (e.g., the non-birth mother is in an unmarried couple, or the recipient is single), the sperm donor will be the legal father, irrespective of what the parents agree or what is recorded on the birth certificate (51). Further, a sperm donor who donates through sexual intercourse (sometimes called "natural insemination") is always the legal father of any child conceived, irrespective of what the parents agree or what is recorded on the birth certificate (51). For unmarried couples, single women and anyone who conceives via sexual intercourse, then, there is the possibility that the donor could make a claim for legal parenthood, which could later be established in court (52). Whilst for donors, there can be concerns that recipients will "come after them" for child support (45).

There are also some health risks associated with unregulated sperm donation. For example, recipients must trust that donors are free from sexually transmitted infections (53). Although some sperm donation websites suggest that donors are tested and present their test results to recipients prior to insemination, there is no guarantee that they will not contract an infection between the tests being conducted and the donation being received (52). It is also difficult to safeguard against the risk of consanguinity and genetic illnesses in unregulated sperm donation arrangements (40). However, this issue is not unique to the unregulated route. There is evidence of donors in the US fathering hundreds of offspring through donations to different sperm banks and/or moving from clinic-based to online sperm donation (54). In some cases, sperm banks had failed to detect life-threatening genetic conditions in donors, which were inherited by donor offspring (54). In UK clinics, any one donor's sperm can be used to help a maximum of ten families (55); however, records extend only to HFEA licensed clinics. As there is no independent global register which records the identities and locations of the children each donor has fathered across HFEA licensed clinics, international sperm banks and the unregulated route, "Super Donors" (i.e., donors who purposefully have hundreds of biological offspring) exponentially increase the risk that half-siblings might unwittingly meet and have sexual relationships, and potentially children, with each other later down the line (56).

Lastly, there is anecdotal evidence in the media, and two studies to date, which indicate that women who use online sperm donation sites are being harassed and abused by donors (52, 57–60). McQuoid (52) undertook a "covert netnography", assuming personas to gain access to the online sperm donation community over a period of 33 months, during which time she liaised directly with 198 female recipients, and 92 men. McQuoid found that half of the women ($n = 99$) involved in her research experienced abuse from online sperm donors, such as: physical, financial, emotional and verbal abuse; stalking; trolling; racism and homophobia; sexual grooming, harassment and rape. The author also draws attention to the abbreviations coined by unregulated donors for use on connection sites when discussing their preferred method of insemination (52). These abbreviations include: AI+, artificial insemination plus a sexual act performed by the recipient; PI, partial insertion of the penis into the recipient upon ejaculation, and Natural Insemination or NI, unprotected sex with the recipient (52). When this is combined with an insistence from some donors that the insemination success rate is higher if these sexual acts are performed, McQuoid argues that donors have "linguistically created superfluous culturally authentic 'donation methods' to coerce or push women toward sexual intercourse and/or acts" [(52), p. 2].

It should be noted that McQuoid's research was self-published and has not been peer reviewed; however, a number of these findings have since been initially corroborated by our small, exploratory, qualitative interview study of "morally challenging behavior" among donors and recipients of online sperm donation, undertaken in 2019 (60). Three prolific, experienced donors from the UK, the US and Australia, who characterized themselves as central figures in online sperm donation, discussed their observations of, and experiences in, the online sperm donation "community". The donors reported lying about their identity, convincing recipients that sex is more effective than artificial insemination, breaching recipients' privacy, and prejudice-based discrimination (60). Further, five recipients from the UK, Germany, Poland and Canada who had had "less than positive" experiences of online sperm donation, discussed what these experiences entailed and the impacts. The recipients reported a range of abusive behaviors occurring online and offline, such as dishonesty and deception, online harassment, sexual coercion, trolling and ghosting (60).

Although these two studies should be considered preliminary, this emerging evidence highlights that this may be a widespread problem, warranting further investigation.

By presenting the issues above, we are not necessarily suggesting that online sperm donation should, or indeed could, be regulated. The unregulated route can be of great benefit to those who choose it; but, it must be emphasized that current UK policy and practice for regulated donor insemination may be limiting individuals' opportunities to choose between the unregulated and regulated routes. Further, what this section demonstrates is that, whilst there may be advantages to the unregulated route for certain individuals, the possible implications highlight why we should not simply accept online sperm donation as a route that is commensurate with or makes up for the shortcomings in the policies and practices of, the regulated route.

## CONCLUSIONS

In this article we have considered whether restrictive policies and practices for clinical, regulated DI are a potential driver for the growing online sperm donation market. From an exploration of the NICE criteria for treatment, coupled with evidence of reduced NHS funding and inequity in its distribution, we can conclude that poor, single, LGBT+ and Black and minority ethnic women are at a significant disadvantage when attempting to

access regulated DI, and even more so if they are positioned at the intersection of any number of these identities. Furthermore, from the limited research into online sperm donation, it would appear that: relationship status and sexuality are factors influencing women's decisions to look for a donor, Black and mixed ethnicity people are proportionally over-represented in online sperm donation, and lower costs are seen as an advantage of the online route. Therefore, whilst there are a range of factors driving the unregulated route to DI, it is plausible that the aforementioned policies and practices might be one of these.

We acknowledge the challenges faced by an NHS with limited resources and funds but contend that it is unjustifiable to restrict access to funded services based on an individual's sexuality or relationship status, in the same way as it is unjustifiable (and illegal) to deny treatment based on race, infertility, nationality or religion. It is also important to acknowledge the "triple jeopardy" of gender, class and race (or "quadruple jeopardy" when we also consider sexuality) discrimination experienced by minoritised individuals, who are disproportionately poor and disproportionately bear the consequences of restrictive policies and practices [(61), p. 45]. We suggest a Reproductive Justice approach to DI as a starting point for thinking about how the issues presented in this article might be addressed.

Reproductive Justice defines reproductive rights as simply: "(1) the right not to have a child; (2) the right to have a child; and (3) the right to parent children in safe and healthy environments" (51). Although the term "Reproductive Justice" was coined in the US by women of color, its goals are universally applicable because every human being should have the same human rights, with proponents emphasizing its "idealized commitment to the 'global'" [(61), p. 6]. Reproductive Justice also places reproductive rights within the context of social and economic conditions, which shifts the focus away from the individual and onto the systemic barriers which inhibit marginalized communities from realizing their reproductive rights (62). In the case of DI services, these barriers include the restrictive policies and criteria for regulated treatment, and the subsequent withholding of state funding based on social and economic factors such as sexual orientation, relationship status, location/postcode, race/ethnicity, and insufficient income to pay for "Qualifying Treatment". The reproductive justice approach also looks at how social and economic systems harm lives and constrain the options of the most marginalized individuals and communities. Consistent with this, we would argue that there may not be a choice between regulated and unregulated DI for single women and same-sex female couples, particularly if they are from an ethnic minority, are poor, and/or reside in areas where funding for regulated treatment has been cut (47, 60).

As per the Reproductive Justice framework, we contend that structural and systemic barriers must be interrogated and revised to enable recipients to access NHS-funded DI, if that is the route they choose. However, there are gaps in the evidence base and more definitive evidence is needed to ascertain the link between the shortcomings of current policy and the booming unregulated sperm donation market. The recent BPAS report (31) is a valuable starting point from which to conduct further research into this issue, and we suggest that a systematic review on the experiences of marginalized individuals undertaking regulated DI would help to determine how they are affected by current policies and identify any barriers they face in accessing care. It is also imperative that further research is conducted to explore the characteristics, motivations and experiences of recipients who use online sperm donation platforms, including how current policy and practice impacts on individuals' decisions and experiences. Research is currently being conducted by members of the team at Leeds Beckett University which seeks to fill these gaps. What is already evident, however, is that researching and addressing these issues will be the first steps toward more equitable provision of services and the realization of reproductive justice for *all* recipients of donor sperm.

## DATA AVAILABILITY STATEMENT

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

## AUTHOR CONTRIBUTIONS

FT, TT-M, and GJ led the conceptualization of the paper. FT developed the outline and drafted the paper. FT, TT-M, GJ, and AP provided comments and were involved in the writing of the paper. All authors read the final version and approved it.

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# "There Are Things We Can Do and There Are Things We Cannot Do." A Qualitative Study About Women's Perceptions on Empowerment in Relation to Fertility Intentions and Family Planning Practices in Mozambique

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**Introduction:** The restrictive socio-cultural norms in Mozambique limit the power of women to decide, voice, and act on their reproductive choices. This study aimed to explore women's perceptions and experiences of empowerment relating to fertility intentions and family planning practices in Mozambique, focusing on facilitators and barriers toward reproductive empowerment.

**Methods:** Qualitative in-depth interviews were undertaken with women of reproductive age (18–49 years) in Nampula and Maputo provinces and Maputo city, Mozambique. Data collection took place between February and March 2020 in Maputo region and during August 2020 in Nampula Province. Convenience sampling was used to recruit participants from both urban and rural healthcare facilities and from within the communities serving the healthcare facilities. In Maputo city, a snowball sampling technique was used to recruit women from the community. A total of 64 women were interviewed, 39 from Maputo and 25 from Nampula. A thematic analysis was conducted with the support of NVivo12 software.

**Results:** Several factors that hinder and facilitate women's empowerment toward fertility and family planning practices in Mozambique were identified and were interpreted within the socio-ecological model. The identified barriers included women's lack of critical consciousness and oppressive relationships. At the community and societal levels, the role of traditions, culture and gender expectations and limited access to family planning and misinformation were also important hindering factors. The facilitators of reproductive empowerment included building critical consciousness and access to economic resources at the individual level. Negative experiences at the household level were triggers of women's empowerment for family planning. Building collective

power and access to information, including education, were key at the community and societal levels.

**Conclusions:** This study identified various factors that positively or negatively influence women's empowerment journeys in Mozambique. The role of tradition, culture, and gender expectations, and oppressive relationships, were important barriers in both provinces. Women from rural areas would benefit from building of consciousness about their rights, and power to decide on their reproductive lives. Interactions with the health providers offer an opportunity to do this by favoring controlling behaviors concerning their reproductive lives, promoting social networking and levering collective power.

**Keywords: women's empowerment, Mozambique, women's perceptions, fertility intentions, qualitative studies, family planning, reproductive empowerment**

## INTRODUCTION

While the expansion of the family planning program in Mozambique has been effective to increase access to and the uptake of contraceptives from 17% in 2003 (1) to 35% in 2019 (2), recent evidence shows that progress toward universal access to reproductive health care is compromised when women's capacity to make their own decisions with regards to fertility intentions and family planning is constrained (3–6). In Mozambique, gender inequality is one of the main barriers to sexual and reproductive health and rights impacting women's health and lives (6, 7). The restrictive socio-cultural norms in Mozambique limit the power of women to decide, voice, and act on their reproductive choices, including negotiating with their partners or deciding when to get pregnant, how many children to have, and accessing family planning services (5, 7).

Gender equality and the empowerment of all women and girls are prioritized in goal number 5 of the Sustainable Development Goal (SDGs) (8). Women's empowerment is considered both a mechanism to tackle gender inequality and a goal in itself as empowered women more often have active participation in society, tend to acquire positive behaviors, achieve their full potential, and have better health outcomes (4, 9). In the Family Planning 2020 (FP2020—now extended to 2030) initiative, empowerment is also considered key for family planning programs and practices (10).

Family planning services with the provision of modern contraceptives are expected to be available free of charge in all public health care facilities in Mozambique. However, the supply of such commodities to health care services is often compromised by stockouts and by the limited capacity of the government to supply health services nationwide which contributes to the lack of women's access and use (6). Furthermore, there is a dearth of trained health providers on family planning who support women in informed decision-making regarding their reproductive choices.

Overall empowerment has been associated with women's increased chances of using modern contraception (11), preventing unintended pregnancy (12, 13), being able to negotiate sexual relationships (14), accessing antenatal care, and having a birth with a qualified professional (15). Despite the undeniable benefits of overall empowerment of women, the evidence from two recent systematic reviews shows inconsistent relationships between empowerment and family planning (14) and women's fertility (13). This is in part related to the diversity of definitions, conceptualization, measures, and operationalization of the term empowerment across studies (11, 16, 17).

Women's decision-making is the most studied domain of empowerment for reproductive outcomes (17). However, this is focused on decision-making about the functioning of the household rather than on reproduction, assuming that reproductive decisions take similar pathways (17), which is not supported by recent findings (18, 19). The need for tracking progress toward SDG 5.6.1: Proportion of women aged 15–49 years who make their own informed decisions regarding sexual relations, contraceptive use, and reproductive health care, has refined the use of indicators to better capture the processes of women's decision-making on their reproductive issues (20, 21). While these indicators are widely available through the Generations and Gender Survey (22) and Demographic and Health Surveys (23), allowing comparison of standardized data, they fail to capture important components of empowerment such as women's agency (24). Furthermore, empowerment is intrinsically linked to specificities of the context in which it is measured (18). Access to resources like education or employment as well as normative views, values, and women's own understanding of empowerment in different settings can shape negatively or positively the pathways of empowerment (24, 25).

Despite the recent efforts to support the conceptualization and operationalization of empowerment for sexual and reproductive health, these efforts fail to include women's own perceptions and lived experiences that look at factors that can facilitate or hinder empowerment in this sphere of a woman's life (24). This has contributed to the limited understanding of the relationship between women's empowerment and reproductive outcomes and the ability to develop effective interventions (17). The inclusion of women's views and experiences considering the specificities of the contexts where they live, could uncover important nuances of empowerment for sexual and reproductive health expanding on the conceptualization and measurements of empowerment, and support the development of relevant interventions.

This study aimed to explore women's perceptions and experiences of empowerment relating to fertility intentions and family planning practices in Mozambique focusing on facilitators and barriers women face in their journeys toward reproductive empowerment. This study builds on the existing literature on reproductive empowerment and specifically contributes to informing family planning strategies and programs in Mozambique that could enhance women's decision-making and agency on reproductive matters.

# METHODS

## Study Design and Setting

Qualitative in-depth interviews were undertaken with women of reproductive age (18–49 years) in two provinces in Mozambique, Nampula in the north and Maputo in the south, and Maputo city. The selection of the study sites was based on the 2015 Demographic and Health Survey results (26) showing differences in contraceptive use and the level of empowerment of women across these provinces pointing to heterogeneity in how women perceive and experience empowerment concerning fertility intentions and family planning practices. Study participants were recruited from both urban and rural health care facilities and from within communities served by the health care facilities. The health care facilities were health centers chosen with the support of the Provincial Health Directorates (DPS—Direcção Provincial de Saúde) and the Health Directorate of the City of Maputo. In total, five health centers were selected, three urban and two rural.

The health centers are the primary level of care facilities whose services varied depending on the geographical location and level of specialized care. The selection of the health care facilities was based on the provision of the different types of contraceptive methods; the largest population served for increased diversity and, the feasibility to accessing it by the research team.

The Provincial Health Directorates liaised with the head of each health care facility for permission to conduct the study. In each health center, the research project was briefly presented by the researchers to its Director and health providers. The fieldwork team involved a lead researcher, the first author (SCL), who conducted the interviews, and a research assistant who supported translation from local languages to Portuguese.

## Study Participants

Women of reproductive age (18 to 49 years), not pregnant (confirmed verbally), attending one of the selected health facilities or living in the communities served by the health care facility were invited to participate in the study. A total of 64 women were interviewed, 39 from Maputo city and province (Health center-21; Community-18), 25 from Nampula (Health center-19; Community-6), corresponding to 41 and 23 women from urban and rural areas, respectively.

The complete list of participants and respective characteristics are presented in **Supplementary Table 1**. A summary of the main characteristics of the participants is presented in the Results section.

## Recruitment

The lead researcher approached women in the health center, in a group and then individually, briefly explaining the purpose of the study and what their participation would entail and, provided flyers with additional information about the study. Women interested in participating were taken to a private location in the health care facility and provided with more detailed information about the research and eligibility was confirmed. All participants signed an informed consent form after confirming their willingness to participate. The in-depth interview was conducted immediately after in the same space.

At the community level, in both Maputo and Nampula provinces, a convenience sample was used to identify and recruit eligible women with the support of the local community leaders. The community leaders invited women of reproductive age who do not attend a health facility often, who are less likely to use contraceptives, and who were available to do the in-depth interview on the scheduled days. In Maputo city, a snowball sampling technique was used since community leaders are no longer influential in the communities. In-depth interviews were conducted in the participant's home or a public space, agreed upon with the participant.

## Data Collection

Data collection took place between February and March 2020 in Maputo city and Province, and during August 2020 in Nampula Province. Due to the COVID-19 pandemic, data collection in Nampula Province had to be postponed to August 2020 when all safety measures could be put in place.

A semi-structured interview guide was developed, and the topics included were based on the published literature (17, 25, 27). Specifically, the key research questions were: how do women experience empowerment in relation to fertility intentions and family planning? What are the barriers and facilitators to the processes of empowerment for fertility intentions and family planning? In the first part of the interview, a life timeline technique was used to explore women's experiences of empowerment about their reproductive lives. The use of a timeline elicited biographical data relating to important life events, changes, decisions, and experiences (28). With the application of this technique, fertility intentions and family planning practices were mapped and explored starting at the age of women's first menstruation, going through first co-habitation, looking at moments of decision-making and processes involved around pregnancies, and power dynamics within the household and in the health services context. Other events that could indirectly have an impact such as having a paid job, death of a family member, exposure to violence or participation in a women's group or association were also explored when appropriate. The second part of the interview focused on women's perceptions around gender roles and gender power imbalances in their communities and Mozambican society. In both sections, facilitators and barriers were explored. During the interview, the questions were adjusted to the interviewee for better understanding.

Before the start of data collection, two training sessions were organized with the research assistant on the implementation

of the interview guide and the informed consent process. The interview guide was piloted in the urban and rural selected locations (four interviews) in both provinces and adjustments and improvements were made in terms of language and terminology used to improve clarity.

