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Awareness and Willingness to Use HIV Pre-exposure Prophylaxis Among Men Who Have Sex With Men in Rwanda: A Cross-Sectional Descriptive Survey

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Author Contributions

A. Munyaneza designed the work, wrote the original manuscript draft, and coordinated its revision. A. Adedimeji, L. Mutesa, P. E. Castle, J. M. Palefsky, and K. Anastos substantially contributed to the conception of the study and contributed to the original and revised versions of the manuscript. H.-Y. Kim, Q. Shi, and D. R. Hoover conducted the analysis, oversaw interpretation of the data, and contributed to the original and revised versions of the manuscript. J. Ross, G. Murenzi, J. Kabahizi, B. Nsengiyumva, J. Gasana, G. Kubwimana, F. Kanyabwisha, L. Murchison, B. Muhoza, and C. Ingabire substantially contributed to the conception of the study and contributed to the original and revised versions of the manuscript. V. V. Patel provided leadership, contributed to the design of the work, and revised the manuscript for important intellectual content. All authors have approved the final version for publication and agreed to be responsible for all aspects of the work, ensuring that issues related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

Disclosures

The authors declare no conflict of interest.

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Keywords

HIV pre-exposure prophylaxis; MSM; Rwanda; sexual minority men; sub-Saharan Africa

Men who have sex with men (MSM) in Rwanda are disproportionately affected by HIV and recognized by the Ministry of Health (MOH) to be a key population for HIV prevention (MOH, 2018). Although national estimates of HIV prevalence among MSM do not exist, studies conducted in Rwanda have reported HIV prevalence two to three times higher among MSM compared with the general population of men (Murenzi et al., 2020; Ntale et al., 2019). In Africa, MSM account for 6%–17% of new HIV infections annually (Bigna & Nansseu, 2019). Among MSM in other East African countries, prevalence of HIV is even higher, ranging from 14% in Uganda to 30% in Tanzania (Kambutse et al., 2019; Karuga et al., 2016), underscoring the need for additional HIV prevention options in East Africa.

Pre-exposure prophylaxis (PrEP), the use of anti-retroviral drugs to prevent HIV infection in persons without HIV (World Health Organization, 2015), is now considered a first-line HIV prevention option worldwide. PrEP reduces the risk of HIV infection by up to 99% in a variety of populations, including MSM (Center for Disease Control and Prevention, 2020). Recent demonstration projects in the United States and Australia have found no HIV seroconversions among MSM adherent to PrEP (Desai et al., 2017; Zablotska et al., 2019). However, use of PrEP in sub-Saharan African (SSA) countries is low, mostly due to limited availability associated with cost, despite the fact that most new HIV infections globally occur in this region (Kambutse et al., 2019). Although several SSA countries, including Kenya and South Africa, have begun implementing PrEP, with a focus on key populations such as MSM, access to PrEP is not yet widely available in much of SSA, including Rwanda (AVAC, 2020).

Awareness of and willingness to use PrEP seems to vary by diverse demographic characteristics such as geography, age, and place of residence and is important to understand

given its implications for eventual adoption of PrEP (Strauss et al., 2017). In their study in the United States, Ransome et al. (2019) identified that involvement with community groups of gay, bisexual, and other MSM (as opposed to no involvement) was associated with a higher likelihood of awareness of PrEP among MSM. In Ghana, a qualitative study among MSM identified a low level of PrEP awareness (Ogunbajo et al., 2020). However, after receiving information about PrEP, acceptability of PrEP was high and was related to believing that PrEP was protective against HIV and had minimal side effects in this study (Ogunbajo et al., 2020). In a study conducted in Kenya with MSM, PrEP awareness, defined as having heard of PrEP, was 64.3% (Ogunbajo et al., 2019). In this Kenyan study, regular condom use and membership in MSM organizations were associated with PrEP awareness. However, willingness to use PrEP was low (44.9%) and family exclusion was among the variables associated with acceptability of PrEP use (Ogunbajo et al., 2019).

