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# Factors Associated with Retention in HIV Prevention and Treatment Clinical Services Among Female Sex Workers Enrolled in a Sex Workers' Outreach Program (SWOP) in Nairobi, Kenya

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## Abstract

Female sex workers (FSWs) are among the key populations (KP) prioritized for comprehensive HIV programming in Kenya. Retention in the program is critical for prevention of HIV acquisition and transmission among FSWs and their sexual partners. We conducted a retrospective cohort analysis of data collected from FSWs enrolled between October 2016 and September 2017 at seven drop-in centers (DICs) in Nairobi, Kenya, to assess factors associated with retention in HIV prevention and treatment services. We found a 3- and 12- month retention of 24% and 17%, respectively. FSWs aged 20–34 years old were less likely to be retained compared to those 50 years or older. FSWs enrolled in a DIC located in their sub-county of residence or reporting ever using HIV pre- or post-exposure prophylaxis were more likely to be retained. Engaging young FSWs to identify strategies to enhance retention should be prioritized. Strengthening the referral

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**Code Availability** Not applicable.

Declarations

**Ethical Approval** Ethical approval was obtained for protocol HP-00083531 "Evaluation of HIV Prevention, Care and Treatment Services in Kisii, Migori, and Nairobi Counties in Kenya." This protocol was approved by CDC, University of Maryland, Baltimore IRB and Kenya local IRB, African Medical and Research Foundation (AMREF).

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system across DICs may provide opportunities to enhance retention in facilities closer to their residence. Implementation research is needed to gain an additional understanding of the health services needs and preferences among FSWs to optimize retention for this population.

### Keywords

Female sex workers; Retention; Key populations

## Background

Kenya has a significant population of female sex workers (FSWs), estimated at 167,940, who are disproportionately affected by HIV compared to the general population [1, 2]. Key populations (KPs), including FSWs, and their sexual partners account for 62% of new adult HIV infections globally, and 28% in Eastern and Southern Africa [3]. In addition, FSWs were 13-times more likely to have HIV-infections compared to other women of reproductive age [4]. In Kenya, approximately 33% of new HIV infections are attributable to KPs, with FSWs and their clients contributing 14.1% [5]. The HIV prevalence among FSWs (45.1%) is about six times that of women in the general population (7.2%) [6]. Furthermore, FSWs have an increased risk of disengaging from HIV services due to structural, health system and individual barriers, including HIV-related stigma and discrimination, high mobility, and mental health conditions [7].

The World Health Organization (WHO) recommends the implementation of comprehensive health sector interventions with strategies fostering an enabling environment for KP [2].

In 2009, the Ministry of Health (MOH) in Kenya, through the National AIDS and STI Control Program (NASCOP), launched a program focused on KPs, establishing national guidelines that recommended implementing a combination of behavioral, structural, and biomedical interventions [8]. Under these guidelines, HIV testing is recommended every three months with routine follow-ups for education, distribution of condoms, pre-exposure prophylaxis (PrEP) eligibility/risk assessment and monitoring, and STI screening and treatment [8, 9]. Regular and repeated HIV testing offered to FSWs contributes to early HIV case identification and linkage to treatment, and it reduces HIV-related mortality and morbidity. It also prevents further transmission of HIV [7, 10]. The benefit of HIV biomedical prevention interventions such as PrEP, targeting high-risk FSWs who test HIV-negative, is highly dependent on the user's adherence [11], necessitating close longitudinal monitoring.

Despite NASCOP's recommendation on routine follow ups and quarterly retesting of HIV, limited data is available on retaining FSWs in HIV prevention and treatment programs. Due to the critical importance of retention in the continuum of care for both HIV-positive and -negative FSWs, we examined the factors associated with retention in HIV preventive and treatment services among FSWs across seven KP-dedicated clinics in Nairobi, Kenya.

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## Methods

### Study Design and Setting

We conducted a retrospective cohort analysis of data from FSWs enrolled at the seven Sex Workers Outreach Program (SWOP) Drop-in Centers (DICs) located in Nairobi, the capital city of Kenya and one of Kenya's 47 counties. The seven SWOP DICs are located in different sub-counties within Nairobi County and are strategically located at the center of mapped hotspots (areas with the highest concentration of KPs). Location of the DIC is advised by the KP community through a participatory process aimed at optimizing access to KP friendly services. SWOP DICs are supported by the University of Manitoba (UoM) and the University of Maryland, Baltimore (UMB) in collaboration with Nairobi Metropolitan Services, Directorate of Health (DoH). The DoH and NASCOP oversaw program implementation.

### Population

All FSWs aged 18 years and over who enrolled in the program between October 2016 and September 2017 were included. In Kenya, sex workers are defined as adults aged 18 years and older who receive money or goods in exchange for sexual services, either regularly or occasionally [8]; therefore, those aged under 18 years in sex work are not enrolled in the program but are linked to programs supporting adolescent girls. FSWs who transferred-in from other sex workers' programs within the specified period were excluded from this analysis.

### Sampling

We conducted a systematic sampling of 3774 FSWs newly enrolled at the seven DICs between October 2016 and September 2017. Following the Kenya Health Quality Improvement Framework, a sample size table was used to determine the number of clients' charts to be sampled at each DIC, based on its population size, to achieve a 95% representative sample [12]. A sampling frame was established and the *nth* record for chart abstraction determined by dividing the total number of clients enrolled in each DIC by the site's calculated sample size [12], ranging from 3 to 6 for this study.

