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HIV Pre-exposure Prophylaxis Uptake and Continuation Among Key Populations in Cameroon: Lessons Learned From the CHAMP Program

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Introduction: Pre-exposure prophylaxis (PrEP) is proven to be a highly effective HIV prevention method for key populations. However, its scale-up in resource-limited settings remains sub-optimal. This paper seeks to describe PrEP initiation and continuation among key populations in Cameroon.

Methodology: From June 2019 through October 2020, we collected routine program data on PrEP uptake and continuation among female sex workers (FSWs) and men who have sex with men (MSM) in the Continuum of prevention, care and treatment of HIV/AIDS with Most-at-risk Populations (CHAMP) program in Cameroon. PrEP was offered to clients who tested negative for HIV and were assessed to potentially benefit from PrEP. Using survival analysis, we identified factors associated with PrEP discontinuation over time with significance set at 5%.

Results: Overall, 27,750 clients were sensitized for PrEP of whom 3,138 persons were eligible to start PrEP and 1,409 (45%; FSW: 691 and MSM: 718) initiated PrEP. The PrEP continuation rate was 37% at 3 months, 28% at 6 months and 19% at 12 months. PrEP discontinuation was significantly higher among FSW than MSM [adjusted hazard ratio (aHR) 1.5 (95% CI: 1.2 to 1.9)] in Yaounde [aHR 1.5 (95% CI: 1.2 to 1.9)] and Bafoussam/Bertoua [aHR 3.1 (2.2–4.5)] relative to Douala. Discontinuation was lower among those with moderate [aHR 0.3 (0.3–0.4)] or good adherence [aHR 0.4 (0.3–0.6)] compared with poor adherence (all $P < 0.001$).

Conclusion: Differentiated approaches to deliver PrEP, create demand, and provide more intensive support for adherence and continuation may support scale-up of PrEP in Cameroon for equitable and prolonged impact on HIV prevention.

INTRODUCTION

Despite outstanding progress in reducing new HIV infections and related deaths, HIV incidence remains high globally, with up to 1.7 million people newly infected annually.[1,2] Female sex workers (FSWs) and men who have sex with men (MSM) are disproportionately more vulnerable in acquiring and transmitting HIV as compared with the broader adult population.[3] In West and Central Africa, which accounts for one-fifth of new HIV infections globally, 40% of new infections are among key population groups.[4] Specifically in Cameroon, HIV prevalence among FSW and MSM was 24.3% and 20.6%, respectively, in 2019 compared with 3.1% in the general population.[5] Increasing coverage of evidence-based interventions among key populations is integral to achieving HIV epidemic control in Cameroon and the broader region.[6]

A growing body of evidence has demonstrated that HIV pre-exposure prophylaxis (PrEP) can be a highly effective biomedical HIV prevention method.[7–11] Furthermore, emerging studies have shown that the widespread offer of PrEP through affordable and flexible service delivery can meaningfully reduce population-level HIV incidence.[12,13] The World Health Organization (WHO) has recommended PrEP for persons at high risk of HIV as part of a combination HIV prevention strategy.[10,14,15] Critical questions remain regarding local relevance for health problem priority, optimal demand generation strategies, how to address supply and supply chain issues, and how to best provide adequate support to PrEP clients for effective and consistent use, especially in countries across sub-Saharan Africa.[16–18]

Through the United States Agency for International Development (USAID), the President's Emergency Plan for AIDS Relief (PEPFAR) has played a pivotal role in supporting the provision of PrEP to FSWs, MSM, serodiscordant couples, and people who inject drugs across several countries of sub-Saharan Africa.[17] With support from PEPFAR, PrEP services were made available for FSW and MSM in Cameroon starting in June 2019, as a part of the Continuum of prevention, care, and treatment of HIV/AIDS with Most-at-risk Populations (CHAMP) program. This paper seeks to describe PrEP initiation and continuation among FSM and MSM in Cameroon using routine programmatic data.