In Rwanda, national guidelines for HIV prevention have identified MSM as a key population that could benefit from PrEP (MOH, 2018), although there has not yet been widespread roll-out. The extent to which Rwandan MSM are aware of PrEP and/or find it acceptable is unknown. To guide policy and PrEP scale-up and roll-out, further information is needed. The aim of this study was to explore the awareness of PrEP among a sample of Rwandan MSM, their willingness to use PrEP, and formulation preferences to inform current and future implementation efforts.

Methods

Study Design

This was a descriptive cross-sectional survey of PrEP knowledge, and attitudes nested within a longitudinal cohort study evaluating incidence and prevalence of human papillomavirus and HIV among Rwandan MSM. This substudy uses survey data from the second study visit, occurring 6 months after enrollment among participants who had tested negative for HIV at the baseline visit. The 6-month follow-up visit data collection occurred between September 2016 and February 2017. This study was approved by the Institutional Boards of Rwanda National Ethic Committee (No. 910/RNEC/2016, No.100/RNEC/2020), and Albert Einstein College of Medicine (2014–410, Reference: 066359) Institutional Review Board.

Study Settings

The study took place in Kigali City, the capital of and largest city in Rwanda, which has an HIV prevalence of 4.4% among men (National Institute of Statistics, 2015). Although same-sex behaviors are not criminalized in Rwanda (Adedimeji et al., 2019), MSM, and the broader lesbian, gay, bisexual, transgender, and intersex (LGBTI) communities, are highly stigmatized and socially isolated, with low access to sexual health information or culturally sensitive health services (Adedimeji et al., 2019). Kigali has a large concentration of MSM (Adedimeji et al., 2019), and has many MSM and LGBTI community organizations that address human rights issues with varying capacities and provide limited social and health support to these communities.

Study Population

Inclusion criteria for the parent longitudinal study were (a) self-identified men, (b) had any type of sexual acts with another man in the past 6 months before enrollment to the study (sexual acts in this context were defined as “any nature of sexual activities that include manual, oral, insertive/receptive anal sex or oral-anal contact” (Adedimeji et al., 2019), (c) age 18 years or older, (d) lived and maintained their social activities in Kigali in the past 6 months before enrollment to the study, (e) not known to be living with HIV, and (f) signed an informed consent form at enrollment.

The parent cohort had 350 participants, including 300 participants whose HIV status was unknown. Participants in the parent cohort were recruited from community-based MSM organizations and via snow-ball sampling. For the snow-ball sampling, a two-part invitation for manda study information brochure were distributed to first recruited participants who were then asked to recruit at least one additional study participant from their sexual networks, community organizations, friends, or acquaintances known to be MSM. An additional 50 participants known to be living with HIV were recruited from health centers considered friendly and caring for key populations living with HIV, including MSM. This recruitment procedure for the cohort has been previously described and published (Adedimeji et al., 2019; Murenzi et al., 2020). For this study, we used data from 283 participants who were not living with HIV at baseline and returned for the second study visit ($N = 225$).

During the second study visit appointment, participants were required to undergo an identification check and confirm their documented informed consent and HIV status at baseline. Once this information was confirmed, participants were then asked to complete the Audio-Computer Assisted Survey-Interview (ACASI) questions about PrEP. To ensure confidentiality of the study participants, we scheduled appointments with at least a 30- to 60-min interval between participants. The survey was administered in Kinyarwanda, the main language spoken in Rwanda. To overcome literacy barriers, participants could get help from a research assistant if they had difficulty reading, or if they had difficulties listening to the the ACASI script or in using the ACASI software. Participants received 8,000 Rwandan francs (~USD \$10) as an incentive after completing the study assessment.

Measures

The processes for developing the research instruments followed an iterative process. First, the instruments were adapted in English from a prior survey of PrEP awareness among MSM (Gupta et al., 2017) and finalized after thorough review and input from the research team with expertise in HIV, PrEP, and MSM health research in Rwanda to ensure face and content validity. Second, the finalized English instrument was then translated into Kinyarwanda, the language widely spoken in Rwanda, by a native Kinyarwanda speaker also fluent in English. The third step was the back translation of the Kinyarwanda instrument to English by a different native Kinyarwanda speaker who was fluent in English. Next, we compared both the original and the translated versions, and any discrepancies were resolved by an independent team of English and Kinyarwanda speakers. Finally, the instrument was

piloted with four MSM community members and refined further to ensure comprehension and clarity, before being programmed into tablet computers using the ACASI.

