RESEARCH ARTICLE

Sexual Behaviour Risk Among Male Regular Partners of Female Sex Workers: Implications for HIV Prevention Interventions in Uganda

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We assessed HIV prevalence and associated sexual behaviour risks among male regular partners (MRPs) of female sex workers (FSWs) attending a peri-urban clinic in Kampala, Uganda. Between June 2012 and June 2017, we conducted a mixed-methods cross-sectional study among MRPs (aged $\geq$ 18 years old). Eligible and interested men were consented and offered HIV counselling and testing. Data on socio-demographic, sexual behaviour and clinical characteristics were collected. Multivariable Poisson regression with robust variance was used to identify factors associated with HIV prevalence. In-depth interviews were conducted to elicit information on participants' knowledge of HIV and its prevention as well as sexual risk practices. Qualitative data were analysed using a thematic content approach. One hundred and sixty-two men were included in the analysis; mean age was 35 years (standard deviation $\pm$ 8.43), and most (73%) reported not using a condom during the last sexual intercourse. Overall HIV prevalence was 65 of 162 (40%). Absence of sexually transmitted infection symptoms in the last 12 months adjusted prevalence ratio (aPR) = 0.56, 95% confidence interval (CI) = [0.37, 0.85] and condom use at last sexual intercourse (aPR = 0.63, 95% CI = [0.45, 0.88]) were associated with a lower HIV prevalence. Being uncircumcised (aPR = 1.83, 95% CI = [1.22, 2.74]) and having $\geq$2 sexual partners in the last 12 months (aPR = 1.91, 95% CI = [1.27, 2.85]) were associated with higher HIV prevalence. Qualitative data showed that most participants reported not consistently using condoms with their FSW partners because of the emotional connections, desire to have children and trust. HIV prevalence among MRPs was high compared to the national average. HIV prevalence among MRPs was associated with high-risk sexual behaviour and circumcision status. Interventions are needed to address the high sexual behaviour risks among MRPs of FSWs as well as supporting them to access safe voluntary medical male circumcision, HIV care and support services.

Keywords: HIV status, sexual behaviour, male sexual partners, sex work, relationships, Uganda

INTRODUCTION

Globally, the importance of male regular partners (MRPs) of female sex workers (FSWs) in human immunodeficiency virus (HIV) and sexually transmitted infections (STIs) epidemiology has increasingly been recognized [1]. MRPs have been categorised as a hard to reach population, and constitute a so-called "critical bridge population" connecting high-risk sexual networks to lower-risk sexual networks in the general population [2, 3]. In Uganda, an estimated 16% of new infections may be attributed to FSWs and their male partners [4]. The elevated levels of HIV/STIs among FSWs and MRPs have been reported widely across sub-Saharan Africa (SSA) [5]. This suggests a critical need for prevention interventions directed toward this population.

MRPs engage in risky sexual behaviours that put them at a higher risk for HIV infection compared to other men in the general population [6–8]. For example in Senegal, the overall HIV prevalence among male partners of FSWs was 19.8% compared to <1% in the general population [9]. A growing number of reports provide evidence that the bridging sexual behaviour risks by the MRPs could be important drivers of the local HIV epidemics in SSA [10]. In Ghana, for instance, the social networks among MRPs were the source of increased HIV prevalence in the general community [11]. More recent behavioural studies have identified multiple and concurrent sexual relationships, alcohol use, limited condom use and concomitant STIs as the most critical components contributing to HIV transmission and acquisition in these key populations [7, 12, 13]. However, evidence suggests that unprotected sex among

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MRPs has been linked to individual factors such as emotional attachment, intimacy, trust, and the desire to have children with their FSW partners [14, 15].

Furthermore, because of the important role of this bridging group in HIV dynamics, programs to reduce HIV transmission within this group could have a considerable effect in slowing down the spread of the HIV epidemic in SSA [16]. In Uganda, the National HIV/AIDS Strategic Plan recognizes key populations as high priority groups in the national response to HIV/AIDS [17]. Whereas in SSA, the MRPs constitute a core group for HIV transmission, few prevention interventions have been developed to target this population [18]. Nonetheless, there is increasing evidence that targeted programs to reduce transmission of HIV infection within these core groups are feasible, effective and have led to successful risk reduction [16]. The international community, including The Joint United Nations Programme on HIV/AIDS (UNAIDS), suggests that public policies should adequately address the important underlying principles including non-discrimination and respect for human rights for successful implementation of programmes among these key populations [19]. However, MRPs are not a readily identifiable group, they are harder to reach than other men in the general population [20, 21]. Consequently, targeting MRPs for prevention programs may be challenging [20].