### Interventions

The DICs provide comprehensive HIV prevention and treatment services to KPs, including men who have sex with men (MSM), transgender women (TG), and FSWs. The program implements a hotspots-based peer-led model for clinical services delivery at the DICs and community locations through integrated clinical outreaches at KP hotspots such as streets, bars (with and without lodging), and brothels. The clinical services offered include biomedical and behavioral interventions (Table 1). The core biomedical interventions include HIV testing services (HTS), syndromic screening for identifying and managing STIs, HIV care and treatment, condoms and lubricant distribution, and screening for and management of tuberculosis (TB), gender-based violence (GBV), and alcohol and drug use. The behavioral interventions include peer education, tailored communication for KPs, and risk reduction counselling. Structural interventions, such as advocacy and community

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outreach to reduce stigma and discrimination using a human rights-based approach, are also provided.

The program employs program officers, clinicians, lay counsellors, and peer educators who provide comprehensive preventive and treatment services both at the facility and community levels based on client needs. Peer leaders are identified through a participatory community approach, trained on peer mobilization and education using a standardized and approved NASCOP – MOH curriculum, and conduct their activities through outreach to their peers. Under the program officer's supervision, the peer educator maintains regular contact (at least once a month) with their assigned FSW peer network enrolled in the program, offers risk-reduction counselling, and facilitates linkage to clinical and non-clinical services (e.g., legal support, economic empowerment resources). These activities are tracked using a peer calendar, which is submitted monthly for review by the program officers.

The continuum of services offered upon program enrollment include risk and vulnerability screening, HTS, syndromic STI screening and management, antiretroviral treatment (ART) initiation among HIV-positive clients, and individualized preventive interventions, such as PrEP, based on FSWs' risk profile. All services provided are documented in MOH-prescribed enrollment forms at enrollment and clinic visit forms at subsequent/follow-up visits. HIV-negative FSWs are encouraged to screen for HIV every three months as per national guidelines.

## Data Sources and Data Collection

Data for this evaluation was abstracted from the MOH-approved enrollment and clinic visit forms available in both electronic and paper-based formats. Based on clients' date of enrollment, baseline information was abstracted from clients' enrollment forms, and information on follow up clinical services was abstracted from the clinic visit forms for the first 12 months from enrollment. We engaged and trained data clerks to abstract the data using tablets. They populated this information into the Kobo toolbox [13], an electronic data collection tool, with data validation incorporated to monitor data capture completeness and manage logic checks. The de-identified data was downloaded in CSV file and used for data analysis.

## Outcomes

Outcomes of interest included short-term (3-month) defined as at least one visit between two and four months after enrollment, and long-term (12-month) retention was defined as two or more clinical revisits, including the last appointment within 10 to 12 months of follow-up. Our definition of retention was informed by NASCOP's recommendation for quarterly interaction with KPs for provisioning key services, including HIV testing and STI screening [8].

## Independent Variables

We included socio-demographic variables (age, education, marital status, number of children, residence area, DIC location), health-related information (HIV infection and care status, pregnancy status, contraception use, self-reported STI, use of PrEP or post-exposure

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prophylaxis [PEP], history of GBV), and behavioral variables (number of years in sex work, type of sex work, number of sex acts per week, use of condoms, use of alcohol and recreational drugs). Type of sex work was defined as venue-based (bars, casino, lodging or guesthouse, massage parlors, sex den /brothels) or non-venue based (open space such as streets).

### Statistical Methods

Descriptive statistics were reported for all collected variables. Continuous variables were summarized using medians and inter-quartile range. Categorical variables were summarized using proportions. Chi square was used to compare groups. Bivariate and multivariate logistic regression models were performed to study the association between each outcome and independent variables. We used Generalized Estimating Equations (GEE) to control for clustering by DICs. For the final models, FSWs with unknown HIV statuses were set as missing HIV status. Data was analyzed using SAS 9.4 (Carey, NC).

### Ethics

Kenyatta National Hospital, University of Nairobi and the Human Research Ethics Committee at the University of Maryland, Baltimore approved this evaluation. This project was also reviewed in accordance with the US Centers for Disease Control and Prevention (CDC) human research protection procedures and was determined to be research, but CDC investigators did not interact with human subjects or have access to identifiable data or specimens for research purposes.

## Results

### Baseline Characteristics

Of the 899 sampled FSWs drawn from the seven DICs, 774 (86.1%) were HIV negative, 78 (8.7%) were HIV positive (44 known and 34 newly diagnosed at enrollment). HIV testing information was missing for 47 (5.2%) at the time of enrollment. Of the 78 identified to be living with HIV at enrollment, 11 (14.1%) were not enrolled in treatment, while 35 (44.9%) and 32 (41%) were enrolled at DIC and non DIC, respectively.

At the time of enrollment, the majority (68.3%) were aged between 20 and 34 years old, 58% were single, and 52% had only completed primary school. The median age at enrollment was 30 (IQR 24–35) years old. Overall, 5% had used PrEP within the review period. Two percent also reported having experienced GBV in the three months prior to enrollment. Fifty-eight percent had 2–4 years working as sex workers, and 88% were venue-based FSWs. While 90% of FSWs reported using a condom during their last sexual encounter, their consistent use of condoms varied at 75.7% and 77.2% for regular and casual (non-regular) clients, respectively, and 32.6% with a boyfriend. A total of 225 (25%) reported using alcohol and recreational drugs while 321 (35.7%) reported never having sex under the influence of alcohol (Table 2).

Compared to HIV-negative women, HIV-positive FSW were older (median 34 [IQR 29–41] vs 30 [IQR 23–35]), less educated (26.9% vs. 15.4% had less than primary education), more

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divorced/separated (41.0% vs. 36.8%), had been on sex work for longer (53.8% vs. 24.7% more than four years), and reported more GBV (5.1% vs. 1.9%). Their condom use at last sexual encounter were similar in both groups (91.0% vs. 91.1%); however, HIV-positive FSW have a higher frequency of condom use with their boyfriends (52.4% vs. 21.4% reporting always) (Table 2).

