



Barriers to post exposure prophylaxis use among men who have sex with men in sub-Saharan Africa: An online cross-sectional survey

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ABSTRACT

Background: Curbing new HIV infections among MSM in SSA remains problematic, due to cultural beliefs, norms that oppose same-sex acts, and criminalization of same-sex acts. No study focused on barriers to PEP use in SSA region has been conducted. Our study focused on identifying barriers to Post-Exposure Prophylaxis (PEP) use among MSM in sub-Saharan Africa (SSA).

Methods: An online cross-sectional survey was sent out to members of 14 Lesbian, Gay, Transgender, Bisexual, Queer (LGBTQ) associations in SSA, to identify barriers to PEP utilization in MSM. A total of 207 MSM from 22 countries in SSA completed the survey between 8 January 2019 and 23 February 2019. Descriptive statistics were generated, chi-square and backward stepwise logistic regression analysis were performed to evaluate the association between the outcome “PEP use” and other variables.

Results: Most of the MSM were aged 18 to 30, and the majority (220, 74.6%) described themselves as gay. Rwanda had the highest number of respondents (117, 39.7% of the total), followed by Nigeria, Ghana and South-Africa.

The majority of respondents reported having heard about PEP (234, 80.7%), and the average PEP correct knowledge level was 59%.

Five characteristics were associated with increased odds of using PEP: Age, having vocational education, having heard of PEP, knowledge of where to get PEP, and having been refused housing.

Conclusion: There is a need for a collaborative effort between policy makers, key players in HIV prevention, and MSM associations in SSA to remove barriers to PEP uptake to promote optimal PEP utilization amongst MSM.

1. Introduction

Globally, men who have sex with men (MSM) have 27 times higher risk of acquiring HIV infection than do their heterosexual counterparts (UNAIDS, 2018). The risk is even higher among MSM in SSA (King and Al, 2013) as a result of negative stigma and prohibitive policies against homosexuality (Laar and Debruin, 2017).

Post-exposure prophylaxis (PEP) can be used to help prevent HIV transmission (Rotheram-borus et al., 2010). However, optimal HIV prevention requires more than just a biomedical strategy; behavioral and structural interventions are also needed (WHO, 2016). Accordingly, the WHO recommends that all countries provide access to PEP for all populations at high risk for HIV, including MSM. However, access to PEP among MSM remains low (Hugo et al., 2016).

Studies among MSM in SSA have consistently found that despite the high prevalence of HIV, access to HIV prevention information and healthcare services is low (Hugo et al., 2016; King and Al, 2013).

MSM in SSA rarely publically reveal their sexual orientations due to stigma, discrimination, and social hostility, which pose difficulties to their accessing and utilizing existing HIV prevention, care, and treatment services (Laar and Debruin, 2017)

Studies have found that some MSM in SSA engaged in sexual activities with women, either because they were also attracted to women or they used sexual relationships with women to conceal their sexual identities (Gbais and Al, 2015; Hladik et al., 2012) – suggesting a heightened risk of contracting HIV not only among MSM but also in the general population. Understanding the use of PEP among MSM can help not only to create effective programs to improve the access to PEP and

Abbreviations: MSM, Men who have sex with men; PEP, Post-Exposure Prophylaxis; SSA, Sub-Saharan Africa

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other HIV services for MSM, but also to reduce HIV incidence in the general population (CDC, 2015).

While some studies have been conducted to understand PEP use among MSM, none had identified barriers to PEP use in SSA (Chomchey et al., 2017; Hugo et al., 2016). Accordingly, this study aimed to identify the factors that prevent MSM from using PEP in SSA context.

2. Methods

2.1. Study design and setting

The survey utilized a cross-sectional, multi-country study design. Data were collected using an online survey.

2.2. Sample and sampling

Men who self-identified as MSM or bi-sexual, who were 18 years old or above, and who resided in SSA countries during the survey period were eligible to participate in the online survey.

Lesbian Gay Transgender Bisexual Queer (LGBTQ) organizations were identified through internet searching and through referrals. Invitation letters and links to the survey were shared with focal persons of each LGBTQ organization, who then disseminated the survey to their members. Follow-up emails were sent to organizations one week after the initial email, if they did not reply. Invitation letters were sent to 17 LGBTQ organizations, 14 agreed to share our questionnaires with their members

2.3. Data collection tools and methods

An online questionnaire was developed to collect data for this study. The questions were adapted from the European Men-who-have-sex-with-men Internet Survey (EMIS) 2010 (Research et al., 2010). Initially 33 questions were selected and then pretested through face-to-face interviews with three MSM in Kigali, Rwanda. Revisions were made based on the feedback from the pre-test. The final questionnaire contained 24 questions, with five questions gathering demographic information, seven asking about sexual behaviours, five about HIV knowledge and PEP knowledge, five about PEP use and barriers to PEP utilization, and two about MSM experiences related to stigma and discrimination. The questionnaire was originally designed in English, then translated into Kinyarwanda and French, and then back-translated by two different individuals to ensure content validity. The online questionnaire was hosted on SurveyMonkey Audience and was available in all three languages.