Although MRPs are a critical population to intervene with HIV prevention programmes, they are less often the targets of HIV/AIDS-related research and preventive interventions than FSWs in SSA [18]. However, to design appropriate interventions, it is necessary to first understand the HIV burden and risk factors. In this paper, we assess the HIV prevalence, associated sexual behaviour risks, as well as documenting knowledge of HIV and its prevention and sexual behavioural risk practices among MRPs in a peri-urban clinic setting in Kampala, Uganda.

MATERIALS AND METHODS
Study Design and Setting
This was a mixed-methods cross-sectional study that employed both quantitative and qualitative data collection methods. The study was conducted between June 2012 and June 2017 at the Good Health for Women Project (GHWP) clinic in a peri-urban suburb of Kampala, the capital city of Uganda. The clinic was established in 2008 to study the epidemiology of HIV and STIs and to implement HIV/STI prevention among FSWs. HIV prevalence among FSWs in the cohort which has been described extensively elsewhere [22] is 37% [23]. The clinic offers HIV care and preventive services, sexual and reproductive health services such as a syndromic approach for management of STIs, distribution of free condoms, and risk reduction counselling to both HIV positive and negative clients.

Participants
The study participants were MRPs attending the GHWP clinic. An MRP was defined as a partner of an FSW who was attending the GHWP clinic for at least ≥6 months, has had a relationship for ≥6 months and reported sexual intercourse with the FSW in the preceding month (duration of relationship and frequency of sexual intercourse indicating that the couple was established as sexual partners). MRPs were identified and invited for enrolment through their FSW partners. Individuals were included if they were aged ≥18 years, willing and able to consent, willing to test for HIV, and willing to take part in interviews about their sexual behaviours and other related information. We excluded those who were not in a relationship with their FSW partners for ≥6 months and those who had not had sexual intercourse with the FSW in the preceding month.

Sample Size Estimation
Quantitative Component
A convenient sample of 162 participants was enrolled to assess the primary outcome (HIV prevalence) of this study. All eligible participants were consecutively enrolled during the study period.

Qualitative Component
Informed by another study conducted in Uganda [14] and based on our experience of conducting research using qualitative methods, a sample of 34 MRPs was selected, a number which was anticipated to allow us achieve saturation.

Recruitment and Study Procedures
Quantitative Component
FSWs attending quarterly visits at the GHWP clinic were screened for having an eligible MRP. FSWs who reported having many partners were asked to identify only one of their sexual partners with whom they had a relationship for ≥6 months and sexual contact in the preceding one month. The identified FSWs were then asked to inform their MRPs about the study using the "study information sheet" and to bring or refer them to the clinic. Potential MRPs were given information about the study, screened to determine their eligibility, and those found eligible consented and enrolled into the study.

Qualitative Component
A subset of the enrolled MRPs were invited to participate in this component of the study. Purposive sampling was used to recruit as varied a sample as possible in terms of age, educational level, residential address, and HIV status to ensure a maximum variation of experiences. Potential participants were identified and invited by a social scientist either in-person during a clinic visit or by telephone.

Data Collection
Quantitative Data Collection
On the enrolment day at the clinic, participants completed an interviewer-administered questionnaire on socio-demographic, clinical and sexual behaviour characteristics. They underwent HIV counselling and provided 4 ml of blood for HIV serology. Socio-demographic measures included age, education level, marital status, alcohol use, and illicit drug use. Alcohol use was assessed by using a standardized WHO Alcohol Use Disorders Identification

Test (AUDIT) [24] and classified into three categories, that is, harmless or low-risk drinkers (score 1–7), harmful or high-risk drinkers (score 8–19) and alcohol dependent (score 20+). The clinical characteristics included the presence of STI symptoms (urethral discharge, genital ulcer, pain during urination) in the last 12 months. Sexual behaviour characteristics included number of sexual partners, circumcision status, history of transactional sex and condom use at last sexual intercourse with the FSW partner.

Qualitative Data Collection

Face-to-face in-depth interviews, lasting between 45 and 60 minutes, were conducted by an experienced social scientist in the participants' preferred language (English or Luganda). The interviews were conducted either at the participant's homes, at other locations in the community, or at the GHWP clinic, depending on the preference of the MRP. An in-depth interview guide was used to elicit background information on participants' knowledge of HIV and its prevention as well as sexual behavioural risk practices. The following topic areas were explored flexibly throughout each interview: knowledge on HIV and the prevention strategies; money, love, sex and HIV risk; multiple sexual relationships; HIV and condom use; and alcohol and illicit drug use. The interviews were not audiotaped but detailed notes were written immediately after each interview, in accordance with our working agreement with research participants at the GHWP [25].