The interviews were conducted in Portuguese, the official language of Mozambique, but, when necessary, translation to local languages was provided. The interviews had an average duration of 45 min and were audio-recorded. Interviewers kept a reflective diary.

## Data Analysis

A thematic analysis was conducted according to Braun and Clarke (29). The qualitative software package NVivo 12 was used to sort and manage data (30).

Both deductive and inductive approaches were employed in the data analysis. First, SCL coded all transcripts by identifying sentence by sentence the topics related to the theme of this work, namely barriers and facilitators of reproductive empowerment. Then a coding framework was developed together with a codebook which was validated by SF. The code framework was useful for organizing the codes that emerged inductively from the analysis under each topic. Codes and respective participant quotes with similar meanings were grouped into themes deductively based on theoretical models for reproductive empowerment (9, 24).

All interviews were transcribed verbatim and analyzed in Portuguese to prevent loss of meaning and increase the accuracy of the interpretation of the findings. At a later stage of the analysis process, when the themes and sub-themes were identified, translation of the illustrative quotes and passages was done from Portuguese into English. To guarantee the rigor and quality of data analysis, a triangulation strategy was used. The first author identified, sentence by sentence, topics related to the theme under study, and the last author collaborated in the certification of the coding framework. The barriers and facilitators' themes were then analyzed within the socio-ecological model framework (31) as a second step of the analysis. The socio-ecological model considers factors, and their interactions, at individual, relationship, community, and societal levels.

## Ethical Considerations

Ethical clearance was obtained from the Human Research Ethics Committee of the Faculty of Health Sciences, University of Cape Town (Ref: HREC 579/2019) and from the Institutional Committee of Bioethics for Health from the Faculty of Medicine/Central Hospital of Maputo, Mozambique (Ref: CIBS FM&HCM/98/2019). The DPS and the Directorate of Health of the City of Maputo approved the implementation of the study before its commencement. All participants provided written informed consent and verbal permission to the audio recording prior to the interview. Confidentiality and anonymity were ensured. Digital data and hard copies were stored in a secure place with access limited to the research team only.

# RESULTS

Sociodemographic and economic characteristics of the participants are described in **Table 1**. Women from Maputo were slightly older than women from Nampula (32.5 vs. 27.8 years). They were also more educated, and a higher proportion were single. However, the mean number of years of education was similar for women in urban areas and low for women in rural areas, particularly in Nampula. Forty six percent and 12% of the participants were employed in Maputo and Nampula, respectively, of which most lived in urban areas. Contraceptive use was more prevalent among women from Maputo, with all women having used modern contraceptive methods at some point in their lives. In both provinces, women living in urban areas used more contraception than women from rural areas. In Maputo, oral contraceptives and injectables were the most prevalent methods, while in Nampula the injectable was the most preferred method. Women living in urban areas of Maputo delayed their first pregnancy on average by 3 years and had fewer children compared to women in the Maputo rural areas, however, these differences were not found between rural and urban areas in Nampula province.

Several factors that hinder and facilitate women's empowerment toward fertility and family planning practices in Mozambique were identified by exploring women's perceptions and lived experiences. These factors were organized in themes under Barriers and Facilitator's topics separately. Empowerment is a multilevel and dynamic process of gaining power (32), that involves the individual and its interactions within the household to the societal structures. Given these characteristics, the results of this work were interpreted within the socio-ecological model (31). **Table 2** summarizes the themes found under barriers and facilitators and respective levels from the socio-ecological model. A detailed description of the themes is provided below, illustrated with participants' quotes.

Although similar results were found across Maputo and Nampula regions, some nuances were captured. Overall, the barriers women faced or perceived seemed to be influenced by the setting women live in (urban or rural). Women's education and marital status seemed to shape what participants considered as a facilitator. These differences were highlighted in the results below where appropriate.

## Barriers

### Lack of Critical Consciousness

Women's critical consciousness can be described as the process of questioning how power inequalities operate in their lives and having a sense of self-value and entitlement (9, 32). Regionally, most women from Nampula and some from Maputo, more often living in rural areas, did not question if their decision-making ability regarding their reproductive lives was being shaped by power imbalances or oppressive systems. Overall, these women were supportive of the current social organization and tended to live within the social expectations where marriage, motherhood, and gender roles were highly valued, and where the freedom and power gained by women were negatively perceived. The

**TABLE 1 |** Sociodemographic and economic characteristics of participants from urban and rural areas of Maputo city and province and Nampula province.

| | Maputo | | | Nampula | | |
|---|---|---|---|---|---|---|
| | **Total** | **Urban[a]** | **Rural** | **Total** | **Urban** | **Rural** |
| | **39** | **27** | **12** | **25** | **14** | **11** |
| Age, mean years [±SD] | 32.5 [±8.0] | 33.6 [±8.1] | 29.9 [±7.1] | 27.8 [±9.1] | 29.5 [±9.6] | 26.6 [±7.7] |
| Education, mean years [±SD] | 9.2 [±4.4] | 10.6 [±4.1] | 6.1 [±3.6] | 8.0 [±3.5] | 10.1 [±2.2] | 5.2 [±3.0] |
| **Currently employed** | | | | | | |
| Yes | 18 (46.1) | 17 (62.9) | 1 (8.3) | 3 (12.0) | 3 (21.4) | 0 |
| **Marital status (%)** | | | | | | |
| Single | 12 (30.8) | 9 (33.3) | 1 (8.3) | 3 (12.0) | 1 (7.1) | 2 (18.2) |
| Married or in union | 23 (59.0) | 14 (51.9) | 9 (75.0) | 20 (80.0) | 11 (78.6) | 9 (81.8) |
| Separated, divorced, or widowed | 6 (15.4) | 4 (14.8) | 2 (16.7) | 2 (8.0) | 2 (14.2) | 0 |
| Age of 1st pregnancy, median [min, max] | 17 [14, 27] | 19.6 [15, 27] | 16.5 [14, 21] | 18.6 [16, 21] | 18.5 [16, 20] | 18.5 [17, 21] |
| Number of pregnancies, mean [±SD] | 2.9 [±1.9] | 2.6 [±1.8] | 3.8 [±2.1] | 4.5 [±3.6] | 4.6 [±3.7] | 4.3 [±3.5] |
| Parity, mean [±SD] | 2.3 [±1.7] | 1.9 [±1.5] | 3.3 [±1.8] | 3.8 [±2.6] | 3.8 [±2.6] | 3.6 [±2.6] |
| Number of live children, mean [±SD] | 2.3 [±1.8] | 1.9 [±1.6] | 3.3 [±1.8] | 3.2 [±2.3] | 3.4 [±2.3] | 2.9 [±2.1] |
| **Current use of contraception (%)** | | | | | | |
| Yes | 32 (82.1) | 23 (82.2) | 8 (66.7) | 16 (64.0) | 11 (78.6) | 5 (45.5) |
| **Ever use of contraception (%)** | | | | | | |
| Yes | 39 (100.0) | 27 (100.0) | 12 (100.0) | 14 (56.0) | 9 (64.2) | 5 (45.45) |
| **Contraceptive method currently used (%)** | | | | | | |
| Oral contraceptive | 9 (23.1) | 8 (29.6) | 1 (8.3) | 2 (8.0) | 1 (7.1) | 1 (9.1) |
| Injection | 9 (23.1) | 6 (22.2) | 3 (25.0) | 13 (52.0) | 9 (64.3) | 4 (36.4) |
| Intrauterine device | 2 (5.1) | 2 (7.4) | 0 | 0 | 0 | 0 |
| Implant | 3 (7.7) | 2 (7.4) | 1 (8.3) | 1 (4.0) | 1 (7.1) | 0 |
| Condom | 8 (20.5) | 5 (18.5) | 3 (25.0) | 0 | 0 | 0 |
| No use | 7 (17.9) | 4 (14.8) | 3 (25.0) | 9 (36.0) | 3 (21.4) | 6 (54.5) |

[a] *Includes participants from Maputo city and urban area of Maputo province.*

perception of choices in life was also limited or non-existent among these women.

This young woman from Nampula illustrates the prevailing perceived benefit of being married and the perceived value of motherhood:

> "It is not good for a woman to live alone. It is important to have a husband. (…) I have never done family planning and I don't want to. I want to get pregnant again, but I haven't been able to. If God allows, I will have at least 4 children." (Nampula, rural area, 21, single, 1 child).

Similarly, the following women show discontent toward the possible choice of other women to decide or take control over their own lives:

> "Women nowadays, they want to do things first for themselves and then they think if they get married, they can go back to their houses. They don't need to stay (married). Being married is not the same as it was before. I don't know what is happening." (Maputo, rural area, 43, 4 children).
>
> "We women, don't respect men nowadays. If I don't respect my husband, he will also not respect me. If I do the things he doesn't want me to do, I am not respecting him." (Nampula, rural, 20, single, 1 child).

## Oppressive Relationships

In their relationship with male partners or other family members, women often reported oppressive behaviors which were key in how women framed their fertility intentions and use of family planning as well as framed other areas of their lives. While in Nampula, urbanized and educated women reported more often the hindering effect of oppressive relationships, that was not observed in participants from Maputo. A woman from Maputo city described her husband's behavior in the face of an unwanted pregnancy.

> "When he found out I was pregnant, he (the husband) was very angry with me. I remember him saying "I spoke to my godmother, and she says you should terminate the pregnancy." But he was lying. He would say: "We just got married and you are already pregnant, how can you be pregnant¿' Those were very difficult times for me. He had no time for me and he started seeing other people from our neighborhood. That was so difficult. I was very sad." (Maputo city, 42, married, 1 child).

Out of fear of consequences including threats of abandonment, loss of social value, verbal or physical violence or name shaming, women did not feel capable of challenging such

**TABLE 2 |** Barriers and facilitators themes for women's empowerment regarding fertility intentions and family planning.

| Themes | Socio-ecological model levels |
|---|---|
| **Barriers** | |
| **Lack of critical consciousness** | |
| - No existence of choice<br>- Support of current system<br>- Negative perception of gender power changes<br>- Limited aspirations | Individual |
| **Oppressive relationships** | |
| - Controlling behavior of husband<br>- Controlling behavior of family members<br>- Fear of consequences | Relationship |
| **Role of traditions, culture, and gender expectations** | |
| - Early marriage and motherhood<br>- Gender roles/activities division in the household | Societal |
| **Limited access to family planning and misinformation** | |
| - Lack or delay in receiving information<br>- Myths and misinformation | Societal |
| **Facilitators** | |
| **Access to economic resources** | |
| - Employment (paid)<br>- Access to loans and credit<br>- "Xitique" [a] | Individual |
| **Building critical consciousness** | |
| - Opening the mind<br>- Change in self-perception (self-value)<br>- Aspirations<br>- Voicing their choices | Individual |
| **Negative experiences as triggers of empowerment** | |
| - Adverse events that lead women to take control | Relationship |
| **Building collective power** | |
| - Social networks of support (e.g., associations, women's groups)<br>- Role models | Societal |
| **Access to information** | |
| - Access to education<br>- Access to family planning services and information | Societal |

[a] *Xitique is an informal saving and credit mechanism at the community level, organized among several people who know each other.*

oppressive environments or behaviors. Experiences of threat and abandonment were described by these participants.

> "At home, my husband makes the decisions. I am afraid of making decisions although he has never bitten me." (Nampula, rural area, 22, married, 3 children).
> "For example, in this question about having children. If a woman doesn't want to have children now, what should she do? She goes to family planning and chooses a contraception method. And the husband only finds out later. The first consequence is that the husband no longer sees the woman as obedient. He would say: "You made the decision of not having children by yourself and you did not ask me if I want children or not. I am going to have children with someone else." Because she decided not to have children for 5 years without his authorization, he is punishing her." (Maputo city, 34, married, 2 children).

## Role of Tradition, Culture, and Gender Expectations

Traditions and cultural rituals strongly embedded early marriage and childbearing in girls and young women, further promoted by the cultural belief that this is the natural and only pathway for them. The influence of traditions and rituals is explored concerning women's sexual and reproductive choices.

> "From my experience within my ethnicity, if a girl reaches maturity, that is when she has her first menstruation, she is considered a grown-up and capable of having sexual intercourse with someone. She feels that she can have these sexual encounters because she has grown. It is because of the teaching in the initiation rituals that she feels she can have sexual intercourse with any person, it does not matter the age. (Maputo city, 34, married, 2 children).

In their roles as wives and mothers, women were often limited to household chores and disempowered from reproductive choices while men's power positions were prioritized. Male power positions were related role as provider and income generator:

> "The man is the one who provides to you while you stay home. He gives you money to buy diapers… So, if he tells you "I want a child," he is the one who knows because a child is his responsibility. For example, if the child is ill, he must give you money for the hospital, for the diapers, for the food, for the groceries. If he wants a child, you must give him, there is no other way." (Maputo city, 24, single, 1 child).

However, for some women, even when the man was given the decision-maker role, it was acceptable to conceal family planning practices from their husbands. As a woman from Maputo described, different rules can be applied to family planning practices.

> "A woman must obey her husband but that (family planning) is different. There are things we can do and things we cannot do" (Maputo, rural area, 25, married, 3 children).

Families' control over women's lives was also enabled by traditions and norms in both provinces. In Nampula, parents were involved in arranging a marriage or approving marriage for their daughters, as this woman recalls.

> "I had a boyfriend of my age but then I got married to a friend of my uncle. He came to the house to ask my parents (for marrying her) and they accepted it." (Nampula, rural area, 22, married, 3 children).

## Limited Access to Family Planning and Misinformation

In Maputo, most women heard about or were offered modern contraceptives after having their first child. In Nampula, women's reported experiences seem to indicate a longer delay. A study

participant explained how only after three pregnancies she obtained information about family planning.

> "With my first three children I didn't use any contraceptives but after that, I got information about family planning at the hospital and some other projects in the community, so I decided to start doing contraception. I decided and just told my husband." (Nampula, rural area, 44, married, 7 children).

Women living in urban areas of Nampula and Maputo reported other factors that also played an important role in discouraging women from practicing family planning, which were misinformation and myths about modern contraception. A woman described what she has heard men saying about contraceptives including perceived infertility due to injectable contraceptives.

> "Men say that when a woman gets an injection (contraceptive) she will "burn" her tummy, "burn" future children as she won't be able to get pregnant again. So, they don't want women to "burn" their tummies, they want women to have children, all the children that God has given to them. All." (Nampula, urban area, 32, married, 4 children).

## Facilitators

### Access to Economic Resources

For most women paid employment was one of the most important steps toward achieving financial independence. Employment was associated with increased power for negotiation and having a voice about childbearing and family planning.

> "To have a job as well as to farm the land can help a woman. If a woman works, she can make decisions. If a woman brings money, she can make decisions." (Nampula, rural area, 23, married, 2 children).
> "From my experience most women these days do not want to have children early due to the socioeconomic contexts they live in. The living conditions. Nowadays we value living conditions. If I have a child today and I am not working, what will I be able to provide to my child?" (Maputo city, 34, divorced, no children).

A resourceful and widely used practice was the "xitique," an informal saving and credit mechanism at the community level, organized among several people (usually women) who know each other. Although this practice was very important for women's financial autonomy and building their small businesses, this was not enough to ensure financial independence. The participants from Nampula highlighted the need for institutional or government programs and funding that could support women in the development of their own businesses, give access to and create job opportunities, and facilitate access to bank loans.

> "In my neighborhood, most women are street vendors, but they cannot expand their businesses because they don't have access to credit from the banks. They don't have a way to get it. They live with the "xitique," so I would like to have that opportunity for women (to have access to bank loans)." (Nampula, urban area, 23, divorced, 1 child).

### Building Critical Consciousness

In both regions, women mentioned the need for women to open their minds or gain consciousness of their potential, their capabilities, and self-value. This was related to changing their self-perception, questioning the status quo that perpetuates gender roles and norms, and building confidence to communicate and voice their choices openly within their relationships and in the community. These views, presented below, were often shared among single and more educated women.

> "A woman must have self-esteem; she needs to feel that she is capable of doing the things she wants. Things that men do. She needs opportunities and then she will end up liking herself more. Once a woman gets a little something, she starts feeling stronger." (Nampula, urban area, 20, single, no children).
> "It would be great if we could speak, if we could speak with our husbands, with the people from the neighborhood... If we could have a voice." (Maputo, rural area, 25, married, 3 children).

### Negative Experiences as Triggers of Empowerment

Within the household, in the relationship with their partners and family members, adverse events seem to be a triggering factor for the empowerment of women in relation to their fertility and family planning. In the face of such negative or adverse situations, like abusive or controlling behaviors, it was acceptable for a woman to take control of her life, particularly with reproductive matters, as explained by these participants.

> "There are many men who are aggressive. What they want, you must give them (sexually). So having family planning (available) helps us a lot." (Maputo, rural area, 21, married, 2 children).
> "A woman can make decisions if there are conflicts or problems at home, when there is violence, when there is no understanding between the woman and the husband.... so a woman should leave that and take care of her own life. I agree that a woman must make their own decisions when it is to avoid the worsening of the situation (between her and her husband)."(Nampula, urban area, 36, married, 5 children).

### Building Collective Power

Only women from Maputo region, mostly single, identified social support and role models from peers as a key resource in the empowerment process. This included safe spaces, like women's associations or groups where women can come together to share experiences, find support, and debate. When engaging with each other, women can have an influencing role among themselves. It is not only those in power positions, such as the ones in the government, that serve as role models but also women from the community whose different pathways become inspirational and an example to follow by others at a local level. A study participant described her experience attending sessions at a women's association in Maputo.

> "I attend a group once a week, where women get together to discuss women's issues. From maternity to society, all sorts of things. And for me, it is important to know that I am not alone, that there are other women that also don't comply with the social expectations, that are living their lives the way they want to. But

within that association, there are many women who think very differently from me, and they are there and there is debate. So, I think it is important for a person, for a woman to listen to both, different sides and make their choices in life." (Maputo city, 29, single, no children).