## Retention

Overall, 860 (96%) of the sampled enrollees, had at least one clinical revisit, with a median of 29 (inter quartile range [IQR] 9–92) days to the first visit after enrollment; however, only 212 (24%) of the sampled FSWs made a second visit to the clinic between 2 and 4 months after enrollment (short-term retention), and 155 (17%) attended at least two visits after enrollment, with the last appointment between 10 and 12 months after enrollment (long-term retention). Retention differed by HIV status; short-term retention was 14.1% for HIV-positive and 23.4% for HIV-negative ($p = 0.062$), while long-term retention was 28.2% for HIV-positive FSW and 15.9% for HIV-negative ($p = 0.005$).

Short-term retention differed by DIC ($p < 0.001$); therefore, further analysis was adjusted for clustering by DICs to avoid confounding. The significant factors associated with short-term retention included duration in sex work, sex worker residence in relation to DIC location, type of sex work venue, and practice of sex work under alcohol and drug influence. FSWs working for more than four years at enrollment, had twice the odds of being retained compared to those with less than two years of work (odds ratio [OR] 2.08, 95%, confidence interval [CI] 1.16–3.73). FSWs enrolled in a DIC located near their area of residence had nearly three times higher odds of being retained (OR 2.74, 95% CI 1.11–6.72) compared to those living in a sub-county outside the DIC of enrollment. FSWs working at a venue-based hotspot including bars, brothels, and massage parlors were less likely to be retained (OR 0.61, 95%, CI 0.38–0.97) than those working in streets or highways. Women who self-reported always having sex under the influence of alcohol were more likely to be retained (OR 1.79, 95%, CI 1.04–3.07) than those who never did. Similarly, FSWs who self-reported ever using recreational drugs, besides alcohol, were more likely to be retained (OR 1.42, 95%, CI 1.16–1.75). All these variables remained significant after controlling for other confounders (Table 3).

Due to the small number of HIV-positive clients in the cohort, further analysis was not stratified by HIV status. However, we also ran the logistic models after excluding HIV-positives from the cohort. No significant change in the direction of the association was observed across the included factors in the multivariate model. Nevertheless, education became a significant factor for this exclusively HIV-negative cohort, where educated FSWs were associated with lower odds of short-term retention. Additionally, residing in the same sub-county and use of recreational drugs lost significance in the multivariate model (Data not shown).

Long-term retention also differed by DIC ($p < 0.001$); therefore, further analysis was adjusted for clustering by DICs. FSWs who were HIV positive had twice the odds of being retained for one year in the program (OR 2.00, 95%, CI 1.09–3.64). FSWs aged 50 years or older had higher odds for retention in the first year in comparison to younger population

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20–34 years of age (Table 4). FSWs enrolled in a DIC located within their sub-county of residence had higher odds of being retained (OR 1.64, 95%, CI 1.11–2.41) compared to those enrolled outside their sub-county of residence. FSWs who self-reported, at enrollment, ever having an STI had 42% higher odds of retention (OR 1.42, 95%, CI 1.03–1.96). Similarly, those who had ever used PrEP or PEP had higher odds of retention within a year of enrollment (PrEP OR 4.76, 95%, CI 1.98–11.43, PEP OR 1.72, 95%CI 1.01–2.95) (Table 4). Women who were pregnant at enrollment were less likely to be retained at 12 months after enrollment (OR 0.33, 95CI% 0.11–0.94).

Similar to short-term retention, when restricting the analysis to only HIV-negative FSWs, no significant change in direction of the association was observed across the included factors in the multivariate model. However, only age at enrollment, ever having STI, and ever using PrEP or PEP remained significant in this model, potentially due to the smaller sample size (Data not shown).

## Discussion

In this study, we examined retention in HIV prevention and treatment program within a year of enrollment and assessed factors associated with short-term (2–4 months) and long-term (10–12 months) retention among FSWs in Nairobi, Kenya. Our findings suggest a low retention of FSWs in HIV prevention and treatment programs in Nairobi, Kenya. The study findings suggest that having been in sex work for more than four years at the time of enrollment in the program, enrolling in DICs located within the sub-county of FSWs' residences, and practicing sex work always under the influence of alcohol and/or other drugs were positively associated with early retention. In contrast, engaging in sex work at venue-based hotspots was associated with lower odds of being retained compared to non-venue-based hotspots. For long-term retention, being enrolled in a DIC located within the sub-county of FSWs' residences remained significantly associated with higher odds of retention. In addition, reporting no STI ever, and past use of PEP or PrEP was associated with higher odds of long-term retention. Conversely, young age (20–34) and pregnancy were factors associated with lower odds of retention. Nearly 9% of the sampled FSWs were living with HIV at the time of enrollment and being HIV positive was associated with higher odds of long-term retention.

Our findings on retention differed from the study conducted by Morales-Miranda et al. in Guatemala which reported retention at 12 months ranging from 7.7 to 42.7%. This difference may be explained by our different definitions of retention; we defined retention as one or more follow up visits within 12 months of the initial visit [14]. Using a similar definition would have increased our retention to 96%, highlighting the need for a standardized definition for retention in KP HIV programming.

We observed that engaging in sex work under the influence of alcohol and other drugs was also positively associated with short-term retention. Although speculative, we suspect that FSWs who reported high-risk behaviors such as drinking alcohol and using drugs may have received earlier, more intensive, and more frequent peer support contributing to the

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observed association. Further investigation is needed to understand better if the intensity of peer-support differed across individuals.