PrEP-related questions were preceded by this brief description: “These questions ask you about PrEP—which stands for pre-exposure prophylaxis (also sometimes called Tenvir, Truvada, or Tenofovir-Emtricitabine), which is a pill taken once a day that people without HIV can take to reduce their risk of getting HIV before having any sex. It involves a healthy person who does not have HIV taking a pill to prevent being infected with HIV. For people who take the pill every day, studies have shown that it reduced their risk of getting HIV by 95–99%.” We then assessed two outcomes: (a) *Awareness of PrEP* (“Before today, have you ever heard of PrEP [Pre-Exposure Prophylaxis]?”) and (b) *Willingness to use PrEP* (“Would you be willing to take anti-HIV medicines [PrEP] to lower your chances of getting HIV?”), and categorized the responses (*Yes*, *No*, *Don’t know*, or *I prefer not to answer*). Finally, we asked about preferred PrEP formulations (e.g., pill, injection) or dosing strategies (daily or on-demand).

Predictor variables assessed for these outcomes included sociodemographic information such as age, education level, current living arrangement, and sexual behavior practices, including sexual behavior disclosure, number of male sex partners in the past 6 months, number of vaginal or anal sex partners, and insertive/receptive anal sex acts with a man and condom use in the past 6 months.

Data Analysis

Demographic and sexual behavior characteristics were analyzed as categorical or categorized variables. Continuous variables were categorized as follows: age (<23, 23–25, 26–28, or ≥29 years), number of male partners in the past 6 months (none, one, two to four, or five and above), and number of female vaginal or male anal sex partners in the past 6 months (none or ≥1). Outcome variables (*Awareness of PrEP* and *Willingness to Use PrEP*) were dichotomized as *Yes* versus *No*, *Don’t know*, or *I prefer not to answer*. Percentages were calculated for each variable and then compared for each outcome using Fisher exact tests, whereas Cochran-Armitage trend tests compared categorized continuous variables between groups. Logistic regression was used to identify associations between demographic and sexual behavior characteristics with each of the outcomes, and an odds ratio (OR) and 95% confidence interval (CI) were used to present these associations. All analyses were performed with SAS statistical software (9.4; SAS Institute, Cary, NC). *p* Values less than .05 were considered statistically significant.

Results

Sociodemographic and Sexual Behavior Characteristics of Study Participants

Among the 225 participants, the mean age was 26.7 years (median age = 26 years; interquartile range was 23–29 years), of which 67 (30%) were 23 years old or younger. Ninety participants (41%) lived alone, 80 (37%) reported having had between two and four male sexual partners in the past 6 months, 111 (51%) reported having insertive anal sex with

a man in the past 6 months, and 80 (36%) reported having receptive anal sex with a man in the past 6 months. Please refer to Table 1.

Pre-Exposure Prophylaxis Awareness

Of the 225 participants, 104 (48%) reported awareness of PrEP (Table 2). The odds of awareness of PrEP were almost twice as high (OR 1.86, 95% CI [1.05–3.30]) for those having receptive anal sex with inconsistent condom use compared with those who did not have receptive anal sex and less likely for those who reported living with other (e.g., family or friends; OR 0.35, 95% CI [0.16–0.76]) compared with those living with male or female partners.

Willingness to Take Pre-Exposure Prophylaxis

Of the 225 participants, 181 (83%) reported that they were willing to take PrEP (Table 2). However, the likelihood of being willing to use PrEP was almost half as low among those who reported insertive anal sex acts and inconsistent condom use than those who did not have insertive anal sex (OR 0.45, 95% CI [0.21–0.97]).