### Access to Information

Access to information was especially highlighted by women living in urban areas in both regions. Education was amongst the most emphasized aspects mentioned by women as a prerequisite required for their progression toward empowerment concerning fertility and family planning practices. Creating conditions for girls and young women to access schools and ensuring these are close to their communities and safe for them to attend was linked to preventing early marriage and motherhood, and to future opportunities, as this participant from Nampula highlighted.

"We need schools in the neighborhood so women's lives can improve. I believe it is mostly schools that we need. Advise our daughters to go to school and to not get married early" (Nampula, urban area, 30, married, 6 children).

For women in Maputo, schools are the place where thinking processes and thought are stimulated, and this was key for women's empowerment in the future.

"I think school. The more schooling, the more education, the more the capacity we have to make ourselves be heard and stand for something we want. I cannot defend something that I don't know or can't understand. I need the knowledge to be able to do it... I need information." (Maputo, urban area, 33, married, 3 children).

Access to family planning services was also considered crucial for women's empowerment for fertility and family planning in both regions. At the health facilities and in the interactions with health providers women learned about the advantages and disadvantages of the different contraceptive methods, which they found useful for their decision-making regarding family planning practices. A woman from Nampula explained how counseling from health providers provided her with confidence in choosing a contraceptive method.

"The health providers first explain the advantages and disadvantages of family planning. They give you confidence... so I trust that health provider and choose a contraceptive method." (Nampula, urban area, 20, single, no children).

Notwithstanding, women highlighted the need to make information about family planning and contraceptive methods more available in various places, namely talks at the health center and sensitization campaigns at the community level. Furthermore, some women from Maputo mentioned the importance of personalized counseling, in a private environment, as stated by this participant.

"Yes (they give us information) but not the way it should be. When you are alone, you can feel comfortable talking if you have a problem. Usually, there are other people (patients) there (consultation room) at the same time and that does not make it easy." (Maputo, urban area, 20, married, 1 child).

## DISCUSSION

This study explored women's perceptions and experiences of empowerment in relation to their fertility intentions and family planning practices, identifying important barriers and facilitators for the empowerment process in Mozambique. Overall, these findings reinforce the importance of the multilevel nature of empowerment by showing how the different barriers and facilitators operate at different levels of a woman's life. Understanding such dynamics can support the development of comprehensive and more effective interventions for women's reproductive empowerment.

The findings of this work represent the perspectives of women from different sociodemographic, and geographical backgrounds, and most importantly it reports on the views of single women, largely absent in the empowerment literature (11, 14, 24). Women who took part in the study were at different points in their empowerment journeys, therefore their experiences and perceptions of barriers and facilitators were not always shared among them. The link between levels of empowerment and how women perceive and experience barriers and facilitators to empowerment deserve further analysis in future research so mechanisms of empowerment can be better understood. Furthermore, it would be interesting to compare our results with those from other studies in the African context about women's perceptions of barriers and facilitators of reproductive empowerment, however, to our knowledge, there is a lack of studies on this topic. Notwithstanding, our study could support the interpretation of quantitative indicators widely used to measure reproductive empowerment such as those included in the monitoring of the SDG 5.6.1, by providing contextual aspects and identifying structural issues (20).

At the regional level, this study captured important differences in how women perceive and experience barriers and facilitators to empowerment in relation to reproduction (25). Women from the Nampula region were, in general, more submissive to male power and gender expectations, where childbearing and marriage are highly valued, and men are responsible for fertility decisions. Women in Nampula were less willing to use modern contraceptives, also observed in other studies (6, 26). Distinct and prevailing social and gender norms, as well as strong embedded traditions in Nampula region, could in part explain the differences between regions. In addition, the limited access to information and health services with a good supply of contraceptives in the region could also play an important role in the low uptake of contraception (33). Our findings also seem to suggest that women's perception and experience of the barriers and facilitators to empowerment are shaped by other factors such as living in a rural or an urban setting, women's educational level, and marital status. This is aligned with the literature about social determinants of women's reproductive empowerment (18, 20).

Similarly to what has been described in other studies, the barriers to women's empowerment regarding fertility and family

planning, are embedded in traditions, culture and gender roles as well as accepted oppressive behaviors toward women and limited access to services and information (24, 32, 33). Contrary to the findings from a study involving other African countries (24), this study showed that family members were associated with greater pressure for women's marriage and childbearing in Mozambique, often not supporting women's family planning practices (34). These barriers work toward keeping control over women's reproduction and at the same time, imposing social expectations related to women's role associated with their childbearing and marriage capacity. Often the fear of consequences from challenging these norms prevents women from embarking on empowerment journeys, contributing to the exposure to harmful situations or the use of contraceptives covertly (24, 34, 35).

An important barrier identified in this study was the lack of critical consciousness of women. The results showed that in some cases women themselves perpetuate oppressive and gender bias traditions as this is also where women can find their voice and exercise some form of power over other women (6). The development of critical consciousness is an essential resource or precondition to trigger empowerment processes (9, 11, 36), also identified in this study.

Beyond education, access to information, financial independence, empowerment resources amply described in the literature, this study identified other facilitators that deserve further attention in research and interventions. Taking part in social networks allows women to come together and share experiences which contributes to breaking oppressive beliefs and expectations among women themselves and simultaneously promoting collective power (32, 36). For example, evidence from Mozambique suggests that living in contexts where open discussion and conversations about family planning take place has a positive influence on the use of contraceptives among women (37).

Conversely, being exposed to negative events, either abusive, controlling behaviors or general neglect of the household by their partners, was also identified as a trigger for women taking control over their reproductive lives (18). Although this could be connected to other facilitators of empowerment such as being conscious of one's rights, having a sense of injustice, or having different options in life (38), further research should be conducted to understand how these negative events influence women's empowerment in relation to their fertilities and family planning practices.

Health providers were one of the main sources of information regarding family planning and modern contraception methods for women in Mozambique. Women showed general satisfaction with the family planning services and the interactions with the health providers. More private and personalized family planning counseling, as well as more information, were perceived as a need by women, which could represent an opportunity to include topics namely women's right to bodily autonomy, choosing and decision-making processes, and having other options in life that are beyond childbearing which can contribute to reproductive empowerment (3).

## Strengths and Limitations

To our knowledge, this study is the first to explore women's perceptions and lived experiences of empowerment in relation to fertility and family planning practices in Mozambique. It also places women at the center of empowerment, including single women, often overlooked, giving them a voice and expands on recent conceptual frameworks of empowerment for sexual and reproductive health. Notwithstanding, this study has some limitations. First, convenience sampling was used to recruit participants, both at the health facility and at the community level and this could have introduced bias in the selection of participants. Women who attended the health center or were known to traditional leaders could be more familiar with contraception methods and more aware of their choices than those not captured by the recruitment process. However, the in-depth interviews captured both personal experiences and more broad views of women and their experiences in Mozambican society, which could have minimized the potential selection bias. Secondly, this study failed to include male perspectives who are often the gatekeepers of decisions related to women's reproduction in Mozambique, and the views of community stakeholders whose influence on social and gender norms is still relevant. Moreover, it did not explore in-depth men's roles and responsibilities in reproductive matters. However, whilst men's roles and responsibilities were not included in the paper, this work explored empowerment for fertility intentions and family planning practices in relation to gender power dynamics. Notwithstanding, this should be further analyzed in future research.

# CONCLUSIONS

This study identified various factors at individual, societal and structural levels that positively or negatively influence women's empowerment journeys in Mozambique. These factors seemed to be influenced by women's region and place of living, urban vs. rural, as well as women's education and marital status. The role of tradition, culture, and gender expectations, as well as oppressive behaviors from partners or other family members, were important barriers for women from both provinces. Women from rural areas, particularly from Nampula, would benefit from building of consciousness about their rights, capacity, and power to decide on their reproductive lives. Interactions with the health providers offer an opportunity to do this by favoring controlling behaviors concerning their reproductive lives, promoting social networking and levering collective power and action.

# DATA AVAILABILITY STATEMENT

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

# ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Human Research Ethics Committee of

the Faculty of Health Sciences, University of Cape Town; Institutional Committee of Bioethics for Health from the Faculty of Medicine/Central Hospital of Maputo, Mozambique. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

SCL, DC, SF, and JH conceptualize the study. SCL designed the study, analyzed the data, and prepared the initial draft of the paper. SF supported data analysis and provided inputs. JH, SF, DC, and NO reviewed and substantially edited the manuscript. All authors read and approved the final manuscript.

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## SUPPLEMENTARY MATERIAL

The Supplementary Material for this article can be found online at: https://www.frontiersin.org/articles/10.3389/fgwh.2022.824650/full#supplementary-material

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BRIEF RESEARCH REPORT
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# Effects of Depot Medroxyprogesterone Acetate Intramuscular Injection, Copper Intrauterine Device and Levonorgestrel Implant Contraception on Estradiol Levels: An Ancillary Study of the ECHO Randomized Trial

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**Introduction:** Hormonal contraception affects endogenous sex steroid levels. Robust evidence from randomized trials of the relative effects of different contraceptive methods is scarce. We compared the effects of three contraceptive methods on serum estradiol levels using data from women (18–35 years) requesting contraception in the Evidence for Contraceptive Options and HIV Outcomes (ECHO) randomized trial.

**Methods:** Women were randomly allocated to the depot medroxyprogesterone acetate intramuscular (DMPA-IM) injection, copper intrauterine device (IUD) or levonorgestrel (LNG) implant. In this sub-study, stored baseline and 6-month serum samples were analyzed in 401 participants from East London, South Africa (DMPA-IM: 131, IUD: 135 and LNG: 135).

**Results:** Baseline median (interquartile range, IQR) estradiol levels were similar between the three groups [DMPA-IM 229 (152–455), IUD 235 (168–426) and LNG 216 (153–419 pmol/L)]. At 6-months, median estradiol in the IUD group was unchanged (298 (163–467) pmol/L), whilst levels in the DMPA-IM and implant groups were significantly reduced from baseline. The median estradiol level in the DMPA-IM group [139 (97–193) pmol/L] was significantly lower than in both IUD ($p < 0.0001$) and implant ($p = 0.005$) groups; and level in the implant group [156 (112–250) pmol/L] was significantly lower than in the IUD group ($p = 0.004$).

**Conclusions:** At 6-months (DMPA-IM nadir), median estradiol with DMPA-IM was 53% lower and with the LNG implant, 48% lower than with the IUD. The greater reduction in estradiol levels with the DMPA-IM injection compared to the LNG implant and IUD has implications for the relative psychological, sexual as well as physiological side-effects of these contraceptive methods.

**ECHO Study Registration:** ClinicalTrials.gov, identifier: NCT02550067.

**Keywords: contraception, randomized trial, depot medroxyprogesterone acetate, copper intrauterine device, levonorgestrel implant, estradiol**

## INTRODUCTION

Hormonal contraception has complex effects on users' endocrine systems. Apart from the direct effects of the exogenous contraceptive hormones, circulating levels of endogenous sex steroid hormones are modified. It is important to have accurate data on the effects of alternative contraceptive methods in order to counsel women appropriately on the relative benefits and risks of different methods, to understand the potential clinical impact of these effects, and to guide future development of safer contraceptive methods.

Estrogens have multiple physiological effects such as on metabolism, menstruation, coagulation, bone health, the cardiovascular system (1) and the vaginal microbiome (2), and are also associated with adverse effects such as increasing susceptibility to candida albicans infection (3, 4). In addition, sex steroid hormones have important neuropsychological and behavioral effects. Hormones of the hypothalamic-pituitary-ovarian (HPO) axis are thought to play a role in depression (5). However, the relationships between sex hormones and psychological wellbeing are complex and poorly understood (6). Estradiol has neuromodulator effects on brain regions involved in mood and behavior (7). In a comprehensive 2021 systematic review, estradiol levels were found to be lower in women with premenstrual dysphoric disorder and postpartum depression, but not perimenopausal depression nor depression unrelated to reproductive transition phases (5).

Sexual function has been found to deteriorate with decreasing ovarian function, and to be improved by hormone replacement therapy with estrogen (8). Estradiol is also considered to play a positive role in sexual desire and arousal in premenopausal women (9). Use of hormonal contraception is associated with reduced libido and changes in sexual function. In a previous randomized trial, we found reduced sexual activity among participants randomized to injectable progestogens vs. the copper T 380 intrauterine device (IUD) (10, 11). The etonogestrel implant and the DMPA-IM have been associated with impaired sexual function ascribed to suppressed estrogen and/or androgen levels (12, 13).

Several observational studies have reported on estrogen levels in women choosing to use various hormonal contraception. Such studies are intrinsically subject to confounding. We are not aware of any studies comparing effects of the depot medroxyprogesterone acetate intramuscular (DMPA-IM) injection, the copper IUD and the levonorgestrel (LNG) implant on estradiol levels conducted in the context of a rigorous randomized clinical trial (RCT). The Evidence for Contraceptive Options and HIV Outcomes (ECHO)[1] study (14, 15) presents a unique opportunity to compare hormonal levels between participants randomized to these methods.

## MATERIALS AND METHODS

This is an ancillary study of the ECHO study, limited to participants enrolled at the Effective Care Research Unit site in East London, South Africa. The ECHO study protocol (15) and primary paper (14) have been published elsewhere. Briefly, Human immunodeficiency virus (HIV)-uninfected women requesting contraception aged 18–35 years who indicated that they had not used injectable hormonal contraception in the preceding 6 months, were randomly allocated to receive DMPA-IM, the copper IUD or the LNG implant, and were followed after 1 month then 3-monthly for 12 to 18 months. Blood samples were collected at baseline and at the 3-monthly visits, separated on site and the serum stored at −80°C in the BARC-SA Bio Repository in Johannesburg. For this ancillary study, only baseline and samples closest to 6 months were studied.

The original ECHO Trial was approved by ethics committees at all the participating sites. The application for additional tests on stored biological samples was approved by the Human Research Ethics Committee, University of the Witwatersrand on 6 May 2019, reference 141112. All women provided informed, written consent to authorize study participation.

### Laboratory Analysis

Laboratory tests were conducted by BARC-SA (Pty) Ltd. Estradiol (E2) levels were measured on stored samples for participants at baseline and closest available sample to 6 months, using a delayed one-step immunoassay for the quantitative determination of estradiol in human serum and plasma using chemiluminescent microparticle immunoassay (CMIA) technology. The few results above or below the detection level

[1]The Evidence for Contraceptive options and HIV Outcomes (ECHO) Trial was a multi-center, open label, randomized clinical trial comparing HIV incidence and contraceptive benefits in women using depot medroxyprogesterone acetate (DMPA-IM) injection, levonorgestrel (LNG) implants, and copper intrauterine devices (IUD). FHI 360 Study #523201.

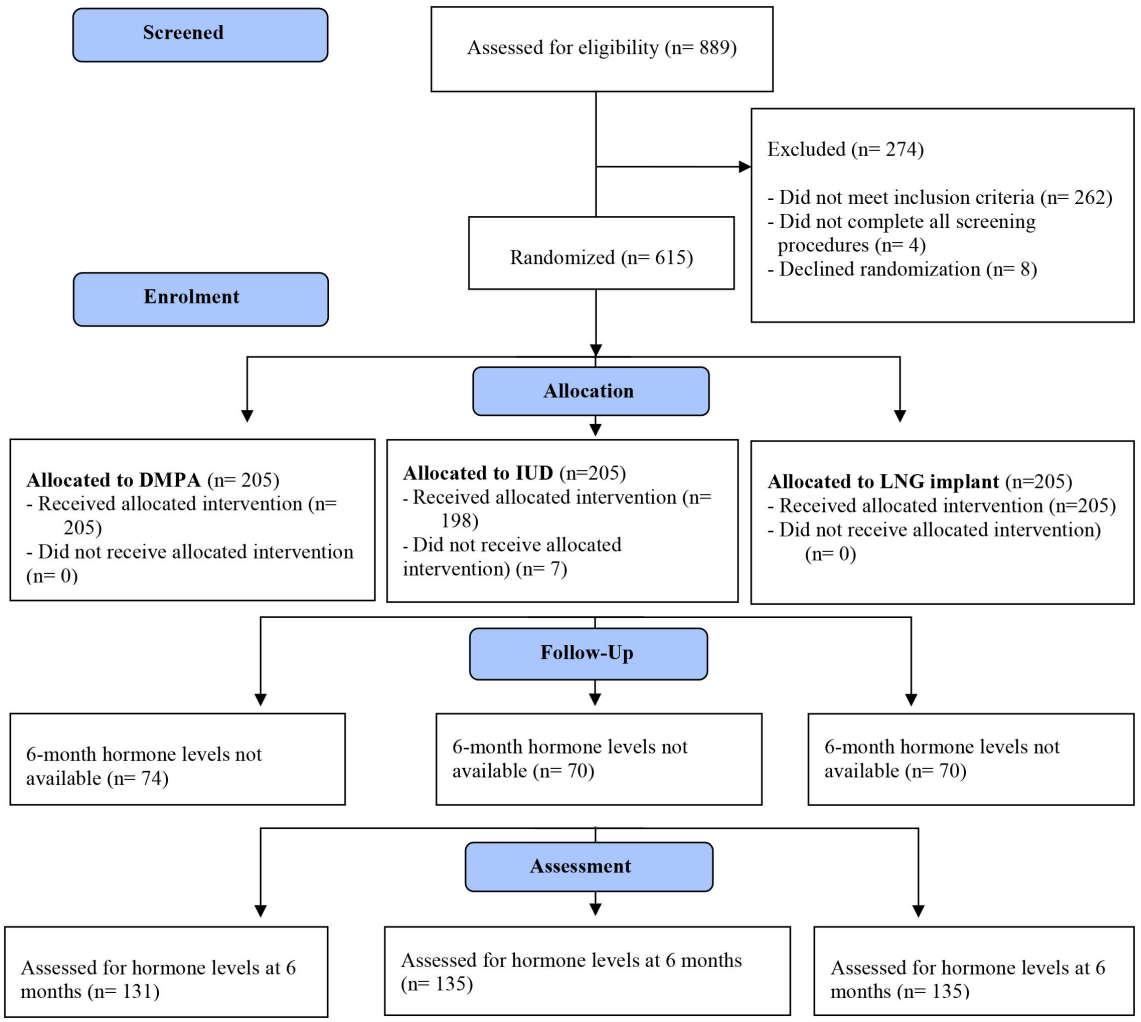


**FIGURE 1 |** CONSORT flow diagram.

of the assay were assigned the value of the upper or lower limit of the assay respectively.