HIV-positive status was associated with better retention at 12 months. Our results differed from the Morales-Miranda et al. study that found that positive HIV diagnosis negatively impacted retention [14]. This difference may be attributed to the availability of treatment within the program in our study in contrast to referring HIV-positive women to clinical care unit for HIV care and treatment in the Guatemala study. The referral process may have increased the risk of being lost to follow up. Additionally, the difference in service delivery model, whereby we engaged peers as case managers to deliver ongoing support, counseling, and community follow-up to HIV-positive FSWs, may account for the observed association. Similar to Miranda-Morales et al., we found that sex work location, drug use, and level of education did not significantly impact long-term retention [14].

We observed that approximately 5% of the included population reported using PrEP at some point. Low uptake of PrEP among this high-risk population may be explained by the evaluation period, which coincided with the early phase of PrEP rollout in Kenya (PrEP demonstration project conducted in 3/7 DICs in 2015 and national rollout in 2017). Our study found that clients receiving PrEP were also more likely to be retained in the long-term. The association of PrEP usage with higher retention may be attributed to close monitoring of individuals on PrEP, which includes a follow up visit and PrEP refill at months 1 and 3 following PrEP initiation. Future studies should examine retention among HIV-negative FSWs after Kenya's roll-out and scale-up of PrEP use.

HIV positivity among our study population of new enrollees (8.7%) was more than two-fold higher than HIV prevalence among the adults in Nairobi County [15]. However, other studies have reported higher HIV prevalence among FSWs in Kenya, varying from 29.5 to 56.5% [16, 17]. Differences in the study population may explain these divergences; for example, in our evaluation, we included a sample of FSWs who sought health services voluntarily in a clinic, while other studies may recruit FSWs using different recruitment strategies, including respondent-driven sampling methods commonly used to reach marginalized populations that may not be accessing HIV services. Also, more than 85% of our included sample fell within the age groups between 18 and 39 years of age, this age group has a lower HIV prevalence than women aged (40–54 years of age) [18].

Limitations of this evaluation include our definition of retention, which was limited to DIC attendance and therefore may not have completely captured hotspots-based interactions between peer educators and their peers. However, clinical services including HTS provided during hotspots-based outreaches were updated in the clinical records. We may have further underestimated retention by missing data of FSWs who may have accessed HIV services at other DICs or in public health facilities. We were unable to examine factors associated with retention disaggregated by HIV status due to the small number of FSWs living with HIV in this cohort. The clinical and behavioral characteristics were self-reported by the FSWs, which may have introduced bias due to social desirability or recall bias [19]. We were also not able to qualitatively assess the structural and other barriers to retention.

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## Conclusion

In this evaluation, we found low short and long-term retention into HIV prevention and treatment for FSWs at DICs. Our findings identify specific individual factors associated with retention, suggesting an urgent need to design, implement, and evaluate client-centered interventions. We found that young FSWs were less likely to be retained at 12 months following enrollment. Engaging young FSWs to identify strategies to enhance retention should be prioritized. We also found that FSWs enrolled in a DIC located in a sub-county outside their residence were less likely to be retained. Strengthening the referral system across DICs may provide opportunities to enhance retention in facilities closer to their residence. Implementation research is needed to understand better the health services needs and preferences among FSWs to optimize retention towards controlling the HIV epidemic.

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## Data Availability

This data was collected for routine programming under PACT Endeleza. The data is officially owned by Ministry of Health, Republic of Kenya.

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**Table 1**

Description of the key population HIV prevention, treatment, and care services at the sex workers' outreach program in Nairobi, Kenya

| Component | Interventions | Service providers |
|---|---|---|
| Behavioral [a] | • Peer education | • Peer Educators |
| | • Targeted Information Education and Communication) | • Program officers |
| | • Promotion, demonstration and distribution condoms and water-based lubricants | |
| | • Risk assessment, risk reduction counselling & skills building | |
| Biomedical | • HIV testing [b] | • Counsellors |
| | • Screening & treatment of STI [c] | • Clinical/ Nursing officers |
| | • Screening & treatment of TB [c] | |
| | • Screening & treatment of GBV [c] | |
| | • ARV-related prevention (PrEP, PEP) [d] | |
| | • Alcohol and drug abuse screening [c] | |
| | • HIV care and treatment [d] | |
| | • Family planning & EC [d] | |
| | • Post abortion care [d] | |
| | • Cervical cancer screening [e] | |
| | • Mental health [d] | |
| | • Viral hepatitis screening, vaccination, treatment & care [d] | |
| Structural[a] | • Shaping policy and creating enabling environments | • Peer Educators |
| | • Reducing stigma and discrimination | • Program officers |
| | • Empowering the community, including ownership and leadership | • Community advocacy groups |
| | • Violence prevention and response | |