MATERIALS AND METHODS

Study Setting, Period, and Population

This paper reports on routine programmatic data from the USAID/PEPFAR-funded CHAMP program led by CARE United States and CARE Cameroon from June 28, 2019, through October 31, 2020, among key populations in Cameroon.[19,20] CHAMP provides HIV prevention, testing, and linkage to treatment services to key populations, notably FSW and their clients, MSM, transgender people, and people who inject drugs (PWIDs). The CHAMP program offered PrEP services to FSW and MSM from June 2019, initially in Cameroon's 2 largest cities of Yaoundé and Douala and expanding to Bafoussam and Bertoua in August 2020. Based on the program criteria, clients were considered FSW if they were assigned female sex at birth and reported exchanging sex for money in the previous 12 months. Clients were considered MSM if they were assigned male sex at birth and reported anal sex with a man within the previous 12 months. PrEP eligibility and procedures were informed by an implementation guide developed by the national PrEP task force. FSW and MSM reached by the CHAMP program who were aged at least 21 years and who were not known to be living with HIV were able to be considered for PrEP. This age restriction was part of the national governance for PrEP implementation which permitted only clients with the autonomy to give consent (21 years and above) to be initiated on PrEP. In addition, both groups were subject to further screening criteria described below.

Procedures

During routine activities in community and online outreach, peer mobilizers sensitized FSW and MSM on PrEP services available at the drop-in centers (DICs) of the participating community-based organization (CBO) partners. The client was given a brief introduction to the benefits of PrEP and advised to go to DICs for detailed information. Individuals interested in PrEP were referred to nurses or other health personnel for counseling on the rationale for its use, benefits, inconveniences, the detailed procedures for uptake/follow-up, and the importance of adherence. In addition to clients referred from outreach activities, staff also provided PrEP counseling and screening to clients who were reached during routine testing services at the DICs and who subsequently tested HIV negative. At the first level of screening, clients were assessed using a standardized questionnaire based on sexual behavior in the previous 6 months to identify clients who may benefit from PrEP. Clients were considered potential candidates for PrEP if they reported any condomless vaginal or anal sex in the past 6 months, any recent STIs, recently being prescribed postexposure prophylaxis, or an ongoing sexual relationship with a partner living with HIV, especially if not on treatment or the partner's viral load is unsuppressed/unknown.

Potential candidates for PrEP underwent further clinical screening and biomedical testing. First, a nurse or another trained health personnel assessed clients for recent exposure to HIV, based on reporting unprotected sex with someone living with HIV and not on treatment in the previous month or reporting HIV-like symptoms in the previous 3 days. If recent exposure to HIV was suspected, PrEP initiation was deferred until the individual could be retested for HIV after waiting one more month. Furthermore, clients referred from community outreach reaching the DIC without knowing their HIV serological status or clients whose previous HIV test dated more than 3 months were tested for HIV while being assessed for PrEP eligibility. HIV testing was performed using dual rapid diagnostic tests on venous blood: first testing with Alere

Determine HIV-1/2 antigen/antibody combo test (Alere, Waltham, MA) and, if positive, follow-up testing with OraQuick ADVANCE Rapid HIV-1/2 antibody test (OraSure Technologies, Bethlehem, PA). Individuals who tested HIV positive were linked to HIV care through standard operating procedures.

After confirmation of the HIV-negative status, individuals received further testing and clinical screening for other STIs and hepatitis B (see Figure 1, Supplemental Digital Content, http://links.lww.com/QAI/B902); appropriate treatment and/or referral was provided as needed. According to the implementation guide, individuals with serum creatinine clearance less than 60 mL/min were deemed not eligible for PrEP. Individuals meeting the above PrEP eligibility criteria and without any recent exposure to HIV provided informed consent and then were immediately initiated on PrEP. During December 2019 and January 2020, modified procedures incorporated a 1 month delay before initiation, as mandated by the government directive at the time. The PrEP drugs received by clients were free of charge and included tenofovir disoproxil fumarate (TDF) and emtricitabine (FTC) at 300 mg and 200 mg, respectively, and taken 1 tablet orally per day under the daily PrEP regimen.

For the first 3 months after initiation, 30 days of PrEP drugs were dispensed at each monthly visit. Seven to 10 days after initiation, a nurse phoned clients to enquire about side effects, adherence, and offer support. PrEP clients were also required to come back to the DICs for monthly follow-up tests, including an HIV test, urine tests, and STI screening (see Figure 1, Supplemental Digital Content, http://links.lww.com/QAI/B902). During follow-up visits PrEP clients were asked about side effects, adherence to PrEP, and potential recent exposure to HIV and other STIs. Adherence was assessed by 3 questions on self-reported adherence in the past 30 days which was graded by the administering health personnel (see Table 1, Supplemental Digital Content, http://links.lww.com/QAI/B902). Any client assessed to have a poor or moderate adherence level received adherence counseling from a nurse or another health personnel. Any reported undesired drug side effect was monitored closely and appropriately managed depending on the severity. After 3 months, PrEP clients judged to be adherent were entitled to multimonth dispensation at 3-month intervals.