Preferred Pre-Exposure

Prophylaxis Formulations—Table 3 shows that of the 181 participants who were willing to take PrEP, 39% ($n = 70/181$) preferred PrEP in the form of a daily pill; 12% ($n = 21/181$) preferred taking once-daily PrEP Monday and Friday, and another pill after intercourse; 9% ($n = 17/181$) preferred PrEP on demand (2 pills taken 2–24 hr before intercourse followed by 1 pill 24 hr after the first dose, and the last pill 48 hr after the first dose for a total of 4 doses over 48 hr). To receive PrEP as an injection, 22% ($n = 39/181$) preferred an injection every 2–3 months, whereas 16% ($n = 29/181$) preferred an injection once a month; 3% of study participants ($n = 5/181$) did not prefer any of these options.

Discussion

This is the first study of PrEP awareness and acceptability among Rwandan MSM, a marginalized and key population at high risk for HIV. Within this community-recruited sample, we found a relatively high awareness of PrEP (48% had heard of PrEP), and a very high willingness to use this prevention strategy (83% were willing to use PrEP).

The relatively high awareness of PrEP among Rwandan MSM, despite the lack of formal or planned outreach efforts of any kind for this population, may be due in part to the manner in which participants in this study were recruited. Participants were identified through MSM community associations, where they are likely to access or be connected to sources of information to promote their health and well-being. For example, individuals who were part of LGBTI associations may be better networked with other MSM, know how or where to access online health information for MSM, and then also share new information with other association members (Ogunbajo et al., 2019). A recent qualitative study nested from the same cohort of this study found that peer-to-peer knowledge or advice sharing, and online sources were important avenues to access information (Adedimeji et al., 2019). In the New Orleans metropolitan area (United States), another study found that

participation or membership in gay community groups were associated with increased PrEP awareness among MSM (Ransome et al., 2019). These findings reinforce the critical role that community organizations and networks can have in promoting PrEP uptake among MSM, as well as their role in raising a wareness of other health issues among MSM.

A study in Kenya reported varying levels of awareness of PrEP and found that condom use among men who have anal sex with other men was significantly associated with knowledge of PrEP (Ogunbajo et al., 2019). Similarly, our study found that sometimes using condoms with anal receptive sex was associated with awareness of PrEP, whereas other studies elsewhere were inconclusive regarding predictors of awareness (Yi et al., 2017). There were likely other important characteristics that were not measured, that may be associated with awareness, such as an individual's degree of connection to an MSM or LGBTI organization. It is likely that such membership enhances access to health-related knowledge and influences behaviors (Ransome et al., 2019). Additionally, other sources for information about PrEP are likely to become important in Rwanda and may influence uptake among MSM. The critical role of nurses, who already provide education and counseling at health centers when individuals present for HIV testing or care, could be instrumental in helping to promote PrEP awareness and uptake (Nelson et al., 2019). However, for this to happen, nurses and other health care providers must create LGBTQ-friendly and safe spaces (National LGBT Health Education Center, n.d.). It will be important to study such social network factors in the future to better inform PrEP implementation efforts.

A majority of participants (83%) were willing to use PrEP, similar to other studies that have assessed willingness to use PrEP among MSM in SSA (Karuga et al., 2016; Ogunbajo et al., 2019), which suggests potentially high uptake once PrEP is made available and accessible in SSA. However, studies about PrEP acceptability from other low- and middle-income countries have shown variability of PrEP acceptability (Lim et al., 2017; Ogunbajo et al., 2020; Torres et al., 2019). These differences in the acceptability of PrEP in low- and middle-income settings may reflect differences in the availability of or access to online PrEP information in various languages, sociocultural differences (e.g., attitudes toward allopathic drugs), sampling differences, and the manner in which questions about the acceptability of PrEP were asked or data collected.

Our study found that willingness to use PrEP was negatively associated with insertive anal sex acts and inconsistent condom use. This finding is consistent with other studies in which high willingness to use PrEP was negatively associated with belief barriers (e.g., sexual partners may expect sex without a condom; Torres et al., 2019). As PrEP is being rolled out in Rwanda and elsewhere, future research should examine the actual uptake of PrEP, and the factors associated with the use of PrEP in various contexts to inform the ongoing scale-up and monitoring of any emerging disparities in the uptake of PrEP, particularly in low- and middle-income countries for which limited data exist.