Laboratory Procedures

HIV testing was conducted on blood obtained by venepuncture using three HIV rapid test kits as per national guidelines [26]: Alere Determine HIV-1/HIV-2 (Alere Medical, Tokyo, Japan) for screening, Stat-Pak HIV 1/2 (Chembio Diagnostic Systems, New York City, NY) for confirmation of positive results, and Uni-Gold 1/2 (Trinity Biotech, Bray, Ireland) as a tiebreaker in case of discrepant results.

Data Analysis

Quantitative Data Analysis

Data were double entered in OpenClinica, cleaned, and exported to Stata15.0 (StataCorp, College Station, TX, USA) for analysis. We resolved discrepancies by checking the source documents for clarification. Categorical demographic and clinical characteristics were summarized by counts and percentages. Continuous variables were summarized by means and standard deviations (SD) or medians and interquartile ranges. The proportion with HIV prevalence was analysed by the different demographic, clinical and sexual behaviour characteristics using χ^2 test for categorical variables and student t test for continuous variables. Poisson regression models with robust variance were fitted to identify factors associated with HIV prevalence at unadjusted analysis. Factors for which the association attained statistical significance on log likelihood ratio test (LRT) of $p < .20$ were selected for the multivariable Poisson regression model. Factors were retained in the final multivariable Poisson regression model if their

inclusion did not make the fit of the model significantly worse at the 5% level on an LRT.

Qualitative Data Analysis

The data were analysed thematically using a Framework Analysis approach [27]. Two social scientists first read through four scripts (two each) to identify common and recurring themes that were linked to the research questions. They then discussed with the larger study team and constructed a coding framework. Codes with similar or closer meaning were combined to form broader themes. Thereafter, an excel matrix was developed and the rest of the scripts were read while copying from text and pasting in the table under relevant themes.

RESULTS

Quantitative Results

Recruitment Profile

Between January 2012 and December 2017, FSWs attending GHWP clinic were screened for eligibility to refer their MRPs ($n = 2500$), of these 800 women ($n = 800/2500$, 32%) were excluded: women who had been enrolled <6 months at GHWP clinic ($n = 600/2500$, 24%) and those who were lost to follow-up ($n = 200/2500$, 8%). One thousand seven hundred women were eligible to refer their partners, and of these, we excluded those who did not accept or were not decided to inform their partners ($n = 600/1700$, 35.3%). A total of 1100 MRPs were informed and invited by their FSW partners to the clinic, of these, 830 men ($n = 830/1100$, 75.5%) did not come to the clinic. Thus, 270 men were screened for eligibility, and of these 18 men ($n = 18/270$, 6.7%) were excluded due to ineligibility; those who were not in a relationship with their FSW partners for ≥6 months ($n = 8$) and those who had not had sexual intercourse with the FSW in the preceding month ($n = 10$). A total of 252 MRPs were enrolled, of these, 70 men ($n = 70$) were excluded due to insufficient data on study independent variables. Thus, a total of 162 MRPs were included in the analysis (figure 1).

Participants' Baseline Characteristics

One hundred and sixty-two men were included in the analysis; mean age was 35 years (SD $\pm$ 8.43). More than half (51%) of the MRPs were aged ≥35 years, more than a third had attained primary education (34%) and about two thirds (62%) were married with one wife. Most (73%) had never used illicit drugs, nearly half (45%) were dependent alcohol drinkers, the majority (90%) had no signs and symptoms of STIs in the last 12 months, and most (73%) reported not using a condom during the last sexual intercourse. More than half (52%) were not circumcised and nearly half (48%) reported having ≥2 sexual partners. Only 14% reported paying food or money for sex. The overall HIV prevalence was 40% (table 1).