If a client elected or was mandated by a health professional to stop PrEP during a follow-up visit (ie, official interruption), then the client and attending health personnel cocompleted the reason for stopping PrEP in a short exit survey.

Key Outcome Measures

The mobilization rate was calculated as a proportion of clients sensitized for PrEP who sought more information from staff at the DIC. PrEP uptake was calculated as a proportion of eligible individuals who initiated PrEP. PrEP continuation was defined as receiving a PrEP drug refill at 1, 2, 3, 6, 9, and 12 months after PrEP initiation. This accounted for both continuous use or interrupted use where PrEP was restarted by the end of the follow-up period. PrEP clients who initiated

PrEP for a shorter time than the specified period before the data collection end date were excluded from the various PrEP continuation calculations because there was insufficient follow-up time to measure continuation. For example, PrEP continuation at 3 months was based on clients who initiated PrEP at least 3 months prior, from June 28, 2019, to July 31, 2020.

Self-reported adherence measures were recategorized into 3 levels and assigned a numerical value from 0 to 2 standing for lowest to higher adherence, respectively (see Table 1, Supplemental Digital Content, http://links.lww.com/QAI/B902). In the regression analysis, a composite measure of overall adherence was used, derived by summing the 3 adherence measure scores to obtain a value from 0 to 6. If the client had attended more than one follow-up visit, the average overall adherence at previous visits was calculated. The average overall adherence was categorized as good (6), moderate (3–5), or poor (0–2) (see Table 1, Supplemental Digital Content, http://links.lww.com/QAI/B902).

PrEP discontinuation was defined based on the PrEP status at the data collection end date or last documented visit to account for people with PrEP interruptions who restarted PrEP. PrEP discontinuation was classified as officially stopping PrEP without restarting PrEP during the data collection period or nonattendance at their most recent drug refill appointment. For clients with an uncertain PrEP discontinuation date, the date of last missed drug refill appointment was used.

Reasons for PrEP interruption were grouped by doctor-linked and client-linked decisions, and categories are not mutually exclusive. For clients who stopped and reinitiated PrEP more than once, the reason shown is based on the first official interruption. Commonly reported other reasons for PrEP interruption listed in free text were reclassified into separate categories.

Data Management and Analysis

For each client mobilized for PrEP, the program maintained a paper-based clinical file with a unique identifying code. Each file contained routine data involving sociodemographic characteristics, results of behavioral and clinical assessments and laboratory testing, informed consent, as well as PrEP initiation and follow-up information. Data on PrEP sensitization through PrEP initiation were collected from routine program systems, whereas detailed data on PrEP continuation were extracted from clients' PrEP initiation and follow-up clinical file.

Data were entered in an Excel spreadsheet and analyzed using IBM SPSS Statistics for Windows, Version 23.0 (IBM Corporation, Armonk, NY). Count data were presented as absolute and relative frequencies in tables and figures. Contingency tables and graphs were also developed, and PrEP uptake was compared concerning key population groups (FSW and MSM) using the χ^2 test.

Cox proportional hazard regression was used to explore factors associated with time to PrEP discontinuation. Covariates considered in the bivariate Cox regression were key population group, city, age group, self-reported moderate-to-

severe drug side effects, if completed adherence assessment at least once, and average adherence level. A multivariate Cox regression model was developed to estimate adjusted hazard ratios (aHRs) adjusting for all factors significant in the bivariate analysis as well as age with type I error cut-off for all tests set at 5%. In the Cox models, follow-up time commenced at PrEP initiation. Clients without discontinuation were censored 12 months after PrEP initiation or at the end of the study period.

Ethical Consideration

Participation was voluntary, with informed consent signed for all participants before clinical evaluation and starting PrEP with the ability to discontinue at any time. The CHAMP program also received ethical approval from the Cameroon National Ethics Committee and administrative authorization from the Cameroonian Ministry of Public Health.