Respondents could choose between English, French and Kinyarwanda as the survey language they preferred. The survey was optimized for use on any Internet enabled device, including cellphones, tablets and/or computer. The average time to complete the survey during pre-test was 25 min. The first page of the online survey provided the introduction and purpose of the study, a checkbox served as consent was included at the bottom of the page. After indicating their consent, the respondents were given access to the survey. No name or other personal identification was recorded in the survey. To avoid duplication of answers, the survey allowed only one response per person. The survey was available online between January and February 2019.

The study was approved by the University of Global Health Equity (UGHE) Institutional Review Board (IRB) (Protocol #: 0052).

3. Measures

There were two key measures in this study:

- 1) PEP utilization rate among MSM
- 2) Factors affecting PEP utilization

3.1. Data management and analysis

Descriptive statistics were used to summarize respondents' demographics, risky sexual behaviours, HIV/PEP knowledge, and barriers to PEP utilization. The cut-off knowledge was set to 80%, based on some previously published peer-reviewed articles for knowledge assessment (Hui-Chin et al., 2015; Kaliyaperumal, 2004). Respondents who reported that they did not know PEP were excluded in the analysis. A chi-square test was used to evaluate the association between PEP use and all other variables. The variables tested were: Country of residence, sexual orientation, education level, access to condom, having heard of PEP, source of PEP information, knowledge about where to get PEP, availability of PEP at health facility, comfort to discuss sexuality with a healthcare provider, PEP being free, ability to afford PEP, age group, knowledge level of PEP, knowledge level of HIV, discrimination in the society, stigma, being blackmailed, physical violence, refused housing, refused access to healthcare, and services, detained by Police, fired or refused a job, and facing abusive language or insults at the church or place of worship. All variables with $P < 0.2$ at bivariate analysis were further analyzed using logistic regression with backward stepwise approach to detect the strength of association. All statistical tests were conducted using Stata v.14. A p-value < 0.05 was considered statistically significant.

4. Results

During the study period, 307 surveys were completed. Three surveys were discarded due to the respondents not being residents of a country in SSA, and seven were discarded because they were incomplete. Resulting in a final sample size of 297 from 22 countries. The completion rate was 96.7%. The majority of respondents were from Rwanda ($n = 117$, 39.7%), Nigeria ($n = 35$, 11.9%), South Africa ($n = 27$, 9.2%), and Ghana ($n = 25$, 8.5%). The mean age was 35.9 years old and ranged from 18 to 69, with 145 (49.3%) respondents between 18 and 30 years old and 106 (36.1%) between 31 and 50. The majority of respondents were single ($n = 206$, 70.1%); 58 (19.7%) were reportedly married to women and 30 (10.2%) were reportedly married to men. A total of 113 (38.6%) had achieved only secondary school education whereas 96 (32.8%) had attained University-level education. Nearly three quarters (220, 74.6%) identified themselves as homosexual and 57 (19.3%) as bisexual (Table 1). A high proportion of respondents ($n = 284$, 95.6%) exhibited at least one risky behavior (either not always using condoms or having more than one sex partner), 203 (69.3%) reported they never or sometimes use condoms when having sex, while 266 (90.7%) had more than one male sexual partner over the last six months. Among 297 respondents, 234 reported that they have heard of PEP. The 63 who had not heard of PEP were excluded from the analysis.

The utilization of PEP was 41.2% ($n = 121$) among the respondents. Half of the respondents ($n = 148$, 50%) indicated that they knew where to get PEP, and 140 (47.5%) said PEP was available at the health facilities. Only 43 (15.4%) of 298 respondents reported that PEP was free in their countries, and only 84 (29.1%) reported they could afford to buy PEP (Table 1). Most respondents (80.7%) heard of information about PEP. Friends (18.3%) and journals (13.3%) were the two main sources of PEP information (Table 1).

More than half of the respondents (53.3%) felt uncomfortable to discuss sexuality with their healthcare providers; 66.3% reported having experienced discrimination, stigma (62.3%), abusive language or insults at church or place of worship (29.3%), physical violence (25.6%), detention by the police (21.9%); blackmailing (20.2%); being fired from or refused a job (19.5%); or being refused access to healthcare and services (17.5%) due to their sexual orientation (Table 2).