[a] Intervention provided continuously

[b] Intervention provided quarterly

[c] Intervention provided at every visit

[d] Intervention provided as per need

[e] Intervention provided annually

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**Table 2**

Baseline characteristics of a sample of female sex workers enrolled between October 2016 to September 2017 at the seven sex workers outreach program (SWOP) clinics in Nairobi, Kenya

| Characteristics | Total N = 899[a] n (%) | HIV positive N = 78 n (%) | HIV negative N = 774 n (%) |
|---|---|---|---|
| Age at enrollment (years) | | | |
| 18–19 | 34 (3.8) | 2 (2.6) | 32 (4.1) |
| 20–24 | 209 (23.2) | 4 (5.1) | 197 (25.4) |
| 25–29 | 204 (22.7) | 14 (17.9) | 179 (23.3) |
| 30–34 | 202 (22.4) | 21 (26.9) | 169 (21.8) |
| 35–39 | 123 (13.7) | 16 (20.5) | 102 (13.2) |
| 40–49 | 103 (11.5) | 18 (23.1) | 77 (9.9) |
| ≥ 50 | 24 (2.7) | 3 (3.9) | 18 (2.3) |
| Age at enrollment (median (IQR))(years) | 30 (34–35) | 34 (29–41) | 30 (23–35) |
| Highest level of education obtained | | | |
| Less than primary | 156 (17.3) | 21 (26.9) | 119 (15.4) |
| Primary | 469 (52.2) | 42 (53.9) | 405 (52.3) |
| Secondary | 223 (24.8) | 14 (17.9) | 202 (26.1) |
| Tertiary | 51 (5.7) | 1 (1.3) | 48 (6.2) |
| Marital status | | | |
| Divorced/separated | 323 (35.9) | 32 (41.0) | 285 (36.8) |
| Married | 31 (3.5) | 2 (2.6) | 29 (3.8) |
| Single | 520 (57.8) | 40 (51.3) | 439 (56.7) |
| Widowed | 25 (2.8) | 4 (5.1) | 21 (2.7) |
| SWOP Drop-in centers (DICs) | | | |
| City | 131 (14.6) | 10 (12.8) | 120 (15.5) |
| Embakasi | 132 (14.8) | 12 (15.4) | 112 (14.5) |
| Kawangware | 126 (14.0) | 11 (14.1) | 115 (14.9) |
| Korogocho | 137 (15.2) | 7 (9.0) | 129 (16.6) |
| Lang’ata | 137 (15.2) | 17 (21.8) | 117 (15.1) |
| Majengo | 110 (12.2) | 12 (15.4) | 64 (8.3) |

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| Characteristics | Total N = 899[a] n (%) | HIV positive N = 78 n (%) | HIV negative N = 774 n (%) |
|---|---|---|---|
| Thika Road | 126 (14.0) | 9 (11.5) | 117 (15.1) |
| DICS in same county of residence | 595 (66.2) | 55 (70.5) | 497 (64.2) |
| HIV care on enrollment [b] | | | |
| DICS | | 35 (44.9) | |
| Non-DICS | | 32 (41.0) | |
| Not enrolled | | 11 (14.1) | |
| Years in sex work | | | |
| Less than 2 | 131 (14.6) | 3 (3.9) | 121 (15.6) |
| 2–4 | 520 (57.8) | 33 (42.3) | 462 (59.7) |
| More than 4 | 248 (27.6) | 42 (53.8) | 191 (24.7) |
| Currently pregnant | 67 (7.5) | 10 (12.8) | 56 (7.2) |
| Number of children | | | |
| None | 137 (15.2) | 7 (9.0) | 123 (15.9) |
| 01-Feb | 544 (60.5) | 36 (46.1) | 481 (62.1) |
| 3 or more | 218 (24.3) | 35 (44.9) | 170 (22.0) |
| Use of contraceptives at time of enrollment | 702 (78.1) | 57 (73.1) | 607 (78.4) |
| Area mostly operate[c] | | | |
| Venue | 793 (88.2) | 69 (88.5) | 687 (88.8) |
| Non venue | 106 (11.8) | 9 (11.5) | 87 (11.2) |
| Average of sex acts per week | | | |
| ≤ 10 | 287 (31.9) | 22 (28.2) | 250 (32.3) |
| Oct-20 | 343 (38.2) | 22 (28.2) | 298 (38.5) |
| 21–40 | 242 (26.9) | 32 (41.0) | 203 (26.2) |
| > 40 | 27 (3.0) | 2 (2.6) | 23 (3.0) |
| STI ever | 408 (45.3) | 35 (44.9) | 349 (45.1) |
| Use of condom during last encounter | 813 (90.4) | 71 (91.0) | 705 (91.1) |
| Frequency of condom use with regular client | | | |
| Always | 656 (75.7) | 56 (74.7) | 567 (75.8) |
| Sometimes | 187 (21.5) | 17 (22.7) | 159 (21.3) |
| Never | 24 (2.8) | 2 (2.6) | 22 (2.9) |

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| Characteristics | Total N = 899[a] n (%) | HIV positive N = 78 n (%) | HIV negative N = 774 n (%) |
|---|---|---|---|
| Frequency of condom use with casual (non-regular) client | | | |
| Always | 669 (77.2) | 59 (78.7) | 578 (77.3) |
| Sometimes | 185 (21.3) | 16 (21.3) | 157 (21.0) |
| Never | 13 (1.5) | - | 12 (1.7) |
| Frequency of condom use with boyfriend | | | |
| Always | 202 (32.6) | 22 (52.4) | 172 (21.4) |
| Sometimes | 95 (15.4) | 8 (19.0) | 80 (14.6) |
| Never | 322 (52.0) | 12 (28.6) | 296 (54.1) |
| Sex under the influence of alcohol | | | |
| Always | 47 (5.2) | 5 (6.4) | 37 (4.8) |
| Most times | 70 (7.8) | 4(5.1) | 59 (7.6) |
| Sometimes | 461 (51.3) | 40 (51.3) | 408 (52.7) |
| Never | 321 (35.7) | 29 (37.2) | 270 (34.9) |
| Use of recreational drugs[d] | 225 (25.0) | 20 (25.6) | 194 (25.1) |
| Experienced GBV in the 3 months before SWOP Enrollment | 20 (2.2) | 4 (5.1) | 15 (1.9) |
| PrEP use ever | 47 (5.2) | 5 (6.4) | 42 (5.4) |
| PEP use ever | 44 (4.9) | - | 44 (5.7) |