HIV Prevalence and Associated Factors

Men who reported no symptoms for STIs in the last 12 months were less likely to be HIV seropositive
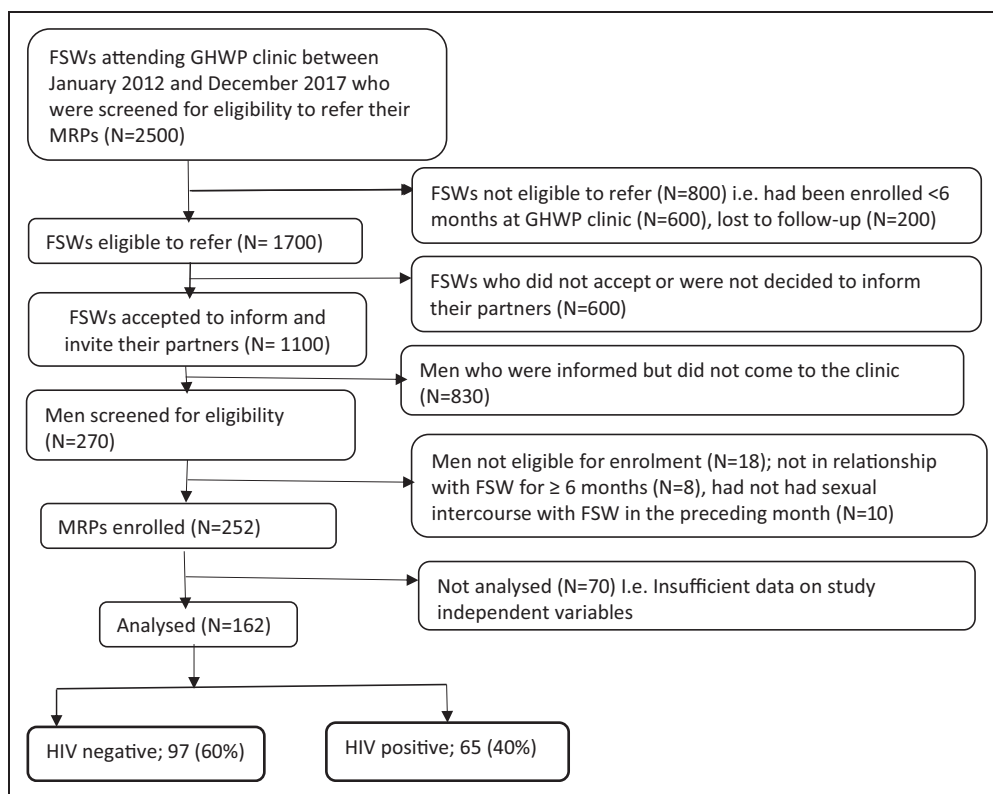
Figure 1. Recruitment profile for MRPs of FSWs at Good Health for Women Project (GHWP) clinic in Kampala, Uganda (2012–2017). DOI: https://doi.org/10.1525/agh.2022.1547913.f1

Table 1. Baseline Characteristics Among MRPs of FSWs at GHWP Clinic in Kampala, Uganda, 2012–2017. DOI: https://doi.org/10.1525/agh.2022.1547913.t1

Baseline Characteristics	Category	Overall, $N = 162$, n (col%)	HIV Seronegative, $N = 97$, n (col%)	HIV Seropositive, $N = 65$, n (col%)	p Value
Socio-demographic characteristics					
Age (years), mean ($\pm$ SD)		35 (SD $\pm$ 8.43)	4.5 (SD $\pm$ 8.35)	35.6 (SD $\pm$ 8.55)	.383[†]
Age category, years					.704*
	18–30	61 (37.7)	38 (39.2)	23 (35.4)	
	31–40	64 (39.5)	39 (40.2)	25 (38.5)	
	41+	37 (22.8)	20 (20.6)	17 (26.1)	
Education level					.179*
	Secondary +	48 (30)	33 (34)	15 (23)	
	Primary	59 (36)	36 (37)	23 (35)	
	Never	55 (34)	28 (29)	27 (42)	
Marital status					.296*
	Married with many wives	34 (21)	24 (25)	10 (15)	
	Married with one wife	101 (62)	59 (61)	42 (54)	
	Not married	27 (17)	14 (14)	13 (20)	
Ever used drug					.339*
	Yes	44 (27)	29 (30)	15 (23)	
	No	118 (73)	68 (70)	50 (77)	

(continued)