The mean knowledge score percentage of correct answers related to HIV was 79%. The three questions answered correctly by most

Table 1
Sociodemographic characteristics, sexual behaviour, and barriers to access.

		N (%)
Sample		297
Orientation	Gay	220 (74.6%)
	Bisexual	57 (19.3%)
	Straight	3 (1%)
	Not categorized	15 (5.1%)
Country	Rwanda	117 (39.4%)
	Nigeria	35 (11.8%)
	South Africa	27 (9.1%)
	Ghana	25 (8.4%)
	Kenya	15 (5.1%)
	Senegal	14 (4.7%)
	Tanzania	13 (4.4%)
	Uganda	11 (3.7%)
	Others	38 (13.4%)
Highest educational level achieved	No education	15 (5.1%)
	Primary	35 (11.9%)
	Secondary	113 (38.6%)
	Vocational	33 (11.3%)
	University or above	96 (32.8%)
Marital status	Single	206 (70.1%)
	Married to man	30 (10.2%)
	Married to woman	58 (19.7%)
Age (years)	Mean (range)	35.9 (18–69)
	18 to 30 years	145 (49.3%)
	31 to 50 years	106 (36.1%)
	> 50 years	43 (14.6%)
Sexual activities	Have anal sex with men	281 (94.6%)
	Have anal sex with women	81 (27.3%)
	Have vaginal sex with women	56 (18.9%)
	Masturbate with men	97 (32.7%)
	Masturbate with women	29 (9.8%)
	Oral sex	130 (43.8%)
High risk behavior	Never or sometimes use condom when have sex with men	203 (69.3%)
	Never or sometimes use condom when have sex with women	136 (82.9%)
	> 1 male sex partner concurrently	266 (90.7%)
	> 1 female sex partner concurrently	67 (24.9%)
	Having at least 1 risky behavior	284 (95.6%)
Access to condoms when needed	No	161 (55.7%)
	Yes	128 (44.3%)
Heard of PEP	No	56 (19.3%)
	Yes	234 (80.7%)
Source of PEP information	Friends	51 (18.3%)
	Journals	37 (13.3%)
	Radio/TV	33 (11.9%)
	HCP	65 (23.4%)
	Other MSM	46 (16.5%)
Used PEP	No	151 (51.4%)
	Yes	121 (41.2%)
Know where to get PEP	No	148 (50%)
	Yes	148 (50%)
PEP readily available at the health facility	No	84 (28.5%)
	Yes	140 (47.5%)
Comfortable to discuss sexuality with healthcare provider	Do Not feel comfortable	153 (53.3%)
	Feel comfortable	96 (33.4%)
Free PEP in the country	No	156 (55.9%)
	Yes	43 (15.4%)
Able to afford PEP	No	140 (48.6%)
	Yes	84 (29.2%)

* Other countries included (Togo n=7; Cameroon n=5; Burundi n=4; Democratic Republic of Congo n=3; Cote d'Ivoire n=3; Burkina Faso n=2; Lesotho n=2; Congo n=1; Cape Verde n=1; Gabon n=4; Malawi n=1; Mozambique n=1; Papa New Guinea n=1; Swaziland n=1; Zimbabwe n=1).

respondents were: 1) One can get HIV from hugging (99%), 2) Anal sex with women could transmit HIV infection (95.8%); and 3) Condoms reduce chances of acquiring HIV infection during sex (94.6%). The three questions with the least respondents answering correctly were: 1) It takes six months for one to transmit HIV (42.7%), 2) One can get HIV from oral sex without ejaculation (58.2%), 3) Pulling out the penis before a man ejaculates can prevent getting HIV during sex (65.7%) (Table 3).

The mean knowledge score percentage of correct answers related to PEP was 59%. The three questions with the most respondents

answering correctly were: 1) It's preferable to take PEP within 72 h following HIV exposure (90.7%), 2) PEP is taken for 28 days (83.7%) and 3) PEP is indicated after potential exposure to HIV (75.8%). The two questions answered correctly by the fewest participants were: 1) The effectiveness of PEP is < 100%, and 2) PEP can prevent further HIV infection (8.3%) (Table 4).

Eight factors were found associated with PEP use: 1) Highest educational level achieved ($p = 0.045$), 2) Having heard of PEP ($p < 0.001$), 3) Knowledge about where to get PEP ($p < 0.001$), 4) PEP availability at the health facility ($p < 0.001$), 5) Comfort to

Table 2
Summary of knowledge score.