[a] Includes FSW with HIV diagnosis positive, negative and unknown (n = 47)

[b] Among HIV positives

[c] Venues include bars with and without lodging, beach, casino, lodging or guesthouse, massage parlor, sex den brothels. Non-venue refers to street and highways

[d] Alcohol, Marijuana, Cigarettes and Khat

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**Table 3**

Factors associated with 3-month retention of a sample of female sex workers enrolled between October 2016 to September 2017 at the seven sex workers outreach program (SWOP) clinics in Nairobi, Kenya

| Variables | 3-month retention N = 899 | | | |
|---|---|---|---|---|
| | No N = 687 n(%) | Yes N = 212 n(%) | OR[b] (95% CI) | $OR_{adj}$[c] (95% CI) |
| HIV status at enrollment[a] | | | | |
| Negative | 593 (89.9) | 181 (94.3) | REF | |
| Positive | 67 (10.1) | 11 (5.7) | 0.54 (0.19–1.50) | |
| Age at enrollment (years) | | | | |
| ≥ 50 | 18 (2.6) | 6 (2.8) | REF | |
| 18–19 | 28 (4.1) | 6 (2.8) | 0.64 (0.20–2.07) | |
| 20–24 | 167 (24.3) | 42 (19.8) | 0.75 (0.29–1.98) | |
| 25–29 | 157 (22.8) | 47 (22.2) | 0.90 (0.47–1.70) | |
| 30–34 | 153 (22.3) | 49 (23.1) | 0.96 (0.41–2.23) | |
| 35–39 | 91 (13.3) | 32 (15.1) | 1.05 (0.42–2.67) | |
| 40–49 | 73 (10.6) | 30 (14.2) | 1.23 (0.42–3.62) | |
| Duration of sex work (years) | | | | |
| Less 2 | 112 (16.3) | 19 (9.0) | REF | REF |
| 02-Apr | 398 (57.9) | 122 (57.5) | 1.81 (0.90–3.63) | 1.72 (0.89–3.34) |
| More than 4 | 177 (25.8) | 71 (33.5) | 2.36 (1.38–4.05) | 2.08 (1.16–3.73) |
| Marital status | | | | |
| Married | 25 (3.6) | 6 (2.8) | REF | |
| Divorced/separated | 261 (38.0) | 62 (29.2) | 0.99 (0.33–2.99) | |
| Single | 381 (55.5) | 139 (65.6) | 1.52 (0.45–5.11) | |
| Widowed | 20 (2.9) | 5 (2.4) | 1.04 (0.29–3.70) | |
| Education | | | | |
| Less than completed Primary | 109 (15.9) | 47 (22.2) | REF | |
| Completed Primary | 368 (53.6) | 101 (47.6) | 0.64 (0.39–1.04) | |
| Completed Secondary | 170 (24.7) | 53 (25.0) | 0.72 (0.43–1.20) | |

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| Variables | 3-month retention | | | |
|---|---|---|---|---|
| | N = 899 | | | |
| | No N = 687 n(%) | Yes N = 212 n(%) | OR[b] (95% CI) | $OR_{adj}$[c] (95% CI) |
| Completed Tertiary | 40 (5.8) | 11 (5.2) | 0.64 (0.36–1.13) | |
| DICs in same county of residence | | | | |
| No | 266 (38.7) | 38 (17.9) | REF | REF |
| Yes | 421 (61.3) | 174 (82.1) | 2.89 (1.11–7.52) | 2.74 (1.11–6.72) |
| Area of work | | | | |
| No venue | 70 (10.2) | 36 (17.0) | REF | REF |
| Venue | 617 (89.8) | 176 (83.0) | 0.55 (0.33–0.92) | 0.61 (0.38–0.97) |
| Currently pregnant | | | | |
| No | 639 (93.0) | 193 (91.0) | REF | |
| Yes | 48 (7.0) | 19 (9.0) | 1.31 (0.83–2.08) | |
| Number of children | | | | |
| None | 103 (15.0) | 34 (16.0) | REF | |
| 01-Feb | 420 (61.1) | 124 (58.5) | 0.89 (0.61–1.31) | |
| 3 or more | 164 (23.9) | 54 (25.5) | 1.00 (0.73–1.36) | |
| STI ever | | | | |
| No | 369 (53.7) | 122 (57.6) | REF | |
| Yes | 318 (46.3) | 90 (42.4) | 0.86 (0.56–1.32) | |
| Using contraceptives at time of enrollment | | | | |
| No | 150 (21.8) | 47 (22.2) | REF | |
| Yes | 537 (78.2) | 165 (77.8) | 0.98 (0.75–1.28) | |
| Average of sex acts per week | | | | |
| ≤ 10 | 221 (32.2) | 66 (31.1) | REF | |
| Oct-20 | 262 (38.1) | 81 (38.2) | 1.04 (0.59–1.81) | |
| 21–40 | 183 (26.6) | 59 (27.9) | 1.08 (0.56–2.07) | |
| > 40 | 21 (3.1) | 6 (2.8) | 0.96 (0.37–2.47) | |
| Used condom during last encounter | | | | |
| No | 62 (9.0) | 24 (11.3) | REF | |
| Yes | 625 (91.0) | 188 (88.7) | 0.78 (0.50–1.22) | |