RESULTS

PrEP Cascade by the Key Population Group

As shown on Figure 2, Supplemental Digital Content, http://links.lww.com/QAI/B902, 27,750 (FSW: 13,738 and MSM: 14,012) clients were sensitized for PrEP. Of those, 13,305 (48%) clients were mobilized (FSW: 66% and MSM: 30%; $P < 0.001$). Among those mobilized, 3851 (29%) were considered as potential candidates for PrEP based on their sexual behavior in the past 6 months and underwent clinical PrEP eligibility assessments (FSW: 15%, 1382/9081 and MSM: 58%, 2469/4224; $P < 0.001$). Among those who were clinically assessed, 3138 (81%) were eligible to start PrEP (FSW: 1128 and MSM: 2010). In total, 1409 (45% of those eligible) clients were initiated on PrEP as of October 31, 2020 (FSW: 61%, 691/1128 and MSM: 36%, 718/2010; $P < 0.001$).

The median age of clients who initiated PrEP was 27 years (IQR: 23–33). Most of the clients who initiated PrEP were enrolled from the cities of Douala (50%) and Yaounde (42%) whereas of Bafoussam and Bertoua, each enrolled 4% of the clients. The follow-up period of the clients enrolled on PrEP ranged from 1 to 12 months during which 62% of the clients had at least one adherence assessment. Among those, on average, 19% had good adherence, 63% moderate adherence, and 18% poor adherence.

PrEP Initiation Over Time

Following an initial high of 74 enrollments in the second month of implementation, PrEP enrolments declined to a low of 5 enrollments in December 2019, when 1-month delayed initiation was introduced where all eligible clients were required to wait 1 month and retest for HIV before starting PrEP. In response, the program implemented a plan to strengthen communication strategies for PrEP and systematically sensitize and offer PrEP services to all persons reached by the CHAMP program who tested negative. In addition, stakeholders conducted advocacy to reinstate same-day initiation of PrEP for clients with no recent exposure to HIV which led to same-day PrEP initiation being reinstated in

February 2020. These refinements to implementation strategies, coupled with the expansion of PrEP to other program sites, led to significant increases in monthly new PrEP enrolments, reaching 313 in September 2020. The program experienced a steep drop in PrEP initiation in October 2020 because of a widespread drug stockout that occurred during that month (see Figure 3, Supplemental Digital Content, http://links.lww.com/QAI/B902).

PrEP Continuation

After initiation, 67% (902/1357) of clients returned for PrEP refill at 1 month, 40% (442/1115) at 2 months, 37% (289/783) at 3 months, 28% (137/491) at 6 months, 21% (63/294) at 9 months, and 19% (42/221) at 12 months (see Figure 4, Supplemental Digital Content, http://links.lww.com/QAI/B902).

PrEP continuation varied across age groups, key population groups, cities, the experience of moderate or severe drug side effects, and self-reported adherence during the previous visit. Older clients aged 50 years and older had high continuation than younger age groups; 4 (40%) of the older clients eligible for follow-up came back for PrEP drug refill after 12 months compared with 14 (19%) and 24 (18%) of clients aged 30–49 years and 21–29 years, respectively. FSW had lower continuation rates, with 5% of those eligible for drug refills after 12 months compared with 27% of MSM. Clients whose self-reported adherence levels were not assessed or had poorly reported adherence levels during their previous visit had lower PrEP continuation rates than those who had self-reported good or moderate adherence levels (see Table 2, Supplemental Digital Content, http://links.lww.com/QAI/B902).

In the adjusted Cox regression model (see Table 3, Supplemental Digital Content, http://links.lww.com/QAI/B902), FSW were 1.5 times (95% CI: 1.2 to 1.9) more likely to discontinue PrEP over time as compared with MSM ($P < 0.001$). Clients from Yaoundé and Bafoussam/Bertoua were 1.5 (95% CI: 1.2 to 1.8) and 3.1 (95% CI: 2.2 to 4.5) times more likely to discontinue PrEP over time as compared with clients from Douala ($P < 0.001$). Clients with average adherence levels rated good [aHR: 0.4 (95% CI: 0.3 to 0.6)] or moderate [aHR: 0.3 (0.3–0.4)] had a lower likelihood of discontinuing PrEP as compared with those with poor average adherence levels ($P < 0.001$). In unadjusted analysis, clients who had not conducted at least one adherence assessment during their follow-up visits were 8.2 times (95% CI: 6.9 to 9.6) more likely to discontinue PrEP compared with those who did at least one adherence assessment ($P < 0.001$).