Table 1. *(continued)*

Baseline Characteristics	Category	Overall, N = 162, n (col%)	HIV Seronegative, N = 97, n (col%)	HIV Seropositive, N = 65, n (col%)	p Value
Alcohol use					.243*
	Low risk	52 (32)	58 (60)	31 (48)	
	Harmful/high risk	37 (23)	25 (26)	19 (29)	
	Alcohol dependent	73 (45)	14 (14)	15 (23)	
Clinical characteristics					
Presence of STI symptoms in the last 12 months					.007*
	Yes	17 (10)	5 (5)	12 (18)	
	No	145 (90)	92 (95)	53 (82)	
Sexual behavioural characteristics					
Condom use during the last sexual intercourse					.005*
	Yes	43 (27)	18 (19)	25 (38)	
	No	119 (73)	79 (81)	40 (62)	
Uncircumcised					.004*
	No	77 (48)	55 (57)	22 (34)	
	Yes	85 (52)	42 (43)	43 (66)	
Number of women with sexual relationship in the last 12 months					.001*
	1	85 (52)	56 (58)	21 (32)	
	2+	77 (48)	41 (42)	44 (68)	
Paying food or money for sex in the last 12 months					.723*
	Yes	22 (14)	12 (12)	10 (15)	
	No	140 (86)	85 (88)	55 (85)	

MRPs = male regular partners; FSWs = female sex workers; GHWP = Good Health for Women Project; SD = standard deviation; STI = sexually transmitted infections.

†Student *t* *p* value.

*Chi-square *p* value.

compared to those who did (82% vs. 18%, $p = .007$). Men who used condoms during the last sexual intercourse were less likely to be HIV seropositive compared to those who didn't (62% vs. 38%, $p = .005$). Uncircumcised men were more likely to be HIV seropositive compared to those who were circumcised (66% vs. 34%, $p = .004$). Also, men who had ≥2 sexual partners were more likely to be HIV seropositive compared to those with only one partner (68% vs. 32%, $p = .001$; table 1).

Absence of STI symptoms (adjusted prevalence ratio [aPR] = 0.56, 95% confidence interval [CI] = [0.37, 0.85]) and condom use at last sexual intercourse (aPR = 0.63, 95% CI = [0.45, 0.88]) were associated with a decreased HIV prevalence. Being uncircumcised (aPR = 1.83, 95% CI = [1.22, 2.74]) and having ≥2 sexual partners (aPR = 1.91, 95% CI = [1.27, 2.85]) were associated with an increased HIV prevalence (table 2).

Qualitative Results
Participant Characteristics
Of the 162 men enrolled in the study, 34 (21%) participated in the qualitative component. The mean age was 43.7 (SD ± 10.1) years (ranging from 22 to 60+years). More than two thirds (23/34, 68%) were in the age range of 25 to 45 years old. These participants were mostly employed in the informal sectors; motorcycle-taxi (9/34, 26%), farming (5/34, 15%) and building (8/34, 24%) and described their work as involving a lot of mobility. More

than half (18/34, 53%) were HIV positive, most (24/34, 71%) of the men were not married to the FSWs who introduced them to the GHWP clinic, and more than half (53%, and 18/34) had attained only primary education.

HIV/STIs and Condom Use

The participants showed good knowledge of HIV/STIs transmission routes. They frequently mentioned the importance of condom use to prevent infection. Most men, regardless of social status, said condoms were important to protect themselves and their families, as a 34-year-old man describes "Unsafe sexual behaviour is not good; I want to remain healthy and look after my children."

However, this knowledge did not translate into safer-sex practices. While condoms had been widely distributed in bars and lodges by outreach clinic staff, several men admitted to inconsistent condom use, particularly those who consumed alcohol regularly. They were unable or unwilling to use condoms with their FSW partners and spouses, as this would lead to evidence or suspicion of sexual relationships with other partners. A 50-year-old man explained that: "I don't use a condom with my partner because we trust each other. One can never use a condom with his own wife."

Not using condoms with their FSW partners or spouses, sometimes was linked to the desire to have children, intimacy and trust as a 34-year-old man said that: "Too much love does not accommodate condoms . . . ." Another man also said; "The desire for children exposes his partners to HIV risk but it's a risk they are both willing to take." [38-year-old MRP]

The MRPs who sometimes used a condom did so at the first encounter with a new FSW. Some MRPs had difficulty understanding that someone could be infected with HIV and not have any physical symptoms as a 22-year-old man narrates:

> Love started in primary school with my girlfriend, no condoms were used since she was young, looked healthy and we were in love. However, now I stay with four peers, we all import FSWs and sleep with them in turns, and we prefer the fat and younger ones.

Multiple Sexual Relationships

All the MRPs reported having other sexual partners in addition to their FSWs partners. The men emphasised that they were in intimate relationships with their FSW partners. A 34-year-old man said: "I admit to having multiple partners. Even then, I struggled to come to terms with the FSW label of my partner, but I feel there is an emotional connection."