## Data Analysis

The laboratory data were entered into a secure Microsoft Excel spreadsheet, cleaned and merged with data from the original ECHO study database for analysis, using EpiInfo software. Baseline data were compared to ensure that the comparability of the groups was not compromised by loss to follow-up. Six-month values were compared with baseline values for each group. Pairwise comparisons were made between the three groups by allocated method at 6 months (intention to treat analysis). Statistical comparisons were by analysis of variance if the distribution of the data was normal, otherwise by the Mann-Whitney *U* test.

# RESULTS

Of 615 participants enrolled at the East London site, results for hormonal studies were available for 401 (65%) participants both at baseline and at 6 months. The CONSORT flow diagram is shown in **Figure 1**. Baseline characteristics of participants are displayed in **Table 1**.

Retrospective random testing of baseline blood of 157/615 enrolled participants for evidence of recent hormonal contraceptive exposure found quantifiable medroxyprogesterone acetate in 85 (54%), levonorgestrel in 9 (5.7%), norethisterone in 7 (4.5%) and etonogestrel in 1 (0.6%). In view of the stringent randomization process, these effects are likely to be similar between the randomly allocated groups. Given the potential for distortion of baseline hormone levels due to prior contraceptive exposure, we primarily compared absolute differences between randomized groups at 6 months rather than change from baseline. Prior exposure to progestogen contraception would result in under-estimation of the changes observed in the progestogen group, as well as apparent changes in the copper IUD group in the opposite direction of the progestogen effects.

Baseline median (interquartile range, IQR) estradiol levels were similar between the three groups [DMPA-IM 229 (152–455) pmol/L, IUD 235 (168–426) pmol/L and LNG implant

**TABLE 1 |** Baseline variables.

| | DMPA-IM ($n = 131$) | | Copper IUD ($n = 135$) | | LNG implant ($n = 135$) | |
|---|---|---|---|---|---|---|
| | **Mean** | **SD** | **Mean** | **SD** | **Mean** | **SD** |
| Age (years) | 25.0 | 4.3 | 25.4 | 4.6 | 24.5 | 4.7 |
| | ***n*** | **%** | ***n*** | **%** | ***n*** | **%** |
| Never married | 122 | 93.1 | 131 | 97.0 | 131 | 97.0 |
| Secondary school incomplete | 75 | 57.3 | 63 | 46.7 | 75 | 55.6 |
| Earns income | 16 | 12.2 | 22 | 16.3 | 19 | 14.1 |
| Nulliparous | 33 | 25.2 | 40 | 29.6 | 41 | 30.4 |
| Regular menses | 76 | 58.0 | 89 | 65.0 | 79 | 58.5 |

*DMPA-IM, depot medroxyprogesterone acetate intramuscular injection; IUD, intrauterine device; LNG, levonorgestrel; SD, standard deviation.*

**TABLE 2 |** Estradiol results expressed as median values (interquartile range).

| | DMPA-IM | | | Copper IUD | | | LNG implant | | | DMPA vs. IUD | DMPA vs. implant | Implant vs. IUD |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **E2 pmol/L** | ***n*** | **Median** | **IQR** | ***n*** | **Median** | **IQR** | ***n*** | **Median** | **IQR** | ***p*** | ***p*** | ***p*** |
| Baseline | 131 | 229 | 152–455 | 135 | 235 | 168–426 | 134 | 216 | 153–419 | 0.89 | 0.80* | 0.40* |
| 6 months | 131 | 139 | 97–193 | 135 | 298 | 163–467 | 132 | 156 | 112–250 | <0.0001* | 0.005 | 0.004 |
| P (change from baseline) | | <0.0001* | | | 0.51 | | | 0.0002* | | | | |

*E2, estradiol; DMPA, depot medroxyprogesterone acetate; IUD, intrauterine device; LNG, levonorgestrel; CI, confidence interval; IQR, interquartile range; * Mann Whitney U test.*

216 (153–419) pmol/L] (**Table 2**). At 6 months, median estradiol level in the IUD group was unchanged [298 (163–467) pmol/L]. Median estradiol levels in the DMPA-IM and implant groups were significantly reduced from baseline. The median estradiol level in the DMPA-IM group [139 (97–193) pmol/L] was significantly lower than in both the IUD ($p < 0.0001$) and implant ($p = 0.005$) groups; and the level in the implant group [156 (112–250) pmol/L] was significantly lower than in the IUD group ($p = 0.004$).

## DISCUSSION

This study quantifies for the first time using RCT methodology the differences in levels of endogenous estradiol in young women (18–35 years) randomly allocated to receive the DMPA-IM injection, the LNG implant or non-hormonal contraception (the copper IUD). At 6 months, the median estradiol levels in women using both progestogen contraceptives were in the postmenopausal range. The striking finding was the significantly greater reduction in estradiol in women allocated to DMPA-IM injection than to the LNG implant. While the data for the LNG implant would represent the steady-state LNG effect, the samples were collected at the time of a DMPA-IM injection, and thus represented the nadir DMPA-IM effect. The average effect of DMPA-IM over time would be expected to be an even greater reduction in estradiol levels.

Our findings are consistent with a possible association of estradiol and sexual behavior. The main ECHO Trial [Appendix Table S11 of main trial paper (14)] reported sexual activity was generally lower with the LNG implant than with the IUD, and lower with DMPA-IM than with the LNG implant (14). The lower self-reported sexual activity with DMPA-IM than with the LNG implant are consistent with an ancillary study at three of the ECHO sites which found prostate-specific antigen levels in cervical samples to be less frequent in women allocated to DMPA than to the LNG implant (16).

Although an inclusion criterion for enrolment in the ECHO study was no injectable contraception in the last 6 months, retrospective spot checks conducted during the main study indicated that a proportion of women had evidence of persistent DMPA or norethisterone levels. Considerable discrepancies between self-reported and biologically confirmed prior contraceptive exposure have been reported in other studies (17). In addition, use of oral contraception was permitted up to the day preceding enrolment. It is therefore likely that some women in all groups had some estradiol suppression at baseline. This assumption is consistent with the (non-significant) increase in estradiol levels in the IUD group at 6 months. Therefore, the reductions from baseline estradiol in the hormonal method groups may be an under-estimate of the true suppressive effect of the methods. For this reason, while we have included the baseline estradiol levels to confirm comparability of the groups, we have primarily compared absolute levels at 6 months between groups rather than changes from baseline.

In conclusion, the significant reduction in endogenous estradiol with the LNG implant, and the significantly greater reduction with DMPA-IM have relevance to the estradiol-related

physiological and psychological side-effects and beneficial effects of these methods. While data on the relationship of sex steroids to clinical parameters are not consistent, these effects might include menstrual cycle disruption, bone health, cardiovascular health, vaginal microbiome, candidiasis susceptibility, mood and sexual experience.

## DATA AVAILABILITY STATEMENT

The data that support the findings of this ancillary study of the ECHO Study are available from the corresponding author upon reasonable request. Access will be granted if the concept is evaluated to have scientific merit and if sufficient data protections are in place. As of the time of publication, data access applications are in process with the governing institutional review boards of the ECHO Study to make de-identified data from the primary ECHO dataset publicly available. Requests to access these datasets should be directed to justhof@gmail.com.

## ETHICS STATEMENT

The studies involving human participants were reviewed and approved by Witwatersrand Human Research Ethics Committee and the WHO Research Ethics Review Committee. The patients/participants provided their written informed consent to participate in this study.

## AUTHOR CONTRIBUTIONS

GH, MS-M, and JB were involved with conception, design, and conduct of the study. GH and YB performed the statistical analysis. GH wrote the first draft of the manuscript. RR, AM, and CM contributed to subsequent drafts. All authors have read and approved the manuscript.

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# Contraceptive method use trajectories among young women in Kenya: A qualitative study

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**Background:** Many young women experience important key life transitions during adolescence and early adulthood, such as initiation of sexual activity, first use of contraceptives, marriage, and childbirth. For young women to be able to plan and manage their lives, it is critical to understand how these life events intersect and shape their contraceptive decision-making. This study aims to explore young women's contraceptive method use trajectories, including the factors that influence contraceptive decision-making throughout adolescence and youth.

**Methodology:** In 2019, the Full Access, Full Choice project (FAFC), implemented by the University of North Carolina at Chapel Hill and the African Institute for Development Policy, conducted 30 in-depth interviews with young women aged 18–24 years in three counties in Kenya (Nairobi, Mombasa and Migori). Eligible respondents had used two or more modern contraceptive methods. Interview guides utilized a modified life history approach to capture details about respondents' contraceptive use and life experiences from the time they first used contraception until the time of interview.

**Results:** We identified five separate contraceptive use trajectories based on the occurrence and timing of marriage, childbirth, and contraceptive method choice as well as various influences on contraceptive decision-making. The majority of respondents began their contraceptive journey by using male condoms or emergency contraception, but subsequent contraceptive decisions were varied across trajectories and influenced by different factors. For many women, the initiation of a non-coitally dependent method occurred after the birth of a child; for some, this was the first method used. Once women transitioned to using a non-coitally dependent method such as injectables or implants, many cycled through different methods to find one that had fewer side effects or provided the desired duration of protection.

**Discussion:** This study highlights the nuanced needs of young women throughout their adolescent and youth years in Kenya. This suggests that programs and policies need to encompass young women's diversity of experiences and motivations to best serve them.

KEYWORDS

family planning, method choice, youth, contraception, life course

## Introduction

Family planning (FP) has numerous health and social benefits for women and families (1–4). These are particularly salient for young women who are at the beginning of their reproductive life course and have the desire and need to delay or space pregnancies (5, 6). Important reproductive health transitions such as initiation of sexual activity, contraceptive use, the experience of a first pregnancy or birth, and union formation often take place during the adolescent and youth years (between ages 10–24 years) (1, 2, 7–9). The reproductive health transitions are often accompanied by changes in school enrollment, employment and other forms of economic activity, and housing status (1, 2). It is critical to understand how these numerous life events intersect and shape contraceptive decision-making for young women in order to strengthen FP programming that better meets the varying needs of young people.

The factors that influence contraceptive use (including uptake, switching, discontinuation and contraceptive method choice) among young women are multifactorial. Numerous barriers and facilitators to contraceptive decision-making have been described in many countries across sub-Saharan Africa and include factors related to knowledge about contraception (10–12), social environment (13–16), partner dynamics (10, 11), concerns about side effects and method characteristics (11, 12, 17), as well as factors related to the supply environment, such as accessibility, privacy, cost, and method availability (10, 16, 18–20). These factors influence whether young women or their partners use contraception or not, the circumstances under which they use contraception, what method young women and their partners use, when they adopt a method, or how long they use the method before discontinuing or switching.

To the best of our knowledge, research is limited on why and how contraceptive method choices change across the adolescent and youth years. Yet, it is widely accepted that contraceptive use is dynamic and young women may initiate, change methods and discontinue over short periods of time (21–24). This, coupled with the multitude of life changes young women experience, points to the need to utilize holistic, life course approaches similar to those that have been used in work among women of all ages (25–27) to examine young women's decision-making around contraceptive adoption and method choice. This knowledge can inform the development of program strategies seeking to provide targeted information and services on reproductive health and contraception to young women. In particular, understanding changes in circumstances over the adolescent and youth years can inform how, where, and when to intervene programmatically to meet the changing needs and desires of young women.

This study explores young women's contraceptive use trajectories, including the factors that influence contraceptive decision-making throughout adolescence and youth among a sample of young women who have used two or more modern contraceptive methods. Using qualitative data from young women in Kenya that asks them about their contraceptive decision-making from the time they first used contraception until the time of the study, we take a holistic approach to understanding young women's contraceptive journeys and how key life events, such as marriage and childbirth, influence use and choice. Building on these key life events, we identify different typologies of young women, which can be useful in the development of program strategies that enable them to access and use contraceptive methods of their choice at various stages of their lives.

Abbreviations: AFIDEP, African Institute for Development Policy; BMGF, Bill & Melinda Gates Foundation; CDM, coitally dependent method; CSE, Comprehensive sexuality education; EC, emergency contraception; FAFC, Full Access, Full Choice project; FP, family planning; IDI, in-depth interview; I, interviewer; OC, oral contraception; IUD, intrauterine device; MOH, Ministry of Health; NCDM, non-coitally dependent method; NCPD, National Commission on Population and Development; NGO, non-governmental organization; R, respondent; SDP, service delivery point; SRH, sexual and reproductive health; UNC, University of North Carolina at Chapel Hill.

## Materials and methods

### Full access, full choice project

This study was undertaken as part of the Bill & Melinda Gates Foundation (BMGF) funded Full Access, Full Choice

project (FAFC), which aims to generate and synthesize evidence on expanded contraceptive method choice for adolescents and youth globally, but with a focus on Kenya and Niger. FAFC is a collaboration between the Carolina Population Center at the University of North Carolina at Chapel Hill (UNC) and two non-profit research institutes: the African Institute for Development Policy (AFIDEP) in Kenya and GRADE Africa in Niger.

In 2018, technical workshops were held in Washington, D.C., Niamey, Niger and Nairobi, Kenya which sought to identify key evidence gaps in expanded contraceptive method choice for adolescents and youth, both globally and at the country levels. The main output for each meeting was a learning agenda containing key research priorities and learning questions (https://dataverse.unc.edu/dataverse/fafc).

In Kenya, the site of this study, the project works in focal counties (Nairobi, Mombasa, Migori, West Pokot and Wajir) chosen based on availability of secondary data sources, levels of contraceptive use among young people, presence of adolescent and youth-focused implementing partners, advocacy partners, regional representation, and political commitment to ensuring access to FP for young people. The counties were selected in collaboration with the Kenya Ministry of Health (MOH) and the Kenya National Council for Population and Development (NCPD).

## Context

Kenya is one of the fastest growing economies in sub-Saharan Africa, with an average economic growth of 5.7% from 2015 to 2019 (28). In 2019, the Kenyan population was estimated to be 47.6 million, with children and young people under the age of 25 comprising 60% of the total population (29).

Research from Kenya shows that women's transition to first sexual activity typically occurs at an average age of 18.4 years in urban areas and 16.7 in rural areas, the average age at marriage is 22.5 years in urban areas and 20.8 years in rural areas, and the average age at first pregnancy is 20.3 years with variability by residence and region (9). The COVID-19 pandemic intensified concerns about the adolescent pregnancy rate in Kenya, and evidence shows higher rates of adolescent pregnancy amongst adolescents whose schools were closed as part of the COVID-19 lockdown compared to a pre-pandemic cohort of their peers (30). The nuanced needs of young women in Kenya are reflected by estimates of contraceptive use and method choice that tend to differ by several demographic factors, including marital status, religion, residence, and economic status (9, 31, 32). For example, modern contraceptive use among married women aged 15–24 was 56% in 2018; compared to 48% among unmarried sexually active young women (9). Further, there are differences in method choice with married young women and those with children being more likely to use longer acting methods (e.g., implants) whereas adolescents and young women without children tend to use short-acting methods [emergency contraception (EC), condoms, and injectables] (9, 20, 31, 33).

Kenya has a hierarchal public health service structure with hospitals, health centers, dispensaries and community health volunteers, as well as a robust private sector with hospitals, clinics, pharmacies and informal drug outlets. Contraception should be available free of charge at public sector facilities in Kenya, though Radovich et al. found that up to half of modern users made out of pocket payments when obtaining their method from a public facility (34). About 63% of married women ages 15–24 sourced their contraceptive method from the public sector compared to 35% of unmarried women (9). This partly reflects the differences in method choice among these two groups, as longer acting methods are available for free or low cost at public facilities, whereas many of the unmarried young women are likely sourcing short-acting methods from pharmacies (20).

In 2015, the Government of Kenya released the National Adolescent Sexual and Reproductive Health Policy, which is aimed at creating a framework to ensure young Kenyans have access to the appropriate knowledge and care they need to achieve their reproductive goals (35). The policy includes eight cross-cutting objectives focused on addressing specific harmful practices and behaviors, promotion of rights for young people, meeting needs of marginalized and vulnerable adolescents, and increasing access to information and age-appropriate comprehensive sexuality education (CSE). A guiding principle of the policy is to be responsive to the varying sexual and reproductive health needs of adolescents.

## Study design

This study uses data from in-depth interviews (IDI) to understand adolescent girls' and young women's contraceptive trajectories. This research topic was selected as a high priority learning question at both the global and Kenya technical workshops. The technical workshops were convened to understand critical policy-relevant evidence gaps to ensure that the project's research was relevant to local realities and needs. To strengthen the design of this study, we created technical advisory groups in Kenya and the United States of America that supported refinement of the research questions and reviewed finalized study materials. The global technical advisory group comprised of individuals from international non-governmental organizations (NGOs), BMGF, UNC, and AFIDEP. The Kenya technical advisory group comprised of individuals from NGOs, University of Nairobi, Ministry of Health (MOH; both central and county-level officers), NCPD, and AFIDEP. The Kenya participant list included youth representatives from civil society groups in order to ensure that the youth perspective was considered. From the list of five priority FAFC counties, Nairobi,

Mombasa and Migori counties were selected as study sites because contraceptive use among young people was higher in these counties than Wajir and West Pokot, which was important for meeting our eligibility criteria.