A total of 390 clients officially stopped PrEP during the reporting period with a documented reason for interruption. The most frequent reasons linked to doctors' decision to stop PrEP officially included multiple missed appointments (19%), drug stockout or expired drugs (17%), nonadherence (11%), severe undesired side effects (3%), seroconversion (2%), and allergic reaction (2%). The most frequent reasons linked to clients' decision to officially stop PrEP included drug side effects (14%), relocation or geographical mobility (11%), no longer at

substantial risk (11%), no reason/loss of incentive to continue (8%), and many follow-up visits (5%) (see Figure 5, Supplemental Digital Content, http://links.lww.com/QAI/B902). Other reasons listed included continuous drug intake (n = 13), refusal by family member (n = 4), on other drugs/therapy (n = 2), stigmatization (n = 1), and insufficient service package (n = 1). Among those who officially interrupted PrEP, 76/390 (19%) reinitiated PrEP later in the follow-up period.

DISCUSSION

Using routine programmatic data, this article provides insights into HIV prevention services for key populations in Cameroon. The coverage of PrEP remains modest in Cameroon, although consistent with other places when first introduced.[10,21–25] Nonetheless, in places such as South Africa and Kenya, the uptake has been exponential in the years after introduction, thus highlighting the potential impact of PrEP.[26] We observed differences in PrEP engagement between FSW and MSM and visualized the impact of changes in service procedures. In particular, these findings highlight the need for implementation strategies to create demand for PrEP and the value of tailored and differentiated approaches for PrEP delivery. These data suggest that strategies to support PrEP adherence and continuation may be most critical in the first 2 months of PrEP initiation.

We observed notable drop-offs in PrEP engagement in the early stages of the cascade before starting PrEP. Although program adaptations to simplify messaging and enable same-day PrEP initiation positively impacted PrEP uptake, this study demonstrated substantial gaps in interest and motivation to use PrEP.[27] This result could be related to the perception of sexual activity as low risk,[28,29] misinformation, and low consumer awareness of PrEP in Cameroon. Moreover, studies elsewhere have suggested that improving knowledge on the benefits of PrEP and promoting accurate perception of how they can benefit from PrEP can improve acceptance and subsequent uptake of PrEP.[30–33] Community-based and key population-led approaches, as used in CHAMP, are highly regarded for delivering accessible and acceptable HIV services to key population groups.[34] Thus, strengthening the role of trained peer mobilizers could play an integral role in raising awareness, providing tailored and relatable messaging, and serving as PrEP ambassadors.[25,35]

Mobilization, screening, and PrEP uptake differed between FSW and MSM, although the absolute number starting on PrEP was similar. Differences in mobilization may be related to where communities were first reached and the proximity and accessibility of the DIC. Beyond initial sensitization, making PrEP information, assessment and delivery more accessible through outreach or online services could increase uptake of PrEP for MSM in particular.[36,37] Greater investment in community-centered demand creation activities to promote broader awareness of PrEP and its benefits may also support PrEP uptake.[38–40] There is a need for further qualitative research to understand other differences in PrEP uptake between MSM and FSW. Identifying structural and procedural bottlenecks, which may include

age limitation,[41,42] multiple visits requirements, daily drug dosing regimen,[43] period until reaches maximum protection, and distance to DIC,[43] will enable appropriate adjustments to support PrEP uptake and continuation.

Research has shown that social stigmatization of PrEP is associated with the lack of interest among potential users and negatively impacts adherence of PrEP users.[44] Language used in PrEP communication and eligibility assessments focusing on "at-risk" or "high-risk" individuals reinforces negative and stigmatizing stereotypes that these individuals are sexually irresponsible or promiscuous.[44–46] Notwithstanding that this PrEP program was implemented through key population-led CBOs to promote a nonstigmatizing environment, social stigma and language used in PrEP communication and assessments may have led to under-reporting of sexual behaviors and could have negatively influenced PrEP interest and uptake. PrEP messaging that preferences positive language focusing on personal agency and taking responsibility for one's health instead of risk may help to mitigate PrEP stigma and promote interest and uptake of PrEP.[44,47]

FSW were significantly less likely to continue PrEP than MSM. In other work, high geographic mobility among FSW, burden of daily pill taking, other sexual and reproductive health needs not met by PrEP, and stigma has been reported as common reasons for discontinuing PrEP.[48–51] Studying optimal delivery strategies given the Cameroonian context for different key populations is critical to improve the understanding of these reasons and structural constraints for PrEP rejection and discontinuation and develop context-specific strategies to improve PrEP uptake and continuation.