And for all of them, once they had joined the GHWP clinic, they were encouraged to bring their other partners to the clinic for HIV testing. One 31-year-old man said that although he was introduced to the programme by one of the partners, he was encouraged to bring in others: He was introduced to the GHWP clinic by a partner who was living with HIV, but he also brought another partner who tested

negative. Some men stated that they engaged in multiple sexual relationships because they wanted women who would contribute to the relationship financially. Such relationships ended up with sexual risk behaviour with no condoms involved. Below is an excerpt from a 31-year-old interview with this participant:

> He started a relationship with an older woman whom he met as he worked at the construction site, used condoms once and it broke in the process and so they abandoned them, after all, there was nothing to protect, she had his child, they separated citing her promiscuity but got back together after they both tested negative. However, they finally separated when she was pregnant with another of his children and he started another relationship at a different construction site. He liked the second partner because she would contribute to household income.

Alcohol and Illicit Drug Use

Another risk behaviour that the MRPs were involved in was excessive alcohol drinking and the use of illicit drugs, which affected their judgement about unprotected sex with multiple sexual partners, thus exposing them to acquiring HIV and other sexually transmitted infections. A 19-year-old man said he drinks to cope with stress; a 44-year-old man told us that marijuana gave him the courage to have sex with older women.

DISCUSSION

In this mixed-methods study, we found that HIV prevalence among MRPs was more than six times higher than the national average of 6.3%, and 10 times higher than the national average for men in the general population of 4% [28]. Interestingly, the observed HIV prevalence among these MRPs is almost similar to their FSW partners enrolled at the GHWP [23]. Similarly, high estimates of HIV prevalence among MRPs have been reported in other studies from SSA [9, 12]. Our study adds to the growing body of literature contributing to the understanding of local HIV epidemics and identification of persons at high risk of HIV acquisition and transmission within SSA [5].

Overall, the complementary qualitative and quantitative findings in this study show that the sexual relationships between MRPs and their FSW partners were characterized by high-risk sexual behaviour. In fact, it's very likely that the elevated HIV prevalence is linked to their sexual behavioural risks including multiple sexual relationships and limited condom use. A possible explanation for this risky behaviour among these men could be the need to fulfil sexual desires or experimentation or the influence of excessive alcohol and illicit drug use as narrated during the interviews. Nonetheless, these findings are not particularly surprising given that this is a high-risk population. However, of great concern is the heightened burden of HIV disease and high rates of sexual behaviour risks in these populations [2]. This is an extremely

Table 2. HIV Prevalence and Associated Factors Among MRPs of FSWs at GHWP Clinic in Kampala, Uganda, 2012–2017. DOI: https://doi.org/10.1525/agh.2022.1547913.t2

Baseline Characteristics	Category	Overall, N = 162, n (col%)	HIV Positive, N = 65, n (col%)	uPR 95% CI	LRT p Value	aPR 95% CI	LRT p Value
Socio-demographic characteristics							
Age (years), mean (± SD)		35 (SD ± 8.43)	35.6 (SD ± 8.55)	1.01 [0.99, 1.03]	.364		
Age category, years					.691		.496
	18–30	61 (37.7)	23 (35.4)	Reference			
	31–40	64 (39.5)	25 (38.5)	1.04 [0.66, 1.62]		1.17 [0.75, 1.82]	
	41+	37 (22.8)	17 (26.1)	1.22 [0.76, 1.96]		1.21 [0.78, 1.91]	.411
Level of education					.185		
	Secondary +	48 (30)	15 (23)	Reference			
	Primary	59 (36)	23 (35)	1.25 [0.74, 2.12]		1.54 [0.95, 2.48]	.079
	Never	55 (34)	27 (42)	1.57 [0.95, 2.59]		1.46 [0.91, 2.33]	.118
Marital status					.331		
	Married with many wives	34 (21)	10 (15)	Reference			
	Married with one wife	101 (62)	42 (54)	1.41 [0.80, 2.51]			
	Not married	27 (17)	13 (20)	1.64 [0.85, 3.15]			
Ever used drug					.357		
	Yes	44 (27)	15 (23)	Reference			
	No	118 (73)	50 (77)	1.24 [0.78, 1.97]			
Alcohol use					.223		
	Low risk	52 (32)	31 (48)	Reference			
	Harmful/high risk	37 (23)	19 (29)	0.67 [0.43, 1.06]			
	Alcohol dependent	73 (45)	15 (23)	0.83 [0.51, 1.36]			