## Sampling and recruitment

Study participants were recruited from service delivery points (SDP)—both health facilities and pharmacies—in the three target counties. To facilitate selection of health facilities, Kenya Health Information System data were reviewed to identify health facilities with high family planning client volumes, including adolescent and youth clients. The MOH sub-county reproductive health coordinators reviewed the list of health facilities with large client loads and gave recommendations on which facilities would be suitable recruitment sites based on their local knowledge of client populations. Two to three public facilities, two private facilities and one pharmacy were selected in each county for a total of sixteen SDPs. Among the public facilities, two public health centers were included in Nairobi, a public dispensary and a health center in Mombasa, and three public hospitals were included in Migori.

The recruitment of study participants was undertaken by county (Nairobi, Mombasa and Migori) and parity (no children and 1+ child). The aim was to undertake ten IDIs per county: five with nulliparous women and five with women who had one or more children. The number of respondents by county and parity are shown in Table 1.

Young women were eligible for this study if they were between 18 and 24 years of age and had ever used two or more contraceptive methods that could be obtained from an SDP: implant, intrauterine device (IUD), injectable, oral pills, EC, male condoms, or female condoms. Use of traditional methods was not a focus of this study. We chose to focus on women 18 and older due to ethical issues related to studying minors. Additionally, since we targeted women with a varied contraceptive history, it would have been relatively difficult to find and recruit girls <18 years who had used two or more contraceptive methods. Respondents did not need to be using a contraceptive method or be seeking FP services at the time of recruitment; respondents could have been at the SDP for another service.

TABLE 1 Participant characteristics at time of interview.

| Characteristic | Number of women |
|---|---|
| **County of residence** | |
| Nairobi | 10 |
| Mombasa | 9 |
| Migori | 11 |
| **Recruitment site** | |
| Public hospital | 7 |
| Public health center | 8 |
| Public dispensary | 2 |
| Private health facility | 8 |
| Pharmacy | 5 |
| **Age** | |
| 18–21 years | 13 |
| 22–24 years | 17 |
| **Highest level of education completed** | |
| Partial or completed primary | 9 |
| Partial or completed secondary | 10 |
| Partial or completed post-secondary | 11 |
| **Employment/Income generation** | |
| None | 12 |
| Employed or generates income | 13 |
| Current student | 5 |
| **Marital status** | |
| Married | 18 |
| Not married | 12 |
| **Parity** | |
| Nulliparous | 15 |
| 1+ child | 15 |
| **Number of contraceptive methods ever used*** | |
| 2 | 15 |
| 3 | 11 |
| 4 | 4 |
| **Type of method ever used (multiple responses possible; all modern methods reported are listed)** | |
| Male condoms | 21 |
| EC | 15 |
| Oral pills | 8 |
| Injectable | 21 |
| Implant | 15 |
| Total number of respondents | 30 |

*Only users of two or more methods were included in this study.

## Study procedures

Prior to the start of data collection, a 10-day data collector training was held in Nairobi, Kenya, explaining study design, types of contraceptive methods, ethics, and interviewing techniques. Data collectors also conducted mock interviews during the training and reviewed and refined the translation of the interview guides. Sessions were facilitated by investigators from UNC and AFIDEP. All interviewers were fluent in the respective local languages for the sites where they would be collecting data, were under the age of 30, and were experienced interviewers who had worked on previous qualitative studies on adolescent and youth sexual and reproductive health. Interviewers were trained to build rapport with respondents through use of common grounding behavior prior to the interview, identification of a site for interview where the

respondent was comfortable, and being courteous and attentive during the interview.

The data collection activities were led by AFIDEP. After conducting a pilot of in-depth interviews in two Nairobi SDPs, study data were collected between August and September 2019. Permission from health facility managers and pharmacy owners was obtained before the start of data collection. Participants were recruited from waiting areas of sampled facilities and outside of pharmacies. A checklist was employed by interviewers to determine if potential participants met the eligibility criteria, and for eligible participants, a verbal informed consent process was undertaken. The interviews were conducted in a private setting in the preferred language of the respondent (English, Kiswahili, DhoLuo, or Kuria) immediately after informed consent was obtained. All interviews were digitally recorded and transcribed verbatim.

### Data collection instrument

We used a modified life history approach to understand adolescent girls' and young women's family planning history and decision-making processes. The life history method is a qualitative approach to identifying and documenting information about an individual's decision or influences over time and how these relate to current attitudes or behaviors (36). The research team jointly developed a semi-structured IDI guide in English that asked about the participants' life circumstances, including their education, living arrangement, employment, relationships, children, and pregnancies. Data were also collected to understand participant's trajectories through their contraceptive journeys, including: the types of contraceptive method they used, starting with the first method ever used; reasons for choosing the method, including life circumstances, characteristics of the method and the types of people that influenced their decision; the type(s) of partners they were with while using the method; other methods they may have considered using at the time; characteristics of the method they liked and disliked; and use of dual methods. The IDI guide was pre-tested and revised before translating it into Kiswahili, DhoLuo, and Kuria. A meeting was held with a group of Kenyan female youth to review the guides prior to finalization. Final revisions to the guide were made based on the interviewers' observations and experiences during piloting.

### Data analysis

Following transcription and translation of IDIs into English, data were uploaded and coded in Dedoose software (v.8.3). Using the *coding reliability* approach of thematic analysis, a priori codes were created based on the IDI guide (37). Five members of the research team at AFIDEP and UNC read the same two transcripts and through group discussions agreed upon additional codes based on emergent themes. To establish coding standards, team members double-coded sections of a third transcript and assessed intercoder reliability. Discrepancies in coding were resolved through discussion and the coding framework was adjusted accordingly. The remaining transcripts were divided among team members. The lead coders periodically checked the validity of code applications on randomly selected transcripts.

Matrices were developed to capture the timing of key life events, such as relationship status, pregnancy and childbirth, with respect to each contraceptive method used and the influences on method choice. In the matrix, women were assigned the main method they were using and dual use was indicated, where applicable. Transitions in method use occurred when a woman stopped using her main method and subsequently started using another method or discontinued all together. Common contraceptive trajectories were identified by reviewing and interpreting the occurrence and timing of life events, choice of contraceptive methods, and the factors within their life course that influenced their choices.

### Ethics approval

Approval for the study protocol, informed consent procedures, and materials and survey tools were provided by the AMREF Health Africa Ethics and Scientific Review Committee (P205/2019), National Commission for Science, Technology and Innovation in Kenya, and the University of North Carolina at Chapel Hill Institutional Review Board (19-1360). Additional approvals were secured from each county's Director of Health.

## Results

### Characteristics of respondents

In total, 30 young women recruited across the 16 SDPs met study inclusion criteria and participated in the in-depth interviews. Table 1 presents the characteristics of the respondents at the time of interview. Thirteen participants were in the age group 18–21 and 17 were ages 22–24. About one-third of the women were from each of the three counties, Nairobi, Mombasa and Migori. Seventeen were recruited from a public health facility, eight from private health facilities, and five from pharmacies. The respondents' levels of education ranged from partial primary school to having completed post-secondary school. Thirteen women were employed or engaged in an income-generating activity and five were students at the time of interview. Eighteen women were married. Half of the women were nulliparous. Additionally, 15 had ever used two methods, 11 had ever used three methods and 4 had ever used four methods. Condoms ($n = 21$) and injectables ($n = 21$) were the most frequently reported methods ever used (Table 1).

## Contraceptive use trajectories

Five main trajectories were identified from the in-depth interviews based on patterns in respondents' characteristics, decision-making influences, and method choice as well as the timing of these (Figure 1). Trajectory one is characterized by young women who first use a condom and continue condom use with periodic EC use. Trajectory two includes respondents who start with condoms and then transition to non-coitally dependent methods (NCDM) such as injectables, implants and oral contraceptive pills in order to delay their first birth. Trajectory three includes women who start with condoms and then transition to NCDM, followed by EC. Trajectory four is characterized by respondents who start with either condoms or EC, and then transition to a NCDM for the purpose of child spacing. Trajectory five includes respondents who only used NCDM after childbirth. Each respondent was placed in the trajectory that most closely resembled her sequence and timing of life events, including the contraceptive methods used and the factors related to changes in method choice over time.

Additionally, two categories of method types emerged from the data. Use of male condoms or EC are referred to as coitally-dependent methods (CDM) and use of implants, injectables and oral pills are referred to as NCDM. When a CDM can be specified because all respondents used that specific method at that time, such as condoms, then we write the name of the method rather than CDM. In Figure 1, each line represents a single trajectory with the starting point being the average age at first contraceptive use and the end point being the average age at interview for that specific trajectory (indicated by the arrow head). Therefore, the length of each line represents the average duration of respondents' contraceptive history. The sequencing of key events is indicated on the trajectory with words describing the events; key events include initiation of a method, a birth, or marriage. Periodic use of specific methods is called out in a dotted box. Each line does not reflect method duration of use or continuation. Of note, the lines represent the general pattern of the events, but the specific details may be different for some study participants categorized into the trajectory. Each of the trajectories are described in more detail below and include the defining characteristics and thematic influencing areas on the women, and factors related to transitions in contraceptive use over time.

Table 2 describes the characteristics of the respondents in each of the five contraceptive use trajectories. Respondents in trajectories 2 and 3 intitiated first contraceptive use at a younger age on average than women in trajectories 1, 4, and 5. Women in trajectories 1 and 2 were nulliparous when they began using contraception and remained so at the time of interview. In constrast, all of the women in trajectory 5 had at least one child when they began using contraception, and all had at least a second child by the time of interview. In trajectories 1 and 3, respondents were unmarried at first contraceptive use and remained so at the time of interview. The majority of respondents in trajectories 2 and 4 transitioned from being unmarried at first contraceptive use to being married at the time of interview. The average number of modern FP methods used ranged from 2.0 among respondents in trajectory 1 to 3.3 in trajectory 3.

### Condom or EC: A common starting point for contraceptive use

A defining feature of the trajectories was which method the respondent started with and what influenced her to start with that method. After the first method used, the trajectories differentiated, and the role of the influences and thematic constructs becomes more divergent, nuanced, and multifactorial.

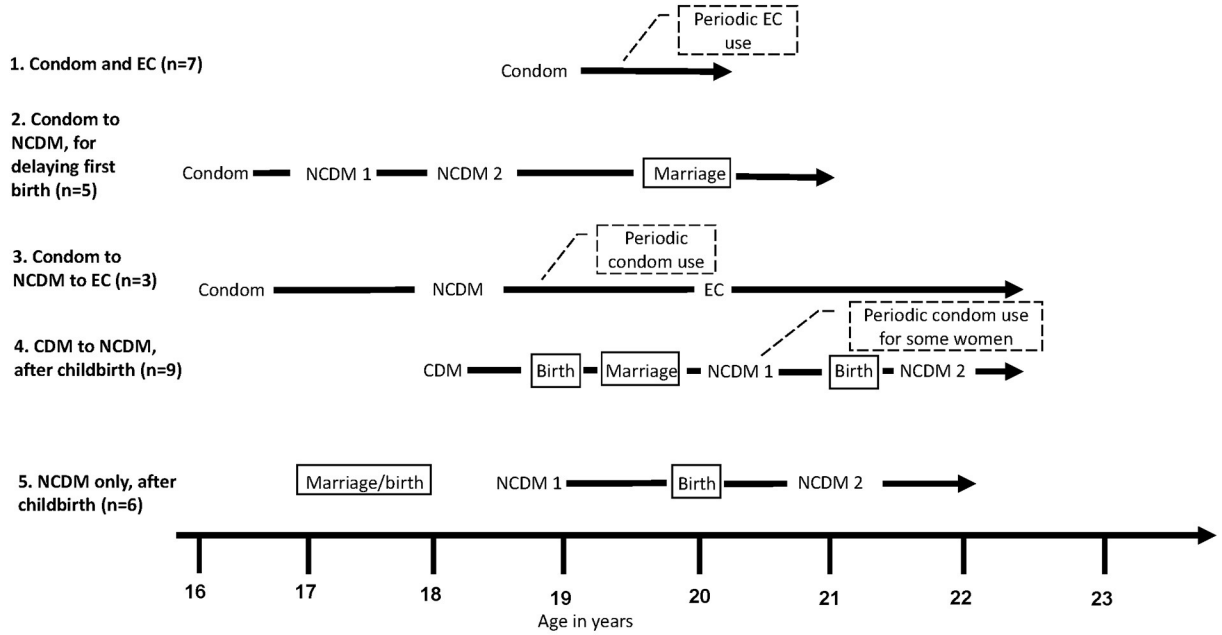
Across all respondents, the majority began their contraceptive journey with condoms ($n = 21$) or EC ($n = 2$) with only six respondents starting with a non-coitally dependent method (all in trajectory 5 where they started after having a child). Due to the similarity in first method use of condoms and EC, we will discuss the influences on the first use of condoms or EC before further elaborating the differences across trajectories.

Young women who began their contraceptive journey with condoms or EC most frequently cited reasons related to the thematic areas of knowledge, accessibility, couple dynamics, low cost and fertility desires. Most women shared that they first used condoms with their boyfriends early in the relationship, primarily because condoms provide dual protection from pregnancy and sexually transmitted infections (STI). When sharing that she chose to use a condom as her first method with her boyfriend, one woman stated the following:

> *Respondent (R): "…I did not want to get pregnant or those diseases like STIs and HIV/AIDS."*
>
> *Interviewer (I): "Who advised you? Were you advised by anybody or you just decided by yourself?"*
>
> *R: "We were taught in school to use protection during sex."*
> 21-year-old, Migori, nulliparous

A few women explicitly spoke to the fact that initially they did not trust their partners and were cautious about both becoming pregnant with such partners, as well as contracting STIs, including HIV from them:

> *I: Why did you decide to use a condom with this partner?*
>
> *R: Okay at first, you know, at first you are never sure of someone you love so…I used it [a condom] because I had*




Note: For trajectory 1, women often switched between condoms and EC. In trajectories 2-5, some respondents reported use of condoms alongside use of NCDM, but this was not a common feature of all of the trajectories.

FIGURE 1
Five trajectories to contraceptive use and method choice.

TABLE 2 Characteristics of respondents in each trajectory.

| Trajectory | Number of women | Average age (years) | | Average parity | | Number of women who are married | | Average number of modern FP method used |
|---|---|---|---|---|---|---|---|---|
| | | At first use | At time of interview | At first use | At time of interview | At first use | At time of interview | |
| 1: Condoms and EC | 7 | 19.0 | 20.7 | 0.0 | 0.0 | 0 | 0 | 2.0 |
| 2: Condom to NCDM | 5 | 16.2 | 21.0 | 0.0 | 0.0 | 0 | 3 | 2.6 |
| 3: Condom to NCDM to EC | 3 | 16.3 | 22.3 | 0.0 | 0.33 | 0 | 0 | 3.3 |
| 4: CDM to NCDM | 9 | 18.3 | 22.4 | 0.1 | 1.6 | 1 | 9 | 2.8 |
| 5: NCDM only | 6 | 18.5 | 22.0 | 1.0 | 2.0 | 4 | 6 | 2.3 |

*some trust issues at first. . . I was not sure of him. . . Maybe the previous girl... you know. . . [had] STIs...*

*I: Okay, okay you were protecting yourself from STIs.*

*R: You know when it is your first time to have sex, it is not even STIs or HIV, it is pregnancy and the fact that I am still living with my mum of course she threatens me: 'I don't want to see you being pregnant here, yeah... definitely I used it... sincerely speaking I used it to prevent getting pregnant.*

19-year-old, Nairobi, nulliparous

Women commonly stated they had no knowledge of other methods when they decided to use a condom and first learned about condoms from their boyfriends, friends, and school-based life skills lessons. Some women reported that their family members influenced their decision to use a condom. One woman shared that multiple family members had encouraged her to use a condom at first sex:

*"My dad. My dad used to tell me that if I were to sleep with a man, I should always use protection before we get to know each other. So, I just had it at the back of my mind. Any time anyone approached me, I would think about it. My grandmother also told me the same thing. 'The day you meet*

> *a man, don't have sex without protection. Make sure you use it.' So, I heeded their advice."*
>
> 24-year-old, Migori, 2 children

Additionally, many women said that they chose to use condoms because they were easily accessible and inexpensive at pharmacies and shops. One woman explained how having no knowledge about other methods in addition to condoms being easy to obtain made it the "default" method choice for her first method:

> *"It [the condom] is not because I wanted the method, but because it was the easy one to get at that time and I did not have knowledge of those others."*
>
> 21-year-old, Migori, nulliparous

Most respondents indicated that the decision to use condoms was mostly theirs, and that their boyfriends agreed with the decision even if they did not especially enjoy using condoms. Women often shared that their boyfriends were "okay with condoms" and that the boyfriends "understood" when the women raised and discussed condom use. One woman stated her boyfriend "did not complain…though mostly he does not want to use condoms." She went on to explain, however, that her boyfriend was the one who had procured condoms the first time they used it.

Several women also expressed that condoms were better for young people to use and that hormonal methods of FP were for married women or were for after giving birth. This belief was rooted in concerns that use of hormonal methods may impact their fertility. One woman shared about her choice to use condoms:

> *I: Had you heard of other methods [other than condom]?*
>
> *R: I had heard about other methods but I didn't want to use them before I get a child.*
>
> *I: Why?*
>
> *R: Because you may decide use a family planning and fail to give birth again once you've got someone to marry you; then you start blaming God for having not given you the kids yet you are the one who have killed them yourself.*
>
> 22-year-old, Mombasa, 1 child

The two women who started their contraceptive journey with EC first learned about EC from their boyfriends. One 21 year old woman from Migori with one child who used EC as her first method shared that she was afraid of getting pregnant after she and her boyfriend had unprotected sex, especially because she was still living at home. Her boyfriend bought her EC and she took the pills. The woman explained that she did not know about EC or what they would do, but her boyfriend had told her to take them because they would help her.

Following initial CDM use, the trajectories diverge and women's contraceptive experience differs based on their life circumstances.