The most commonly preferred formulation for PrEP was a daily, oral preparation; however, there was a range of preferences for different dosing strategies and formulations, which is consistent with another study showing heterogeneity in preferences for PrEP formations and dosing across diverse settings and populations (Wang et al., 2018). Preferences for

PrEP will be important to consider in implementing programs that include different dosing strategies for MSM (e.g., daily or on-demand). It will also be important to design PrEP implementation programs that are able to incorporate new formulations as they become available.

Study Limitations

This study had some limitations, and findings should be interpreted within this context. First, our study only included MSM from Kigali City, and the results may not be generalizable to MSM living in other areas of Rwanda. Next, participants may have been influenced by the HIV prevention questionnaires from the baseline visit and through involvement with community and LGBTQ organizations, which provide information about approaches to HIV prevention. In this study, the description of PrEP provided to participants did not address the potential side effects of PrEP, which could influence the level of willingness to take PrEP. However, most other studies of PrEP awareness have also assessed PrEP acceptability in a similar fashion without mentioning side effects. Finally, despite piloting and refinement of survey items in Kinyarwanda and the use of ACASI, the concept of PrEP may still not have been understood by all participants. Future surveys assessing new concepts could consider inclusion of visual images (e.g., an image of a person taking a pill orally) to help ensure comprehension.

Conclusion

In one of the first studies exploring PrEP for HIV prevention among Rwandan MSM, we found a moderate level of awareness and a high willingness to use it. Because PrEP is not yet currently widely available to MSM in Rwanda, other evidence-based prevention programs and interventions must be promoted until funding is available to increase access to PrEP. Further, research is needed to identify optimal approaches of improving the sexual health of MSM and preventing HIV acquisition through outreach and linkage to places where MSM can access respectful, nondiscriminatory care, including nursing models of care to extend PrEP use once available.

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Sponsorships or competing interests that may be relevant to content are disclosed at the end of this article.

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Key Considerations

- PrEP awareness among Rwandan MSM is reported to be relatively good.
- Involving nurses in providing information on PrEP may increase awareness and use of PrEP among MSM in Rwanda, once access is increased.
- There is a need to develop a national program for the implementation of PrEP among the key populations in Rwanda.

Table 1.

Participant Sociodemographic and Sexual Behavior Characteristics

Variable	n (%)
Total	225 (100)
Age category, years	
23	67 (30)
23–25	55 (24)
26–28	54 (24)
29	49 (22)
Education level	
No education + primary	60 (27)
Technical + secondary	140 (62)
University	25 (11)
Sexual preference disclosure	
Yes	150 (67)
No	75 (33)
Living arrangement	
Male or female partner	39 (18)
Alone	90 (41)
Other	90 (41)
No. of male sex partners in the past 6 months	
None	47 (21.5)
Only one	55 (25)
Between two and four	80 (36.5)
Five and above	37 (17)
No. of female sex partners in the past 6 months	
Zero	155 (71)
One or more	64 (29)
Insertive anal sex acts and condom use	
Never had sex	96 (44)
Had sex, never used condoms	12 (5.5)
Had sex but sometimes used condoms	111 (51)
Receptive anal sex acts and condom use	
Never had sex	121 (55)
Had sex, never used condoms	18 (8)
Had sex but sometimes used condoms	80 (37)

Table 2.