(continued)

Table 2. *(continued)*

Baseline Characteristics	Category	Overall, N = 162, n (col%)	HIV Positive, N = 65, n (col%)	uPR 95% CI	LRT *p* Value	aPR 95% CI	LRT *p* Value
Clinical characteristics							
Presence of STI symptoms in the last 12 months					.001		
	Yes	17 (10)	12 (18)	Reference		Reference	
	No	145 (90)	53 (82)	0.52 [0.36, 0.75]		0.56 [0.37, 0.85]	.006
Sexual behavioural characteristics							
Condom use during the last sexual intercourse					.003		
	No	43 (27)	25 (38)	Reference		Reference	
	Yes	119 (73)	40 (62)	0.58 [0.41, 0.83]		0.63 [0.45, 0.88]	.006
Circumcision status					.007		
	Yes	77 (48)	22 (34)	Reference		Reference	
	No	85 (52)	43 (66)	1.77 [1.17, 2.67]		1.83 [1.22, 2.74]	.004
Number of women with sexual relationship in the last 12 months					.003		
	1	85 (52)	21 (32)	Reference		Reference	
	2+	77 (48)	44 (68)	1.90 [1.25, 2.89]		1.91 [1.27, 2.85]	.002
Paying food or money for sex in the last 12 months					.570		
	Yes	22 (14)	10 (15)	Reference			
	No	140 (86)	55 (85)	0.86 [0.52, 1.43]			

Note: Values in bold indicate statistically significant results, that is, the confidence intervals do not include or cross 1. MRPS = male regular partners; FSWs = female sex workers; uPR = unadjusted prevalence ratio; aPR = adjusted prevalence ratio; CI = confidence interval; LRT = likelihood ratio test; GHWP = Good Health for Women Project; SD = standard deviation; STI = sexually transmitted infections.

concerning issue that needs urgent attention in research, policy and prevention programs [29].

Furthermore, our findings have demonstrated that HIV prevalence was less likely among men without STIs symptoms and those who used condoms during the last sexual intercourse. Supported by our qualitative data and elsewhere in SSA [14, 15], it seems that the trust, intimacy, emotional connections and aspirations of having children regardless of the assessed risk are important factors for determining condom use in these relationships. Not using condoms means that the FSWs and other partners are continuously being exposed to HIV/STIs [18]. In such a context, it clearly shows that there is still a great deal of unprotected sex occurring and high rates of HIV/STIs transmissions in these partnerships [30]. Yet, there is documented evidence that the acceptance rates of STI treatment among MRPs is still low [31]. Building on previous reports, our data implies that through these high-risk behaviours, MRPs can serve as a bridge population for HIV/STIs transmission to their partners and the general population [10, 32].

Additionally, we found that the uncircumcised men and those who had two or more sexual partners were more likely to be HIV seropositive. Consistent with previous reports, circumcision has been convincingly shown to be protective for HIV transmission in SSA [33]. These findings are broadly consistent with other data on sexual behaviour risks among MRPs from SSA [14, 15]. It is likely that the other steady partners such as the wives and other FSWs with whom the MRP has unprotected sex were unaware of their risky sexual behaviours. The combined effects of sexual networking and the acute infections that spike viral loads means that as soon as one person in a sexual network of concurrent relationships contracts HIV/STIs, everyone else in the network is placed at risk [30]. Taken together, these findings highlight the urgent need to scale up effective HIV prevention interventions among MRPs in the region [29].

Also, as described in the qualitative findings and elsewhere in SSA [34], most MRPs were highly mobile which could also have furthered the transmission risk for HIV/STIs to their sexual partners. Surprisingly, in the interviews, participants described feeling a strong sense of responsibility to protect their families from the consequences of HIV infection. However, despite the crucial role of MRPs in the transmission of STIs and HIV, they are a difficult group to study as a result of the challenges we experienced during their recruitment.

Implications for HIV Prevention Interventions

Our findings carry important implications for HIV prevention intervention efforts among MRPs in Uganda. The high HIV prevalence and high levels of sexual behaviour risks identified in this study, similar to FSWs [23] show that HIV prevention is still an unfinished business worldwide. The Ugandan government has identified MRPs as part of the key populations in the country [17]. Thus, the data presented here call for an urgent need for HIV/STIs prevention interventions for this key high-risk group and an important bridge population for transmission of HIV/STIs.