### Trajectory 1: Condom and EC

The first identified trajectory is a group of women who cycled between using condoms and EC in their contraceptive history ($n = 7$); for some women, they also relied on safe days or withdrawal to prevent pregnancy. The majority of these young women were still in school, all were nulliparous, and all were unmarried, but were mostly in stable dating relationships. All women in this trajectory used a condom as their first method and continue to use condoms intermittently. Most women used EC between one and three times, and went back to using condoms, albeit inconsistently in some cases, as their main contraceptive method.

Young women's influences on method choice for condoms and EC in this trajectory align with the reasons provided in the section on condoms and EC as a common starting point. The participants in this trajectory are exemplified by a general lack of knowledge about other contraceptive methods when they first used condoms or EC, yet continue to use these methods despite reporting knowledge of an average of about seven contraceptive methods at the time of interview. Many relayed that they first learned about condoms from teachers and friends, and two women said their boyfriends introduced them to condoms. After using condoms as their first contraceptive method type, women in this trajectory then used EC as their second method, mostly due to having unprotected sex or experiencing condom breakage. As with condoms, respondents in this trajectory mentioned several social influences on their choice to use EC, including friends, boyfriend and learning about EC at school. For both condoms and EC, women emphasized that the methods were easy to obtain, typically from the nearest shop or pharmacy, inexpensive and most often purchased by their boyfriends. Some respondents spoke about their increasing trust in the relationship, which led them to not use condoms every time they had sex:

> *I was using a condom because I did not trust him as much since I had just met this person. But I stopped using it when I came to know more about him."*
>
> 23-year-old, Nairobi, nulliparous

Two women in this trajectory expressed the desire to transition to a hormonal method of contraception. Despite desiring a long-acting method, one respondent cited fears about seeking a hormonal method due to concerns about

unprofessional, unlicensed providers who may not provide full information or allow her to choose her method. The other respondent indicated that she would like to use an implant after a future first birth because the method had been effective for her mother at preventing pregnancy.

### Trajectory 2: Condom to NCDM, for delaying first birth

Trajectory 2 is defined by women who begin using condoms and then transition to using a NCDM for reasons other than child spacing ($n = 5$). Only one woman reported periodic use of condoms after she transitioned to a NCDM. For the most part, these women were in committed relationships with a stable partner even prior to marriage with whom they openly discussed life plans, fertility goals and contraception. These respondents often refer to their desire to complete their education or their partner's education before becoming pregnant or having a child. These desires and goals led them to use contraception, and switch to methods that provided greater protection from pregnancy. Women in this trajectory initiated protected sex at an average age of 16, and at the time of interview remained nulliparous. Three were married. At the time of interview, two of the women in this trajectory had discontinued using contraception in order to get pregnant and one had done so due to infrequent sex.

Like women in the other trajectories, the respondents in this trajectory explained that they used condoms as their first contraceptive method for dual protection from HIV and pregnancy, and/or because of limited knowledge of other methods. However, women in Trajectory 2 also emphasized the importance of their education in their decision to use a condom. This sentiment is illustrated by this statement by a respondent who describes the decision to use a condom with her boyfriend as follows:

> *I: Why did you decide to use the condom with your partner?*
>
> *R: I decided to use it to prevent me from getting pregnant and diseases.*
>
> *I: So when you met with your partner...*
>
> *R: I was still in school so if I got pregnant it would have disappointed my parents.*
>
> 21-year-old, Nairobi, nulliparous

Women in this trajectory switched to a NCDM at an average age of 17 and all considered themselves to be in a stable, long-term relationship. Most women first switched to injectables and one woman to the implant. Two of the injectable users then transitioned to implants. The respondents in the trajectory continued to prioritize education. In one example a nurse tried to discourage a young woman from using an implant and the young women said:

> *I told her that am neither ready to get a child or to be married as at now since my partner is still in school. She asked me whether am faithful to my partner. I told her we have been in a relationship for so long and his parents are aware about it and my brothers know him too and that's why she decided to put it for me.*
>
> 22-year-old, Migori, nulliparous

Our analysis found that influences such as boyfriends or husbands and health care workers often influenced their decision to use the injectable or implant. Importantly, decision-making seemed to be undertaken jointly with their partners. A respondent explained the following about her decision to transition to the implant after experiencing side effects from injectables.

> *I: And why did you choose to use the implant method?*
>
> *R: According to the way the injectable… the way I saw the injectable is not good for my body, so I decided to try with the implant.*
>
> *I: And who did you talk to when you were making that decision?*
>
> *R: We made the decision the two of us. Me and my man.*
>
> 19-year-old, Mombasa, nulliparous

Decision-making about which NCDM to use was often guided by features of the method related to side effects, privacy or discreetness, duration of protection, and fears of infertility. Some women mentioned choosing the injectable instead of implants when they switched to a NCDM because the injectable lasted a shorter period of time and they wanted to become pregnant in the near future:

> *I: Okay. And why did you decide to use Depo? Was there a specific reason why you chose Depo and not…*
>
> *R: [Interjection] yeah. I didn't want to be injected for like the implant. Are they 5 or 3 years?*
>
> *I: 3 or 5*
>
> *R: [Interjection] so I didn't want that because I wanted a child too.*

> *I: Oh. You wanted a short-term method because you wanted a child later.*
>
> *R: Mmh.*
>
> 23-year-old, Nairobi, nulliparous

### Trajectory 3: Condom to NCDM to EC

The third trajectory is characterized by unmarried women who switch between CDM and NCDM, primarily a result of being in short term relationships ($n = 3$). These respondents intermittently used condoms and EC throughout their contraceptive journeys, depending on the trust in their partners and whether or not they were currently using a NCDM. Because the relationships were, at times, short-term, women discontinued or changed the method they were using to correspond with infrequent sex. All of the respondents in this trajectory were unmarried at the time of interview and one of them had experienced a birth at the age of 15.

All three women in Trajectory 3 used condoms as their first contraceptive method, and then switched to a NCDM at some later point. The circumstances and factors that influenced respondents in the first part of their contraceptive journey were similar to the other trajectories that began with use of CDM. That is, they used condoms because it offered dual protection with partners they were in new relationships with, and whom they did not yet trust. Unlike some of the other trajectories, two respondents in this trajectory were influenced to use a condom by their friends and one decided on her own.

Two respondents subsequently switched to using implants and one to injectables. Both implant users changed from condoms to implants because they wanted a method of longer duration. One implant user and the injectable user also explained that they or their partners experienced side effects from the condoms. In one case, the respondent's partner was opposed to contraceptive use, so she used the implant discreetly and did not discuss with her sexual partner. All three women in this trajectory reported use of a condom concurrently with a NCDM at some point due to a lack of trust with their partner and one woman reported condom use when she was late for her re-injection. One respondent shared the following about her concurrent use of the implant and condoms:

> *I: Why did you make that decision [to use condoms and implant concurrently]?*
>
> *R: This one for three years… because I don't know the status of the person. You get me? I don't know if you are healthy or you are sick, that's when I decided…*
>
> *I: [Interjection] and you did that how many times?*
>
> *R: Many times. Because now if you meet someone and he doesn't want both of you to go to the hospital [to get an HIV test], you have to use Trust (a condom brand). Because, a child I have already prevented. I can't get pregnant, because I have prevented. What will you prevent AIDS with?*
>
> 24-year-old, Mombasa, 1 child

Two women went on to use EC after discontinuing a NCDM because of a change in relationship status followed by subsequent infrequent sex before initiating a new relationship. In the new relationship, the women did not immediately return to a healthcare provider to get another injection or implant, and instead used EC, often repeatedly, to prevent pregnancy after having unprotected sex. A 23-year-old woman from Migori explained that she used EC with her boyfriend because he lived far away and they had sex infrequently, and therefore did not need to use an injectable as she had previously. Additionally, two respondents experienced side effects with their NCDM and therefore desired a different, shorter-term method.

### Trajectory 4: CDM to NCDM, after childbirth

Trajectory 4 is defined by women's transition from using a CDM to using NCDM methods after a pregnancy or birth ($n = 9$). Seven of these women used condoms and two used EC as their first method and the influences around first use are similar to those described under the section on a common starting place for contraceptive use. After using condoms and/or EC, the respondents eventually switched to using NCDM as their second or third method, primarily for birth spacing. Though all women transitioned to an NCDM after pregnancy/childbirth, the intentionality of the birth and the partner with whom the birth was with differed amongst women in this trajectory; about half of the respondents had a stable partner throughout their contraceptive history with whom they had a child (planned or unplanned) whereas the remaining respondents had an unplanned birth with a partner and went on to marry and have children with a different partner. About one-third of respondents used condoms concurrently with at least one of her NCDM because of a lack of trust in her relationship or wanting a back-up method. At the time of interview, all women in this trajectory had transitioned to marriage and had an average of 1.6 children (range 1–3).

For women in this trajectory, the primary impetus for switching from a CDM to a NCDM was for child spacing. Women often spoke of the need to allow their recently born baby to grow and develop before giving birth to another child. A respondent from Mombasa who had one child at the time of the interview shared:

> *I have to take some time for my child to grow up to some stage; you know the child will have poor health in case I give birth again before she grows to some stage.*
>
> 22-year-old, Mombasa, 1 child

Another woman with two children at the time of the interview stated:

> *Giving birth quickly is what I didn't want. I wanted my family to [be] spaced.*
>
> 23-year-old, Nairobi, 2 children

Women also shared secondary reasons for switching from CDM to NCDM, including wanting a longer-acting method and wanting to avoid another pregnancy to complete school.

Women were often influenced to use a NCDM method by a family member, such as a sister or mother, who shared their knowledge of and experience with a method with the women; or a health care provider who informed the women of FP methods during antenatal or postnatal care visits. Most women talked about either informing or discussing with their partners that they were going to start using a NCDM, but husbands were often secondary influencers with regard to these methods. In some cases, women used these methods covertly. One woman shared:

> *I did not tell him. You know men disagree with these family planning issues. You know some women hide to go and get the methods of family planning, but once a man knows, you will see. They refuse, they dislike them. I don't know why. So I didn't tell my fiancé…I didn't tell him because had I told him he would have advised me to stop.*
>
> 21-year-old, Migori, 1 child (died at 2 months)

Respondents in this trajectory who switched from one NCDM to another often did so because of method related characteristics such as real or perceived side effects from, or myths about, the method; this was common in all trajectories where there was switching between NCDMs. This switching behavior was sometimes prompted by a health care provider. For example, after using injectables for 3 months for birth spacing after having her first child, a 21-year-old respondent from Mombasa recalled going back for her second injection and being told by the provider that she should "change from this injection to implant because the injection has side effects of not getting a baby completely," indicating that the provider believed injections may lead to infertility.

The majority of respondents were using a NCDM at the time of interview. A small number of respondents stopped using contraception altogether by the time of the interview, largely due to the desire to conceive another child.

### Trajectory 5: NCDM only, after childbirth

Trajectory 5 is comprised of six young women who only used NCDM in their reproductive history. The majority of the respondents were married (one was with a boyfriend who went on to become her husband) and all had one child when they first used contraception. Among the respondents in this trajectory, four started with the injectable and two started with oral contraception. Two respondents used a condom concurrently with their NCDM to protect against STIs due to a lack of trust in their relationship. Most of these women learned about the contraceptive method they chose as their first method from health care providers. Some learned about FP options during their antenatal care visits, or while bringing their infant to the clinic for check-ups.

Most of these women shared that they chose a NCDM first because they had an infant and wanted a method to space their next child. When asked about why she chose to use the injectable as her first contraceptive method, a respondent replied:

> *So that I would not get pregnant before my child has completed breastfeeding.*
>
> 23-year-old, Mombasa, 2 children

Some women relayed their desire for child spacing to health-related reasons for both the infant and themselves, stating that it was good to rest from pregnancy and childbirth for some time, and better for the child to grow more before getting pregnant again. Relatedly, some women relayed their choice of first method to the duration of the method. Women who chose the injectable often shared that they wanted a "short-term method," so that when they wanted to have their next child, they could stop using the method and have a return to fecundity without having to go to the clinic. One woman referred to the injectable as a "long-term method," as she was comparing it to oral contraceptive pills and reported that she wanted a method that she did not have to remember to ingest every day.

Two women reported that their partners did not know that they were going to get contraception at the time of their first contraceptive method use. The remaining women shared that they informed their partners but there was no discussion, or they made the decision about a contraceptive method jointly with their husbands. One woman reported that she was heavily influenced by her partner regarding the type of contraception she first used.

All respondents switched to another NCDM as their second method, either from oral pills to injectables or injectables to implant, often related to the characteristics of the methods. Several women talked about forgetting to get their next dose of the method they were initially on, so chose another method that was longer acting. One woman who switched from using injectable as her first method to implants as her second method shared that she had been busy with work and forgot her

injectable date and became pregnant. Another woman who also switched from injectables to the implant said that, after missing the date that she was supposed to get injected a few times, the service provider she went to recommended that she switch to the implant so she would not have to keep track of the date every 3 months, and she agreed. Women often followed the trajectory of oral pills to injectables to implants, which was heavily influenced by the counseling of health care providers.

Other women switched from one NCDM to another because of experiencing real or perceived side effects. One woman with three children adopted injectables, implants, and oral pills after the births of each of her children. She discontinued all three methods due to side effects from the methods, though ultimately decided that she would be willing to use oral pills in the future.

Some women often switched through a series of NCDM for a combination of reasons that included the fear of side effects and a desire for a longer-acting method. One young woman from Mombasa who had three children at the time of the interview decided to use oral pills as her first method when her first child was 3 months old. She initially wanted to use the injectable, but her husband preferred that she use oral pills, so she used the method for 6 months. After she started experiencing dizzy spells that she attributed to the method, she stopped using it and became pregnant soon after. After having her second child, she jointly decided with her husband that she would use the injectable. She used it for about a year, her husband recommended she stop using it because he believed the chemicals would cause infertility. She stopped using the injectable and became pregnant about 2 years later. After giving birth to her third child, she then had the 5-year implant inserted. The woman explained her decision to use the 5-year implant as follows:

> *I wanted the child to grow. You know if you do not take care of yourself you can find out that you are pregnant again unexpectedly. That is why I decided to use the five-year method. You see I already have three children who are not well spaced, so I wanted to take a break and let these children grow up.*
>
> 24-year-old, Mombasa, 3 children

## Discussion

In this article, we identified five contraceptive use trajectories through the analysis of in-depth interviews with 30 young women from three counties in Kenya. Our study highlights how changing life circumstances and factors at multiple levels influence contraceptive decision-making during the adolescent and youth time periods. Additionally, we describe thematic areas that shape contraceptive choices over time. We also find that young women's relationship status and the occurrence of pregnancies or births are deeply intertwined with how various factors work to influence contraceptive method choice.

Our study found that condoms are an entry point to contraceptive use for many young women. The decision to begin their contraceptive journey with condoms was influenced by several factors, but overwhelmingly the most common influences were related to the strong desire for a method that protected against both pregnancy and STIs, easy accessibility and low cost at pharmacies and shops, and a lack of knowledge about other methods. Use of condoms may be driven, in part, by wider social acceptability of young people using condoms which is rooted in the desire for a method that is used only when needed (coital dependent), not perceived to impact future fertility, as well as the appreciation of the dual protection they provide (10, 15, 17). Our study found that young women learn about condoms from a variety of sources, including teachers, peers, their partner and parents; this differs from the paper from Ouma et al. which found that most young people learn about methods from peers and the internet (10).

Several of the trajectories highlight that young women who used two or more modern contraceptives in their life were able to successfully avoid a pregnancy. This is not limited to young women who are in stable relationships with one partner, but also includes women who may have short-term relationships. The contraceptive choices for trajectories 1–3, which are those young women who have avoided a pregnancy, include use of condoms and EC only, cycling through different types of CDM and NCDM, as well as women who made the choice to transition from a CDM to NCDM. This highlights that a range of contraceptive choices are available and appropriate for women to avoid pregnancy if desired and highlights the importance of ensuring young people are able to make an informed choice about which method they would like to use. The motivations for avoiding a pregnancy are somewhat different depending on the trajectory. Some women and (unmarried) couples value and emphasize their educational pursuits and therefore make informed, proactive decisions about contraceptive method choice, including the use of a hormonal method, in order to ensure that they avoid a pregnancy until they are ready.

For many young women, childbirth precipitated the transition to hormonal methods of contraception and this decision is often related to the desire to space births. Choice of method was often influenced by the health provider in the postnatal period and is typically decided through conversations between the woman, her partner (often husband) and the healthcare provider. As found in other studies in Kenya (15, 17), young women felt it was more acceptable to use hormonal methods after childbirth, which may be due in part to the pregnancy having alleviated personal and familial fears about future infertility. The majority of women did not transition back to condoms or EC once they had started using a hormonal method of contraception. The exception to this were women who did not trust their partner and used condoms with their

hormonal method or women who used condoms as a stop gap measure between injections. Once using a hormonal method, many women tried more than one hormonal method which was driven by the desire to avoid/reduce side effects or find a method with characteristics that met their needs, such as having a long duration of protection.

This study is not the first to develop profiles of women and categorize their contraceptive needs and behaviors. Globally, the reproductive calendar from Demographic Health Surveys (DHS) has been utilized to explore how circumstances such as pregnancy, marriage or education influence contraceptive timing and method choice (22, 27, 38). In a DHS Analytical report (38), an analysis of data from Burundi categorized women of reproductive age into different segments based on patterns of contraceptive use, marriage and childbearing. The majority of young women fell into profiles of a "quiet calendar" with no contraceptive use and no pregnancies for the duration of the calendar or a "family builder" with no contraceptive use and two births for the duration of the calendar. Our study differs from these earlier studies in part because our sample is focused on experienced young contraceptive users and therefore does not include young women who align with the "quiet calendar" or "family builder" profiles. Further, our study focused on learning the experiences of young people and the stories surrounding their decision points. The thematic areas influencing contraceptive method choice in our study were similar to a recent paper by Igras et al. which used longitudinal qualitative data from Benin to explore the pathways women and men follow to meet their FP needs (25). Though similar high-level themes were influential on contraceptive behaviors, some themes, such as trust in the relationship, differed in our study due to the longitudinal perspective which captured influences on young women's reproductive choices prior to marriage or childbearing and our focus on contraceptive method choice rather than unmet need. While these earlier studies determined profiles of women and their behaviors, none provided significant depth on the dynamics of method choice among young women over their life transitions.