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| Variables | 3-month retention | | | |
|---|---|---|---|---|
| | N = 899 | | | |
| | No N = 687 n(%) | Yes N = 212 n(%) | OR[b] (95% CI) | $OR_{adj}$[c] (95% CI) |
| Frequency of condom use with regular clients | | | | |
| Never | 20 (3.0) | 4 (2.0) | REF | |
| Sometimes | 127 (19.2) | 60 (29.1) | 2.36 (0.98–5.67) | |
| Always | 514 (77.8) | 142 (68.9) | 1.38 (0.58–3.29) | |
| Frequency of condom use with casual (non-regular) clients | | | | |
| Never | 12 (1.8) | 1 (0.5) | REF | |
| Sometimes | 132 (20.0) | 53 (25.7) | 4.82 (0.54–43.26) | |
| Always | 517 (78.2) | 152 (73.8) | 3.53 (0.46–27.28) | |
| Frequency of condom use with boyfriend | | | | |
| Never | 239 (49.8) | 83 (59.7) | REF | |
| Sometimes | 75 (15.6) | 20 (14.4) | 0.77 (0.45–1.32) | |
| Always | 166 (34.6) | 36 (25.9) | 0.62 (0.33–1.19) | |
| Sex under the influence of alcohol | | | | |
| Never | 254 (37.0) | 67 (31.6) | REF | REF |
| Sometimes | 345 (50.2) | 116 (54.7) | 1.27 (1.00–1.62) | 0.58 (0.36–0.93) |
| Most times | 59 (8.6) | 11 (5.2) | 0.71 (0.42–1.20) | 1.79 (1.04–3.07) |
| Always | 29 (4.2) | 18 (8.5) | 2.35 (1.35–4.10) | 1.12 (0.91–1.37) |
| Use of recreational drugs[d] | | | | |
| No | 529 (77.0) | 145 (68.4) | REF | REF |
| Yes | 158 (23.0) | 67 (31.6) | 1.55 (1.07–2.24) | 1.42 (1.16–1.75) |
| Experienced GBV in the last 3 months | | | | |
| No | 669 (97.4) | 210 (99.1) | REF | |
| Yes | 18 (2.6) | 2 (0.9) | 0.23 (0.04–1.28) | |
| PrEP use ever | | | | |
| No | 648 (94.3) | 204 (96.2) | REF | |
| Yes | 39 (5.7) | 8 (3.8) | 0.65 (0.41–1.02) | |
| PEP use ever | | | | |
| No | 656 (95.5) | 199 (93.9) | REF | |

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| Variables | 3-month retention | | | |
|---|---|---|---|---|
| | N = 899 | | | |
| | No N = 687 n(%) | Yes N = 212 n(%) | OR[b] (95% CI) | $OR_{adj}$[c] (95% CI) |
| Yes | 31 (4.5) | 13 (6.1) | 1.38 (0.82–2.33) | |

[a] HIV status was set as missing for the purpose of this analysis

[b] Adjusted by DICs clustering

[c] Variables with a p value < 0.05 in the bivariate analysis plus any known confounders described in the literature

[d] Alcohol, Marijuana, Cigarettes and Khat

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**Table 4**

Factors associated with 12-month retention of a sample of female sex workers enrolled between October 2016 to September 2017 at the seven sex workers outreach program (SWOP) clinics in Nairobi, Kenya

| Variables | 12-month retention N = 899 | | | |
|---|---|---|---|---|
| | No N = 744 n(%) | Yes N = 155 n(%) | OR[b] (95%CI) | $OR_{adj}$[c] (95%CI) |
| HIV infection at enrollment[a] | | | | |
| Negative | 651 (92.1) | 123 (84.8) | REF | REF |
| Positive | 56 (7.9) | 22 (15.2) | 2.08 (1.20–3.61) | 2.00 (1.09–3.64) |
| Age at enrollment (years) | | | | |
| ≥ 50 | 16 (2.1) | 8 (5.2) | REF | REF |
| 15–19 | 25 (3.4) | 9 (5.8) | 0.72 (0.50–1.05) | 0.62 (0.33–1.15) |
| 20–24 | 183 (24.6) | 26 (16.8) | 0.28 (0.17–0.49) | 0.22 (0.09–0.52) |
| 25–29 | 174 (23.4) | 30 (19.3) | 0.34 (0.21–0.58) | 0.27 (0.12–0.61) |
| 30–34 | 171 (23.0) | 31 (20.0) | 0.36 (0.17–0.79) | 0.28 (0.10–0.83) |
| 35–39 | 99 (13.3) | 24 (15.5) | 0.48 (0.24–0.97) | 0.37 (0.13–1.04) |
| 40–49 | 76 (10.2) | 27 (17.4) | 0.71 (0.42–1.22) | 0.61 (0.25–1.45) |
| Duration of sex work (years) | | | | |
| Less 2 | 113 (15.2) | 18 (11.6) | REF | REF |
| 02-Apr | 429 (57.7) | 91 (58.7) | 1.33 (0.91–1.95) | 1.18 (0.92–1.51) |
| More than 4 | 202 (27.1) | 46 (29.7) | 1.43 (1.02–2.00) | 1.00 (0.75–1.33) |
| Marital status | | | | |
| Married | 28 (3.8) | 3 (1.9) | REF | |
| Divorced/separated | 258 (34.7) | 65 (41.9) | 2.35 (0.74–7.50) | |
| Single | 439 (59.0) | 81 (52.3) | 1.72 (0.57–5.19) | |
| Widowed | 19 (2.5) | 6 (3.9) | 2.95 (0.86–10.13) | |
| Education | | | | |
| Less than completed Primary | 125 (16.8) | 31 (20.0) | REF | |
| Completed Primary | 393 (52.8) | 76 (49.0) | 0.78 (0.46–1.32) | |
| Completed Secondary | 187 (25.1) | 36 (23.2) | 0.78 (0.36–1.69) | |