The drop-off in PrEP continuation was highest in the first 2 months, consistent with studies among key population groups in several settings, including in Kenya and Thailand.[22,24,52] Unacceptable side effects were the most common reason cited by clients for stopping PrEP and associated with early discontinuation of PrEP in other settings.[10,53] Increased emphasis on managing side effects in counseling and support may improve PrEP continuation, particularly at 1 month. The findings presented here further demonstrate the role of adherence counseling and assessment, and consistent use of adherence assessment during follow-up visits could identify people who would benefit from more rigorous adherence counseling to prolong PrEP continuation. Drug stockouts were another commonly cited reason for interrupting PrEP and accounted for a severe drop-off in PrEP initiation in October 2020. In Uganda, anticipated stockouts have also been reported as a barrier to PrEP uptake.[54] If not addressed, stockouts will continue to act as a primary barrier to PrEP scale-up in Cameroon. Sustainable funding, effective supply chain management, and inventory monitoring need to be strengthened to support effective PrEP implementation. In addition, the availability of event-driven (ED) PrEP may help to extend supply and prevention coverage where stocks are limited.

Extrapolating from experiences in the provision of HIV treatment, differentiated delivery of PrEP may support both PrEP initiation and continuation.[55] Given barriers to continuation relating to multiple follow-up visits and geographic

mobility, providing client-centered opportunities for telehealth/virtual counseling, HIV self-testing, multimonth dispensing (MMD), and community collection of samples for various follow-up laboratory tests may improve convenience and reduce indirect costs.[56–59] Many programs have successfully accelerated adopting these strategies to limit the impact of COVID-19–related interruptions to service access and delivery.[60,61] Learnings from community dispensation and sample collection for antiretroviral therapy, shown to improve treatment engagement in low-income and middle-income countries significantly, can be applied to PrEP.[62] Furthermore, diversifying PrEP delivery to include multiple PrEP modalities may support PrEP scale-up by appealing to different needs and preferences.

Although ED-PrEP was introduced as an option late in the implementation period and data are insufficient for analysis, there has been a high demand for ED-PrEP among men in some settings.[63,64] However, messaging for ED-PrEP needs to be carefully constructed to avoid confusion and misuse.[65] Emerging options for long-acting injectables[66,67] as well as a monthly dapivirine vaginal ring[68] may also provide acceptable and effective alternatives to people burdened by daily pill-taking, who struggle with daily adherence, or who are unable to attend frequent refill appointments. Finally, options for integrated delivery and multipurpose PrEP and hormonal contraception technologies may improve the uptake of PrEP among FSW.[69,70]

Consistent with the implementation guide, PrEP implementation did not explicitly focus on serving transgender women—although transgender women were not excluded from starting PrEP, and young key population groups younger than 21 years of age were not eligible for PrEP. The previous work in Cameroon has demonstrated the need for expanded HIV prevention options among transgender women and young FSW and MSM.[71,72] Although the present findings can inform PrEP scale-up for younger key populations and transgender women, they should be complemented by evaluation specific to those communities to ensure that their needs are appropriately met.

CONCLUSIONS

These results highlight the feasibility and effectiveness of PrEP delivery through community-based and key population-led services for MSM and FSW in Cameroon. However, coverage remains suboptimal given the consistent high HIV and STI prevalence among key populations in Cameroon. Working closely with community groups to scale-up services focused on raising PrEP awareness and knowledge of benefits may better normalize PrEP use as an effective means of HIV prevention. Moreover, government and donor support for expanding PrEP access to other key populations and enabling differentiated approaches to PrEP delivery may further engender equitable and prolonged access to HIV prevention services. Ultimately, for PrEP to achieve its potential as an HIV prevention tool facilitating epidemic control, implementers should look beyond standard program targets and be more responsive to key population community and client needs.

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