Interventions that aim at promoting individual behaviour change are critical and would have significant effects in reducing HIV incidences in high-risk populations [16]. Also, given the high mobility and difficulties in reaching this population, combined intervention programs that integrate both behavioural (e.g., promotion of condom use) and biomedical (treatment of HIV/STIs) components, a vital component of HIV control in SSA, are of high priority [16, 35]. Nonetheless, many new other biomedical prevention programs (e.g., Pre-exposure prophylaxis and microbicides) remain important interventions for these high-risk groups worldwide [29]. Notably, our results demonstrate that HIV prevention, care and treatment services including medical male circumcision, HIV counselling and testing, STI screening and treatment, antiretroviral therapy care, distribution of free condoms, and risk reduction counselling should be integrated within routine targeted services for FSWs.

Importantly, our qualitative results also suggest that interventions that include condom promotion need to go beyond increasing education and access to address issues related to intimacy and trust within these relationships. Another issue that warrants attention, according to the narrations from the men, are the alcohol reduction interventions that can be integrated within the existing HIV risk reduction counselling services in clinic settings. Alcohol use prevention counselling models have demonstrated positive effects in Africa [36]. However, significant challenges to the development of such interventions that include the difficulty of reaching these populations, the stigma, high mobility have been cited [7, 35]. Thus, the development of appropriate prevention interventions requires understanding the social-cultural contexts of the MRPs and their FSW partners [29]. In this context, ongoing HIV/STIs prevention programs and collaborating organizations that focus on these high-risk groups within the country should be strengthened.

STRENGTHS AND LIMITATIONS

Our study had some strengths and limitations. First, this population was drawn from one clinic in Kampala. Thus, the HIV prevalence in our study group is probably not representative of MRPs in other areas, so the results may not be generalizable to other MRPs in Kampala. Second, lack of information on the characteristics of those who refused to participate, the results obtained from the sample may not be considered representative of all MRPs in Kampala. Also, assessing if there were differences between the MRPs recruited and those who refused was not possible. Third, the number of MRPs included in this study was relatively small, which led to lower statistical power and thus assessing characteristics that were independently associated with HIV prevalence was limited. Future larger studies will be required to enhance our understanding of MRP HIV risks. Fourth, the study used a cross-sectional design, making it difficult to establish causal relations in the quantitative analysis. Lastly, participants went through a face-to-face interview, which may have introduced response bias on sensitive questions such as condom use and multiple sexual relationships. However, to minimise

this, extensive measures were taken to protect participants' privacy, develop rapport, promote a trusting environment, and support the anonymity of results.

One of this study's strengths was the use of qualitative data to triangulate against themes identified among the men and quantitative data analysis that allowed a mixed-methods comparison of the findings. Our study, therefore, provides important information about combining study methods that can greatly enhance insights and understanding of the sexual behaviour risks among these men in a more comprehensive manner [37]. Furthermore, our data add to the existing knowledge contributing to the understanding and recruitment of persons at high risk for HIV infection within the region [5]. Our findings are also potentially important for the design and development of future HIV/STIs prevention interventions for high-risk groups in SSA.

CONCLUSIONS

HIV prevalence among MRPs was very high compared to the national average. HIV prevalence among MRPs was associated with high-risk sexual behaviour and circumcision status. Interventions are needed to address the high sexual behaviour risks among MRPs of FSWs as well as supporting them to access safe voluntary medical male circumcision, HIV care and support services.

AUTHOR CONTRIBUTIONS

GN conceived and designed the study, OK and GN performed the statistical analysis, GN wrote the manuscript; OK, DB, YM, TK, RK, MM, AS, ER and JS oversaw the overall execution of the manuscript writing; JS oversaw the critical revisions of the manuscript. All authors read and approved the final manuscript.

AVAILABILITY OF DATA AND MATERIALS

The data collected in this study is available for sharing and procedures for accessing it is contained in the data sharing policy accessible from the Medical Research Council (MRC) website (https://www.mrcuganda.org/publications/data-sharing-policy).

CONSENT TO PUBLISH

All authors have read and approved the submitted manuscript for publication.

ETHICAL CONSIDERATIONS

Ethical approval was obtained from the Uganda Virus Research Institute Research and Ethics Committee and the Uganda National Council for Science and Technology (HS364). Written informed consent was obtained from the participants for both qualitative and quantitative data separately. Confidentiality and anonymity were maintained throughout the study period. All MRPs were offered free screening and treatment for STIs. Those found to have HIV infection were enrolled into HIV care at the GHWP clinic.

COMPETING INTERESTS

The authors declare that they have no competing interests.

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