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| Variables | 12-month retention N = 899 | | | |
|---|---|---|---|---|
| | No N = 744 n(%) | Yes N = 155 n(%) | OR[b] (95%CI) | $OR_{adj}$[c] (95%CI) |
| Completed Tertiary | 39 (5.3) | 12 (7.8) | 1.24 (0.56–2.73) | |
| DICs in same county of residence | | | | |
| No | 262 (35.2) | 42 (27.1) | REF | REF |
| Yes | 482 (64.8) | 113 (72.9) | 1.46 (1.01–2.12) | 1.64 (1.11–2.41) |
| Area of work | | | | |
| No venue | 84 (11.3) | 22 (14.2) | REF | |
| Venue | 660 (88.7) | 133 (85.8) | 0.77 (0.34–1.75) | |
| Currently pregnant | | | | |
| No | 682 (91.7) | 150 (96.8) | REF | REF |
| Yes | 62 (8.3) | 5 (3.2) | 0.37 (0.15–0.93) | 0.33 (0.11–0.94) |
| Number of children | | | | |
| None | 114 (15.3) | 23 (14.8) | REF | |
| 01-Feb | 459 (61.7) | 85 (54.9) | 0.92 (0.50–1.68) | |
| 3 or more | 171 (23.0) | 47 (30.3) | 1.36 (0.76–2.46) | |
| STI ever | | | | |
| No | 417 (56.1) | 74 (47.7) | REF | REF |
| Yes | 327 (43.9) | 81 (52.3) | 1.40 (1.09–1.79) | 1.42 (1.03–1.96) |
| Using contraceptives at time of enrollment | | | | |
| No | 159 (21.4) | 38 (24.5) | REF | |
| Yes | 585 (78.6) | 117 (75.5) | 0.84 (0.45–1.57) | |
| Average of sex acts per week | | | | |
| ≤ 10 | 230 (30.9) | 57 (36.8) | REF | |
| Oct-20 | 286 (38.5) | 57 (36.8) | 0.80 (0.55–1.18) | |
| 21–40 | 207 (27.8) | 35 (22.5) | 0.68 (0.42–1.11) | |
| > 40 | 21 (2.8) | 6 (3.9) | 1.15 (0.81–1.63) | |
| Use of condom during last encounter | | | | |
| No | 70 (9.4) | 16 (10.3) | REF | |
| Yes | 674 (90.6) | 139 (89.7) | 0.90 (0.55–1.46) | |

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| Variables | 12-month retention | | | |
|---|---|---|---|---|
| | N = 899 | | | |
| | No N = 744 n(%) | Yes N = 155 n(%) | OR[b] (95%CI) | $OR_{adj}$[c] (95%CI) |
| Frequency of condom use with regular clients | | | | |
| Never | 19 (2.6) | 5 (3.3) | REF | |
| Sometimes | 148 (20.7) | 39 (25.8) | 1.00 (0.45–2.24) | |
| Always | 549 (76.7) | 107 (70.9) | 0.74 (0.31–1.78) | |
| Frequency of condom use with casual (non-regular) clients | | | | |
| Never | 9 (1.3) | 4 (2.6) | REF | REF |
| Sometimes | 147 (20.5) | 38 (25.2) | 0.58 (0.26–1.28) | 0.65 (0.25–1.71) |
| Always | 560 (78.2) | 109 (72.2) | 0.44 (0.21–0.93) | 0.48 (0.20–1.14) |
| Frequency of condom use with boyfriend | | | | |
| Never | 268 (52.3) | 54 (51.0) | REF | |
| Sometimes | 76 (14.8) | 19 (17.9) | 1.24 (0.69–2.22) | |
| Always | 169 (32.9) | 33 (31.1) | 0.97 (0.64–1.48) | |
| Sex under the influence of alcohol | | | | |
| Never | 269 (36.1) | 52 (33.5) | REF | |
| Sometimes | 381 (51.2) | 80 (51.6) | 1.09 (0.78–1.52) | 1.18 (0.66–2.12) |
| Most times | 57 (7.7) | 13 (8.4) | 1.40 (0.67–2.92) | |
| Always | 37 (5.0) | 10 (6.5) | | |
| Use of recreational drugs[d] | | | | |
| No | 556 (74.7) | 118 (76.1) | REF | |
| Yes | 188 (25.3) | 37 (23.9) | 0.93 (0.58–1.48) | |
| Experienced GBV in the last 3 months | | | | |
| No | 730 (98.1) | 149 (96.1) | REF | |
| Yes | 14 (1.9) | 6 (3.9) | 2.01 (0.81–5.43) | |
| PrEP use ever | | | | |
| No | 717 (96.4) | 135 (87.1) | REF | REF |
| Yes | 27 (3.6) | 20 (12.9) | 3.93 (1.99–7.78) | 4.76 (1.98–11.43) |
| PEP use ever | | | | |
| No | 710 (95.4) | 145 (93.5) | REF | REF |

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| Variables | 12-month retention | | | |
|---|---|---|---|---|
| | N = 899 | | | |
| | No N = 744 n(%) | Yes N = 155 n(%) | OR[b] (95%CI) | $OR_{adj}$[c] (95%CI) |
| Yes | 34 (4.6) | 10 (6.5) | 1.44 (1.02–2.03) | 1.72 (1.01–2.95) |

[a] HIV unknown were set as missing for the purposes of this analysis

[b] Adjusted by DICs clustering

[c] Variables with a p value < 0.05 in the bivariate analysis plus any known confounders described in the literature

[d] Alcohol, Marijuana, Cigarettes and Khat