Bivariate Analysis of PrEP Awareness and Willingness to Use PrEP

Variables	Awareness of PrEP		Willingness to Take PrEP			
	Yes, n (%)	No, n (%)	OR (95% CI)	Yes, n (%)	No, n (%)	OR (95% CI)
Total	104 (48)	114 (52)		181 (83)	36 (17)	
Age category, years						
23	34 (51.5)	32 (48.5)	Ref	56 (85)	10 (15)	Ref
>23 to 26	21 (40)	32 (60)	0.62 (0.30–1.28)	47 (90)	5 (10)	1.68 (0.54–5.26)
>26 to 29	31 (60)	21 (40)	1.39 (0.66–2.90)	39 (76.5)	12 (23.5)	0.58 (0.23–1.48)
>29	18 (38)	29 (62)	0.58 (0.27–1.25)	39 (81)	9 (19)	0.77 (0.29–2.08)
Education						
No education + primary	31 (54)	26 (46)	Ref	47 (82.5)	10 (17.5)	Ref
Technical + secondary	62 (45)	75 (55)	0.69 (0.37–1.29)	115 (83)	23 (17)	1.06 (0.47–2.41)
University	11 (46)	13 (54)	0.71 (0.27–1.85)	19 (86)	3 (14)	1.35 (0.33–5.44)
Disclosed sex						
No	36 (49)	37 (51)	Ref	61 (84)	12 (16)	Ref
Yes	68 (47)	77 (53)	0.91 (0.52–1.59)	120 (83)	24 (17)	0.98 (0.46–2.10)
Living arrangement						
Male or female partner	25 (64)	14 (36)	Ref	35 (90)	4 (10)	Ref
Alone	45 (50)	45 (50)	0.56 (0.26–1.21)	74 (83)	15 (17)	0.56 (0.17–1.82)
Other	34 (38)	55 (62)	0.35 (0.16–0.76) ^a	72 (81)	17 (19)	0.48 (0.15–1.55)
No. of male partners in the past 6 months						
None	20 (43)	26 (57)	Ref	39 (85)	7 (15)	Ref
One	23 (42)	32 (58)	0.93 (0.42–2.06)	42 (76)	13 (24)	0.58 (0.21–1.60)
Two to four	40 (50)	40 (50)	1.30 (0.63–2.70)	68 (86)	11 (14)	1.11 (0.40–3.10)
Five and above	21 (57)	16 (43)	1.71 (0.71–4.09)	32 (86.5)	5 (13.5)	1.15 (0.33–3.97)
No. of female vaginal or anal partners in the past 6 months						
Vaginal = 0 and anal = 0	77 (50)	77 (50)	Ref	126 (82)	28 (18)	Ref
Vaginal >0 or anal >0	27 (42)	37 (58)	0.73 (0.41–1.31)	55 (87)	8 (13)	1.53 (0.65–3.56)

Variables	Awareness of PrEP			Willingness to Take PrEP		
	Yes, <i>n</i> (%)	No, <i>n</i> (%)	OR (95% CI)	Yes, <i>n</i> (%)	No, <i>n</i> (%)	OR (95% CI)
Insertive anal sex acts with a man and condom use in the past 6 months						
Never had anal sex	48 (50.5)	47 (49.5)	Ref	84 (88)	11 (12)	Ref
Had sex, never used condoms	5 (42)	7 (58)	0.70 (0.21–2.36)	11 (100)	0 (0)	NA ^b
Had sex but sometimes used condoms	51 (46)	60 (54)	0.83 (0.48–1.44)	86 (77.5)	25 (22.5)	0.45 (0.21–0.97) ^a
Receptive anal sex acts with a man and condom use in the past 6 months						
Never had anal sex	49 (41)	71 (59)	Ref	100 (84)	19 (16)	Ref
Had sex, never used condoms	10 (56)	8 (44)	1.81 (0.67–4.92)	18 (100)	0 (0)	NA ^b
Had sex but sometimes used condoms	45 (57)	35 (43)	1.86 (1.05–3.30) ^a	63 (79)	17 (21)	0.70 (0.34–1.46)

Note. CI = confidence interval; OR = odds ratio; PrEP = pre-exposure prophylaxis.

^aSignificant at 5% significance level.

^bNot applicable, sample size is too small to calculate the CI.

Table 3.

Preferred Pre-Exposure Prophylaxis Formulations

Formulation	Frequency, n (%)
A pill once a day (i.e., every day) for it to work	70 (39)
A pill every Monday and Friday plus another pill soon after sex for it to work	21 (12)
Two pills before having sex, and two more pills 24 and 48 hr later	17 (9)
An injection once a month	29 (16)
An injection once every 2–3 months	39 (22)
I will not use pre-exposure prophylaxis	5 (3)

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