Each of the trajectories offers opportunities to develop different program strategies to support young women's access to and use of the contraceptive method of their choice while also aligning with the core principles underlying Kenya's 2015 National Adolescent Sexual and Reproductive Health (SRH) Policy (35). A common theme amongst study participants was that they had limited knowledge of contraceptive methods when they began their contraceptive journey. Relatedly, several young women said they learned about contraception from school or teachers. This points to and supports Kenya's 2015 policy to provide age-appropriate comprehensive sexuality education (CSE) to in-school and out-of-school youth. Yet, there are gaps in the content of CSE as shown by a three-county study in 2017 which found that <1 quarter of students were taught about different methods, how to use them or where to obtain contraception (39). In order for young women to be able to realize the benefits of contraception, it is critical that CSE includes information on a range of methods and provides further information on where young people can access health providers for individual-specific counseling. In addition to CSE, schools could link young women to SDPs that offer contraception to help young women access their method of choice. These components would help Kenya fulfill the 2015 SRH policy's guiding principle of being responsive to the varying needs of young women.

Several young women in this study mentioned the role and support of their parents as supportive of contraceptive use. The National Adolescent SRH Policy also highlights the critical role of parents in adolescent SRH and identifies the need to educate them on the SRH needs of young people, but does not elaborate on strategies to do so (35). Further work should explore how to reach parents of young people with information about contraceptive methods as well as provide strategies to parents on how to communicate with their children about contraception. Additionally, boyfriends and partners served as both supportive and prohibitive of contraceptive use and method choice. Those whom were supportive often were active decision-makers and helped to find a contraceptive method that suited their and their partner's needs. Given that young men are frequently active participants in the decision to use contraception, what method to use, and also are responsible for obtaining the methods, programs should focus on sensitizing men, young and old, about contraceptive methods and where to obtain them; this could include ensuring that young men receive information as part of CSE.

Among women who had at least one child, the provision of FP information at antenatal and postnatal care visits and the availability and access to postpartum FP methods are important strategies to help women choose and use a postpartum modern method (40). Our study found that receipt of FP information as part of the continuum of care often resulted in respondents transitioning to a longer-term method for birth spacing. Finally, given that many young women report obtaining their method from pharmacies, programs can also focus on expanding the range of methods available at pharmacies and ensure that young people know about this increased access. Kenya's 2019 policy allowing the provision of injectables at pharmacies, may be particularly helpful in expanding access and ensuring easier access to avoid lapses in method use (41).

## Limitations

This paper has several limitations. First, this study was designed to capture women's contraceptive journeys among a sample of young women who had used two or more types of modern methods. This allowed us to better understand the influences on multiple contraceptive decisions, but it also means

that we are unable to extend these findings to women who have used fewer contraceptive methods. Additionally, because we did not interview young women who had not used contraception, we cannot fully discuss what makes the respondents in our study different from these women or tease out any factors that are barriers to contraceptive use.

Second, given the focus on contraceptive method choice, our interview guide did not ask details about the circumstances around first sex and subsequent sexual activity prior to women's first use of a contraceptive method. Therefore, there are gaps in understanding for some women and trajectories, such as the young women who did not start a contraceptive method until after they had given birth. It would be useful to have information prior to their first contraceptive use in order to fully unpack their reproductive journeys. Similarly, we did not ask detailed questions about number of sexual partners, so we are unable to systematically analyze the data by number of partners or type of partnership at each transition period.

Third, our inclusion criteria and interview guide also precluded any discussion of traditional methods. We did not specifically ask about use of traditional methods, so any mention of it came up organically in the interviews. Therefore, we are not able to fully understand the dynamics and transitions between traditional and modern method use during a young women's early reproductive history.

Fourth, our study may be subject to recall bias. We asked women ages 18–24 to recall their previous contraceptive use and decision-making. Women may not have been able to accurately recall events that happened several years in the past or the circumstances that influenced their decisions and behaviors.

Finally, this study was designed to explore influences on contraceptive method choice among young, female, experienced contraceptive users in Kenya. Given the qualitative design, these findings and the specific trajectories generated are not generalizable to the Kenyan population or to other countries and contexts. Undertaking this study in other settings would allow us to determine if similar trajectories are present and how they may vary in different settings.

## Conclusions

Our results indicate the diversity of contraceptive journeys or trajectories among a sample of young women who are experienced contraceptive users in Kenya. Despite many women beginning their contraceptive journey with condoms or EC, their experiences diverge and a variety of influences shape their subsequent contraceptive choices. For young women looking to delay their first birth, programs should explore expanding access to information and provision of NCDM prior to marriage through school-based programs, engagement of parents, and rolling out access in pharmacies.

## Data availability statement

Information about the study, survey tools and data are available at: https://dataverse.unc.edu/dataverse/fafc. A formal request needs to be made and a data sharing agreement will have to be made before sharing the data.

## Ethics statement

This study involving human participants was reviewed and approved by AMREF Health Africa Ethics and Scientific Review Committee (ESRC) (P205/2019), National Commission for Science, Technology and Innovation (NACOSTI) in Kenya, and the University of North Carolina at Chapel Hill Institutional Review Board (19-1360). Written informed consent for participation was not required for this study in accordance with the national legislation and the institutional requirements, but respondents voluntarily provided verbal informed consent to participate in the study. Additional approvals were secured from each county's Director of Health.

## Author contributions

This paper was conceptualized by LC, MM, BO, EW, CM, EZ, LB, and IS. LC, MM, BO, EW, and CM participated in study implementation and data collection. MM led data analysis with support from LC, BO, EW, and CM. TA, LB, TD, and IS provided input into the analysis approach and interpretation of data. LC and MM led the writing of this manuscript with critical input and revision done by BO, EW, CM, EZ, TA, LB, TD, and IS. All authors contributed to the article, approved the submitted version, and agree to be accountable for all aspects of the work.

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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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# Libido–sexual disorders and abandonment of injectable contraceptives among users of the Ivorian Association for Family Well-Being in Korhogo, Côte d'Ivoire

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**Introduction:** The recent introduction of modern contraceptive methods in resource-limited countries is confronted with the occurrence of undesirable effects that hinder their use in the long term. This study conducted among the users of the Ivorian Association for Family Well-Being in Korhogo describes the libido–sexual problems associated with the discontinuation of injectable contraceptives in former users. The objective of the study was to identify the factors that led to the abandonment of injectable contraceptives among female users of the Ivorian Association for Family Well-Being in Korhogo between 2018 and 2019.

**Materials and methods:** Qualitative data were collected from 15 former users (24–38 years old) of injectable contraceptives duration of 2–3 months. Additional data were collected from five health workers aged 35–60 years. In-depth interviews were conducted to explore the experience with injectable contraceptives and reasons for discontinuation. Following data collection, audio-recorded data were transcribed, translated, and coded using thematic analysis through an inductive approach.

**Results:** Side effects identified as associated with injectable contraceptives include libido–sexual disorders, unusual bleeding, and weight gain. The most common reason for discontinuation were libido–sexual disorders, which impacted the households' intimacy and provoked their abandonment or the change of contraceptive methods among injectable contraceptive users.

**Conclusion:** Adverse events were dominated by libido–sexual disorders, unusual bleeding, and weight gain leading to the abandonment or change of the contraceptive. These results suggest points of intervention for increasing continuation among users. This intervention should include training of health workers to investigate and manage adverse events related to the use of injectable contraceptives and the improvement of communication between health workers and users on adverse events of injectable contraceptive use.

KEYWORDS

injectable contraceptive, libido-sexual disorders, adverse events, contraceptive abandonment, contraceptive, Family well-being, Korhogo, Cote d'Ivoire

# Introduction

Modern contraceptive use remains low in many low- and middle-income countries despite strategies and policies to change behavior (1–3). This reality leads to an unmet need for family planning (FP), unwanted pregnancies, induced abortions, and high maternal-infant deaths (4–7). According to the literature, low contraceptive use is related to individual, sociocultural, legal, policy, and institutional factors that limit access to modern contraceptive methods (MCM) (1, 2). In addition, women's preferences for MCMs may be a barrier to contraceptive use. Several studies addressing FP and contraceptive use issues have highlighted women's preference for injectable contraceptives (1, 8, 9) as they ensure a discreet, easy, and nonrestrictive contraceptive practice. However, their practice is disrupted by the occurrence of adverse events in terms of side effects related to the use of these contraceptives. These are the most common reasons why users abandon them (10, 11). Several studies confirm that injectable contraceptives cause sexual and libido problems after a certain period of use in Europe (12–14), the United States (15–17), and Central Africa (18, 19). Although injectable contraceptive use remains low in sub-Saharan Africa with a slowly increasing tendency (11, 20, 21), side effects are already reported in this recent practice (18, 22). It is the case of the Ivorian context that is marked by a low national contraceptive prevalence (13.9%) with important regional disparities; a high maternal mortality (614 deaths per 100,000 live births) while 38 deaths per 1,000 live births are deplored in neonatology and 108 deaths per 1,000 live births in children under 5 years of age (23). In response to this reality, the National Health Development Plan (2012–2015) has made the promotion of FP a priority, with a view to reducing maternal, infant, and neonatal mortality to improve socioeconomic development indicators in Côte d'Ivoire. It was noted that women are increasingly resorting to MCMs to limit births. These are pills (5.9%) and condoms (4.7%). The particularities of contraceptive use are noted in the northern region with a preference for injectable contraceptives, whose national use rate was estimated at 1.9% (DHS 2012). However, the long-term use of injectable contraceptives by women remains a concern for the managers of the Association Ivoirienne pour le Bien-Être Familial (AIBEF) in the city of Korhogo, an agency that provides support and advice to women who use MCMs. Because important cases of "lost to follow up" are noticed after about six months of users' follow-up. For example, the number of new users fell from 1,547 in 2018 to 701 in 2019 and 336 in 2020, with 76 cases of abandonment in 2018 and 57 cases in 2019, according to AIBEF monitoring reports. This steady decline in new injectable contraceptive adherence and dropout rates prompted an interest in documenting the problems with injectable contraceptive use among AIBEF Korhogo users, as of 2018, and in identifying key factors for dropout. While sexual and libido disorders are widely and extensively documented in developed countries (15, 16, 23), few studies, however, have focused on this topic in the West African context and, in particular, in Côte d'Ivoire. Hence, the present study was conducted with the aim of filling the scientific void in this area. It describes sexual and libido disorders as factors in the abandonment of injectable contraceptives among AIBEF users in Korhogo, Côte d'Ivoire.

# Material and methods

## Framework of the study

Our study took place in the locality of Korhogo and within the AIBEF of this city. Korhogo is the fourth most populous city in Côte d'Ivoire, and the largest city in the north of the country. It is located 635 km from Abidjan and is the capital of the Savanes district and the Poro region, a strategic crossing point to Mali and Burkina Faso. The "City of Poro" covers an area of 12,500 km² for a population of 536,851 inhabitants (including 286,071 inhabitants for the commune of Korhogo), with 91.55% nationals and 8.45% non-nationals (RGPH 2014). It has a Sudanese tropical climate, and its main activities are agriculture, livestock, and trade (**Figure 1**).

## Study design and data collection tools

We conducted a qualitative study in which data were collected by direct interview using an interview guide addressing the following thematic areas:

- Reasons for the choice of injectable contraceptives by AIBEF users.
- Factors related to the abandonment of injectable contraceptives by these users.
- The undesirable effects that could slow down the use of injectable contraceptives.
- The wishes and suggestions of stakeholders for better use of injectable contraceptives in Korhogo.

## Sampling

The process of identifying respondents was done with combined "snowball" and "network" techniques. These techniques allowed us to go from one user to another after we contacted the head of the AIBEF health center in Korhogo and interviewed some of its staff. The AIBEF archives were also used to identify patients who had abandoned their contraceptive methods. This allowed us to identify their contacts and to approach former injectable contraceptive users who had switched to another method or who were no longer using contraceptive methods.

## Recruitment of study participants

Study data were collected from users and health workers at the AIBEF in Korhogo. The selection of participants was done to a maximum. Users were selected based on their experience of using injectable contraceptives. Meanwhile, the selection of health

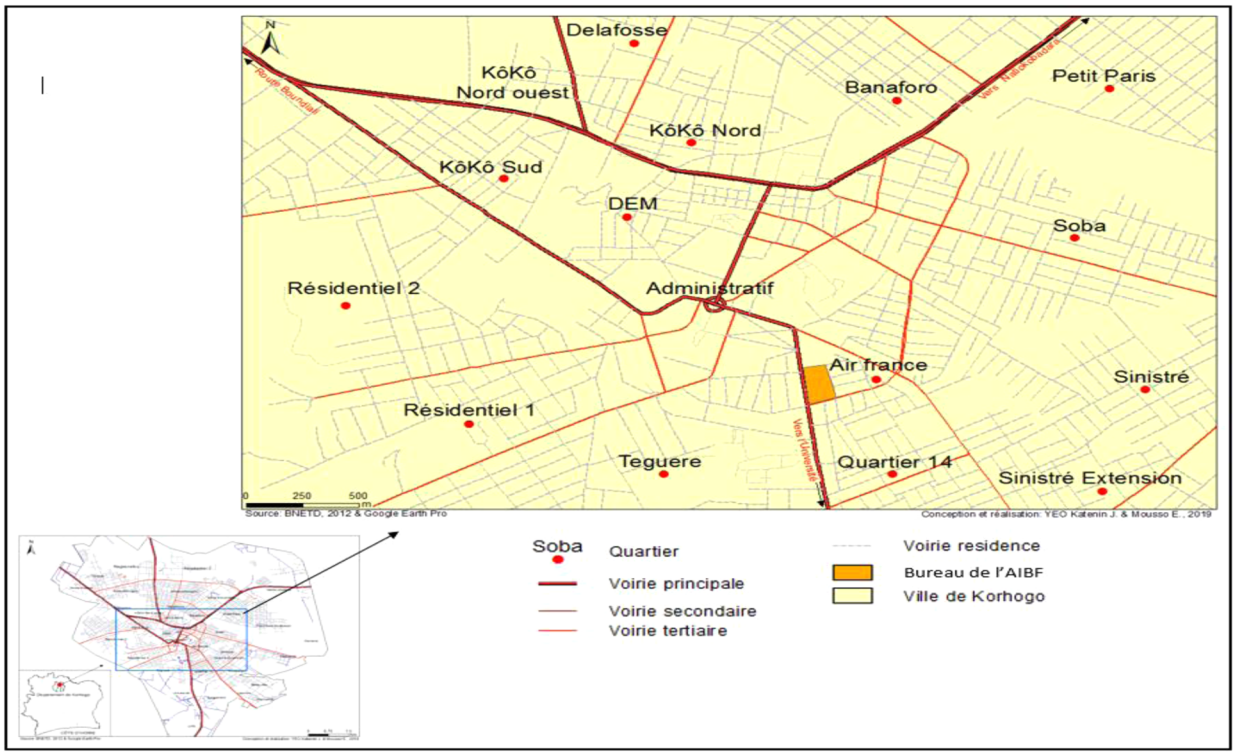


FIGURE 1
Location map of AIBEF in Korhogo.

workers was based on their involvement in sexual and reproductive health services. We conducted the survey with 5health workers, namely, the coordinator, two providers (midwives), the FP educator, and the person in charge of logistics, and 15 former users of injectable contraceptives of AIBEF. These selections based on various files helped strengthen the data quality.

## Data collection

The study was carried out in two phases. The first phase concerned the pre-survey, which played an important role in the study, as it made it possible to discover and explore the field of investigation. We visited the health district and the AIBEF in Korhogo. We conducted some interviews with the head of AIBEF and their computer specialist. These interviews focused on the issue of contraceptive methods within their structure. In practical terms, the pre-survey allowed us to learn about the different types of methods available in their center and to get a feel for some of the realities in the field. This phase lasted for 5 days, from October 20 to 24, 2020, at the AIBEF center.

The second phase involved the actual survey. It took place over 3 weeks and 4 days, from November 5, 2020, to January 1, 2021, in the city of Korhogo. These two phases made it possible to meet with the various participants who made up our sample. The interviews were conducted with former users of injectable contraceptives and the health workers of the structure. We considered the availability of the various respondents (injectable contraceptive users and health workers) to talk with them outside of their work hours and on weekends. Data were collected by an experienced and trained sociologist (YKJ). All individual interviews were recorded on a Dictaphone with a built-in microphone and transcribed in French.

## Data analysis

The qualitative data collected and entirely transcribed in French by the members of the research team were entered and coded using Microsoft Word and Excel Windows 16.

After the transcriptions, a content analysis of the data allowed us to code the information collected and process it. To do this, we listed the information collected, the words recorded directly in audio. We noted the dialogs of the interviewees word by word, without modifying the content of the speech. The data are presented in the form of life stories and opinions that were used to learn about, identify, describe, expose, and classify in detail the factors related to the abandonment of injectable contraceptives among the users of the AIBEF of Korhogo.

## Ethical considerations

The study protocol was approved by the internal scientific committee of the National Institute of Public Health in Abidjan. Verbal and informed consent was obtained from the respondents

before the interviews were conducted. The questionnaire was administered only when consent was obtained. Anonymity and confidentiality were respected; initials were used instead of names. Interviews were conducted in French or local language and in private locations to ensure confidentiality. In addition, permission was obtained from AIBEF and the Korhogo departmental and regional health directorate.

# Results

The 20 people in our sample who were interviewed included 5 health workers (2 women and 3 men) aged 35–60 years and 15 former injectable contraceptive users aged 24–38 years from the Ivorian Association for Family Well-Being (AIBEF) in Korhogo. In total, 17 women (85%) and 3 men (15%) were interviewed. The women used the injectable contraceptive (Depo-Provera) by intramuscular route with an action duration of 2–3 months, between 2018 and 2019. Our results are presented according to the following plan: (i) factors inherent in contraceptives that impact users' sex lives and (ii) sexual and libido disorders inherent to contraceptives.

## Factors inherent in contraceptives that impact users' sex lives

### Overweight

The side effects of injectable contraceptive use on a woman's body are bothersome and annoying to users in all forms. Sudden weight gain can have a negative impact on their sex life and their relationship. It can then lead the user to abandon the contraceptive, according to the words of S.S., 28 years old, in training as a nurse's aide, living in an open relationship and mother of one child:

> *"Personally, I didn't make that weight. I was on the two-month injectables, and I was fine with that because every eighty days I had my period. But since the two-month injectable went out of stock, I started taking the three-month injectable and I started to gain weight, from eighty kilos, I went to one hundred kilos in less than six months. Not all men can handle that, so I gave up the injection and went on the pill. Now I must pay for weight loss teas, medications to release all the hormones in my body."*

This idea is echoed by K.A., an AIBEF provider, 45–50 years old, married with children, who talks about the inherent overweight of injectable contraceptives with these words:

> *"In fact, the the dropouts are due to side effects. Because weight gain under the injectable contraceptive often creates problems. So, it causes many women to give up … This morning, I received a young girl who was put on injectable contraceptives at the Regional Hospital Center … Her mother finds that she is putting on too much weight, so she wants to use another method."*

### Bleeding

The injectable contraceptive is a synthetic progestogen with a high dose whose action consists of blocking ovulation and thickening the mucous membrane of the cervix for a variable period of 8–12 weeks. Blocking ovulation puts the woman's menstrual cycle at rest during the period of action of the progestin. This period is often disrupted by the appearance of unexplained bleeding with repercussions on the social and intimate life of women. They are indisposed to certain social activities and sexual relations, according to C.T., a 24-year-old student, single without children:

> *"If you even hear that you are going to have sex, it means that your period has stopped. But it comes all the time. We're in the month of Lent and I can't pray, I can barely fast. So, I didn't have sex anymore because I was indisposed all the time, I had become very thin, I didn't reach fifty kilos (50 kg) anymore. I wonder if I even had sexual desires anymore … My only concern was how to stop my menstrual period."*

Provider S.B., about 35–40 years old, married and mother, confirms the occurrence of cycle disorders related to injectable contraceptives and their consequences on the users' experience:

> *"When a woman is on contraception, it creates disorder in her couple. Because the fact that she sees her periods all the time makes the man indisposed and he can no longer have sexual relations at any time as he wants … When women use the injectable, they are indisposed all the time, which means that they cannot pray or perform their conjugal duty, so they are not at ease."*

Amenorrhea secondary to the contraceptive also bothers the woman and constitutes, along with bleeding, a reason for abandonment, according to the words of the provider Y.P., between 50 and 55 years old, married with children:

> *"Women often complain of amenorrhea or hypermenorrhea lasting more than ten days or even a month…or embarrassing spotting. Menstruation may come during the day and then stop, only to return in three days. Women come to complain repeatedly of amenorrhea and bleeding outside of menstruation."*

## Sexual and libido disorders inherent to contraceptives

Most women surveyed reported sexual dysfunction and loss of libido after taking the injectable contraceptive. They admitted that they no longer felt sexual desire or pleasure during their various sexual relationships. S.F., a 29-year-old shopkeeper, married and mother of two children, confirmed these disorders:

> *"When I took the injection, I was no longer aroused, I felt no pleasure, I no longer came during sex. There is only pleasure when you come or when you are excited. But I didn't feel any of that, so it's not interesting anymore."*

S.S., a 28-year-old user in training to be a nurse's aide, living in an open relationship and mother of one child, agrees with the previous speaker and confirms the link with the abandonment of the contraceptive in these terms:

> *"Also, I don't like sex very much, but the injection of the contraceptive made everything worse. It doesn't make me feel like having sex and it has taken me further away from sex. So, I often have sex like this, with no desire. But my partner feels like it, so I must touch him, touch him because he feels like it, how am I going to do it? when he's on top of me, I don't feel anything, I'm in a hurry for him to do it quickly and then leave, I think it's even lasting too long. When the person is not there, you think about him, but when he is there in front of you, it makes you angry. So, my darling says to stop the contraceptive because he doesn't feel his wife anymore oh."*

These side effects of taking the injectable contraceptive are perceived by the spouses as negligence or even contempt or lack of interest in them by the woman. This situation creates conflicts that drive the spouses apart in a climate of jealousy and suspicion. This domestic crisis threatens the survival of the couple and leads women to abandon contraception to preserve harmony and peace. According to the experience of S.F., a 29-year-old trader, married and mother of two children, the use of injectable contraceptives has not been sexually beneficial, according to her:

> *"My partner was reluctant to have sex when he saw that I was no longer interested in him, so he didn't ask for much. However, when I was not on injectable contraception, he always asked for it. But since I am on contraception, he has decreased, I tell myself that it is my attitude that caused this, because before it was myself who provoked him and brought him to do the sexual act, but when I started to take the injection there, it did not give me desire anymore. I was no longer interested in him, so he didn't ask me anymore."*

S.F., a 29-year-old shopkeeper, married and mother of two children, underlines the marital conflicts that users of injectable contraceptives face in their households by saying:

> *"My husband says he didn't know I could go a month without being interested in him. He insults me by accusing me of cheating on him with other men when I go to sell."*

The remarks of S.S., a 28-year-old nurse's aide trainee, living in a common-law relationship and mother of one child, support this:

> *"It almost caused a fuss between me and my boyfriend. He told me that the injectable contraceptive is a drug that makes you lose your sexual desire. The wife of one of his friends who was taking it had lost all sexual desire to the point that his friend thought that his wife was cheating on him with other men because she was pushing him away at every attempt."*

In view of these remarks, we can easily understand what users of injectable contraceptives experience and feel. In addition to the effects on the woman's body and her cycle, libido–sexual problems have a lasting impact on the wellbeing of users. The lack of sexual appetite and the decrease in pleasure linked to the conjugal act have an impact on the quality of life of the woman. They are no longer able to fulfill their marital duties in a qualitative way, so they abandon the injectable contraceptive.

## Sexual arousal inherent in contraceptives

Some participants stated that the weight gain associated with the use of the injectable contraceptive was well appreciated by their partners and reawakened their sexual appetite, according to S.S., a 28-year-old nurse's aide, living in a common-law relationship and mother of one child:

> *"My husband refuses to let me go out. Even when I am in front of the gate, we talk because there are boys in front of the yard. He says that I've become too pretty and that I've grown a bit of a bum. So, he doesn't want me to go to the market, he takes the food from his parents to send to me or he pays for food … and when he's not there, just a little bit he calls me, what are you doing? Are you lying down? What position did you take? Hey hey hey!!!"*

Through this report, we understand that the use of the contraceptive has been a source of motivation for sexual practice. Because the contraceptive gave users confidence, it contributed to a certain sexual wellbeing. In addition, contraceptive use has made sexual activity more recurrent among men, with some abuse. In fact, the woman on the contraceptive was more attractive because of the development of her curves when she gained weight. So, the spouses were more attached to their wives, and this increased the frequency of sexual intercourse. This reality was experienced by S.S., 28 years old, in training as a nurse's aide, living with a partner and mother of one child who goes further with this revelation of the effect of weight on the vagina:

> *"Hmmm! It used to be better! when I went on birth control, it increased his cravings because when you get fat, your sex shrinks. So, he found his business!!!…..I tell him ah! my brother, I am also a child of people!!! Just a little, come I'll tell you something and then he takes me to have sex. We even palavered for often two or three days; he does not speak to me. He goes so far as to tell me that I'm doing sexual disobedience. If he was the only one there, every day he would have sex."*

The contraceptive has impacted positively on the sex lives of some users because the security it provides has contributed to the sexual development of their couples. On this point, we recorded the opinions of users who perceived the use of the contraceptive as a positive element in their sexual life. C.N., a 31-year-old shopkeeper married with three children, said

> *"When I took a shot there it made my case worse. I always asked my partner to make love to me, because I knew I was safe."*

These comments were supported by those of S.K., 26 years old, student, single and without children:

> *"In any case, it gave me the courage even to make love. Because it was when I wanted to start a boy's business that I went to take the injection so as not to get pregnant out of wedlock, or that would put an end to my studies, so I was not afraid, I was calm, and I was not afraid of anything anymore."*

However, users have experienced a crisis of trust and tension in their relationships. Contraception gives freedom to the woman, while at the same time fomenting jealousy and doubts in the man about the fidelity and sincerity of his partner. For him, a woman on contraception can easily cheat on her man because she is safe from unwanted pregnancies. This is expressed by K.A., 45–50 years old, married and mother of a family, provider, through his words:

> *"No man wants to see another man touch his wife. There is the case of a woman who was at my home here, her husband called him to know if she had arrived and if it was a man or a woman who was receiving her … I made him understand that in our home, no one has the right to touch another's wife and that we have two midwives who take care of the patients, so no one is going to touch his wife."*

# Discussion

The present study, which describes the libido–sexual disorders related to the abandonment of the injectable contraceptive in Senufo in Korhogo, is a first in Côte d'Ivoire. It raised two major questions that deserve to be discussed: (i) the sexual and libido disorders inherent to contraceptives that are the main subject of this study; (ii) the factors inherent to contraceptives that explain some of these described disorders.

## Sexual and libido disorders inherent to contraceptives

The main results of the study show that the side effects that impact the intimacy of the household and the libido–sexual disorders that cause tension in couples justify abandoning the injectable contraceptive or changing the method. These results are similar to those of previous studies that have looked at the sexual function of hormonal contraceptive users (12, 15, 17, 24, 25).

The users of the injectable progestin were confronted with a decrease in their sexual desire; they did not feel any excitement during the sexual act, which they endured as a real chore. Libido–sexual disorders have an impact on a woman's reproductive health and the harmony of the couple. Sexual relations are part of the physiological needs of the individual, so that any dysfunction affects the health of the individual, with repercussions on his or her abilities and creativity, while compromising the procreative function (22, 25).

Our results also reported positive effects of the contraceptive on sexual function in terms of sexual arousal similar to other studies in the literature (15, 22). In general, the effects of injectable contraceptives on sexual function reported in the literature are controversial and confirm our own.

To date, there is no plausible explanation for the mixed results of hormonal contraceptives on the health of users. The results are different and often contradictory from one study to another. Indeed, for some authors, the impact of progestogen contraceptives on female sexual dysfunction remains minimal (16), while for others, satisfaction during sexual activity depends on factors beyond sexual functioning alone (26). Both et al. denounced a lack of sufficient evidence to establish a clear algorithm for managing hormonal contraceptive-induced sexual dysfunction due to controversies (27). Therefore, the multifaceted nature of female sexual function justifies the importance of establishing a temporal relationship between the onset of sexual complaints and the initiation of hormonal contraception. This is because several factors affecting sexual response may cover the positive or negative impact attributable to hormonal contraception (15). When in doubt, the same contraceptive that produces opposite effects at the same time is subject to discussion and reopens the old debate about the safety of contraceptive products on maternal health. The wellbeing of the woman and the couple sought using modern contraceptives is finally understood by the consequences of their adverse effects. Further studies are needed to reach accurate conclusions and make informed decisions.

However, our supposedly positive contraceptive outcomes have also led to crises of trust and tension in the couple and have caused them to abandon taking the contraceptive. Indeed, the sexual excitement and security of the contraceptive have created situations of sexual abuse that have eventually led to partner fatigue and revolt. Especially since this excitement is surrounded by a climate of unhealthy jealousy, which in the long run suffocates the partner and forces the woman to abandon the contraceptive (28).

## Factors inherent in contraceptives that impact users' sex lives

Contraceptive-related bleeding makes the woman unavailable for her religious practice (going to the mosque to pray, practicing

the Muslim fast, etc.), for certain social activities, and for her partner. In short, bleeding creates situations of discomfort for the woman and the man, generating tensions and crises in the household and affecting the intimate relationship, which leads to the abandonment of the progestin. This result is similar to that of Anoua Adou (2016), who links the side effects (bleeding, pain, amenorrhea, etc.) of the injectable contraceptive with the deterioration of social relations and the risk of the couple breaking up. These disadvantages have led to mistrust of the contraceptive and the abandonment of its use in the rural Ivorian environment of Gwa of Domlon in the health district of Alépé, in the southeast of the country. It was also noted that men's reluctance to use FP was related to the fear of losing control over women's fertility and sexuality (28).

The extra weight associated with contraception, although it bothers women, is well appreciated by men who find it beneficial. Indeed, Ivorians are fond of curves and look for women with generous shapes most of the time. This trend is due to a revelation of this study according to which weight gain shrinks the vagina of the woman and improves the pleasure associated with the sexual act. Weight gain and menstrual problems were the major side effects of injectable contraceptives and implants in the study by Bangoura et al. conducted in Guinea among adolescents and young urban users. The sexual disorder found was a low sensation of sexual pleasure, which was more related to the use of condoms (29).

The contraceptive injection, under the trade names Depo-Provera, Sayana Press, and Noristerat, is a long-acting progestin steroid (progesterone). It suppresses the production of follicle stimulating hormone (FSH) and inhibits the increase in estrogen levels. Its effect reduces serum estradiol levels and is closely linked to users' complaints of mood changes, depression, and decreased sexual desire (17). It is contraindicated in some cases of illness and pregnancy, so careful medical supervision is required before and during its use. However, it should be noted that its use in developing countries, especially in Africa, is not always accompanied by a health check-up (28). Women are put on injectable contraceptives without any medical analysis to assess the non-noxiousness of the product. Everything is done blindly. In this context, it is difficult to objectively attribute the occurrence of an adverse effect to the contraceptive. In addition, the absence of a medical check-up creates a psychosis and develops myths and erroneous perceptions that amplify fear among users, pushing them to abandon the contraceptive at the appearance of any discomfort. In addition, health workers do not have the in-depth knowledge of the various contraceptive products to better advise women and manage adverse events (15, 26, 30).

## Study limitations

The difficulties encountered were related to data on patients no longer using injectable contraceptives. In fact, there were no data for each type of method, so we had to refer to the archives to find them. Some users were not contacted because their records were incomplete, and their contacts were not included. Another difficulty encountered was a lack of confidence in the confidentiality of their statements. This mistrust is justified by the fear of indiscretion felt by some users and health workers. In addition, our respondents found some questions difficult or too private. Some respondents wanted the interviews to be held outside their homes, even in the service, or in places where women gather or somewhere in town. The interviews that took place at the clinic were shorter because they were held during off-duty hours, and there were actors who gave us appointments that they did not keep.

## Conclusion

The results of this study were marked by the occurrence of bothersome side effects after 6 months of use of injectable contraceptives (*Depo-Provera, Sayana Press*, and *Noristerat*) at the AIBEF in Korhogo. These adverse events were dominated by libido–sexual disorders, unusual bleeding, and weight gain, which, while testing the harmony and intimacy of the couple, led to the abandonment or change of the contraceptive. This study shows the urgency of filling the gaps of health workers to better support contraceptive practice to obtain better results and reverse the curve of maternal and child mortality. Moreover, given the controversial results of modern contraceptives on maternal health, we recommend to:

- supervise the setting under MCM of medical examinations and analyses,
- investigate and manage adverse events related to taking MCM,
- train health workers on MCMs for better care of users,
- improve communication between health workers and users, and
- improve monitoring of MCM users, especially those with adverse events.

Prospective research with larger numbers of women is needed to improve understanding and document the potential libido–sexual side effects of injectable contraceptives on a national level.

## 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 study protocol was approved by the internal scientific committee of the National Institute of Public Health in Abidjan. Verbal and informed consent was obtained from the respondents before the interviews were conducted. The questionnaire was administered only when consent was obtained. Anonymity and confidentiality were respected; initials were used instead of names. Interviews were conducted in French or local language and in private locations to ensure confidentiality. In addition,

permission was obtained from AIBEF and the Korhogo departmental and regional health directorate.

## Author contributions

YKJ and ADM developed the study protocol, and YKJ collected the data. The first three authors analyzed the data, and EEM-L wrote the manuscript. All authors read and corrected the final 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.

## Publisher's note



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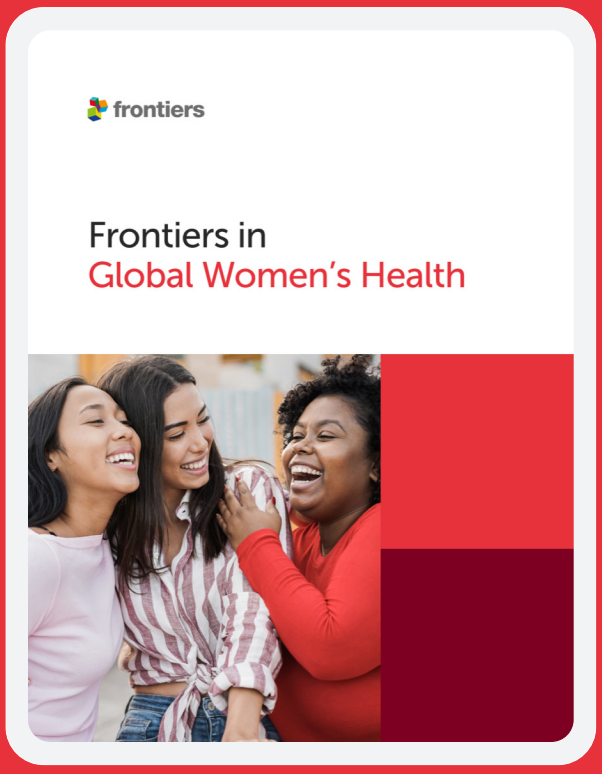


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