HIV Knowledge	Score
You can get HIV from hugging	288 (99%)
You can get HIV from anal sex with a woman	277 (95.8%)
You can get HIV from kissing	209 (74.1%)
You can get HIV from anal sex with a man	265 (94%)
You can get HIV from oral sex with ejaculation	239 (83.9%)
You can get HIV from oral sex without ejaculation	165 (58.2%)
You can get HIV from vaginal sex with a woman	265 (94.6%)
Condoms reduce chances of acquiring HIV infection during sex	263 (94.6%)
Washing one's genitals after sex keeps a person from getting HIV	213 (76.9%)
One can reduce HIV infection by having one faithful sex partner	176 (62.9%)
If someone becomes infected with HIV it may take 6 months before he/she can transmit it	120 (42.7%)
Pulling out the penis before a man ejaculates can prevent from getting HIV during sex	182 (65.7%)
There is a vaccine for HIV	222 (81.9%)
Overall HIV knowledge score	79%
Respondents with high HIV knowledge level (> 80%)	141 (48.1%)
PEP knowledge	Score
PEP is indicated after potential exposure to HIV	225 (91.5%)
PEP can prevent further HIV infection	20 (8.3%)
It's preferable to take PEP within 72 h following HIV exposure	215 (90.7%)
It's preferable to take PEP after 72 h following HIV exposure.	131 (56%)
PEP is taken for 28 days	190 (83.7%)
PEP is taken for six months	147 (66.5%)
The effectiveness of PEP is 100%	90 (39.5%)
The effectiveness of PEP is < 100%	82 (35.8%)
Overall PEP knowledge score	59%
Respondents with high PEP knowledge level (> 80%)	32 (10.8%)

discuss sexuality with a healthcare provider ($p = 0.007$) and 6) PEP being free in the country ($p < 0.001$), 7) being refused housing ($p < 0.041$), 8) Experiencing abusive language or insults at the church or place of worship ($p < 0.006$) (Table 3).

Further testing on the extent of association found MSM who were aged 31–50 had 1.24 time decreased in odds of PEP use than those aged 18–30 (95%CI: 0.086–0.966, $p < 0.044$), MSM who were aged > 50 had 1.36 times decreased in odds of PEP use than those aged 18 – 30 (95%CI: 0.072–0.915, $p < 0.036$), MSM who had vocational education had 1.46 times increased in odds of PEP use than those who had no education (95%CI: 1.617–11.560, $p = 0.04$), MSM who had not heard of PEP had 1.86 times decreased in odds of PEP use than those who had heard of it (95%CI: 0.034–0.711, $p = 0.016$), while MSM who did not know where to get PEP had 3.93 times decreased in odds of PEP use than those who knew where to get it (95%CI: 0.007–0.052, $p < 0.001$), MSM who were refused housing had 1.04 times decreased in odds of PEP use than those who weren't (95%CI: 0.131–0.938, $p < 0.037$) (Table 4).

5. Discussion

Our results showed the utilization rate of PEP among our respondents was only 41.2%. This uptake was higher than what was reported in other previous studies (Hugo et al., 2016; Chomchey et al., 2017; Goeddel et al., 2018). Similar to other self-reported data, verification of accuracy of the information is a limitation to our study.

Respondents had relatively high level of knowledge related to HIV (79%). However, some basic questions related to HIV infection and prevention were not correctly answered by many respondents. More than half of respondents believed that it takes six months for an HIV infected person to be able to transmit the disease. It is possible that they were confused that it can take up to six months to test HIV positive, but transmission can happen within six months (Nelson et al., 2010). Having a faithful partner was not perceived by all respondents as a means to reduce the chance of acquiring HIV. Such belief was reflected in the results - the majority of them have multiple partners. For any intervention to reduce HIV transmission among MSM; it is important to

Table 3
Factors associated with PEP use.

		PEP not used	PEP used	P-value
Country	Rwanda	53 (35.6%)	61 (50.8%)	0.438
	Nigeria	21 (14.1%)	11 (9.2%)	
	South Africa	14 (9.4%)	11 (9.2%)	
	Ghana	15 (10.1%)	9 (7.5%)	
	Kenya	9 (6%)	6 (5%)	
	Senegal	6 (4%)	4 (3.3%)	
	Tanzania	7 (4.7%)	3 (2.5%)	
	Uganda	8 (5.4%)	3 (2.5%)	
	Others	16 (10.7%)	12 (10%)	
	Orientation	Homosexual	114 (76%)	
Bisexual		27 (18%)	24 (20%)	
Straight		1 (0.7%)	2 (1.7%)	
Not categorized		8 (5.3%)	6 (5%)	
Education level	No education	10 (6.7%)	4 (3.4%)	0.045*
	Primary	19 (12.7%)	14 (12.0%)	
	Secondary	52 (34.7%)	57 (48.7%)	
	Vocational	21 (14.0%)	6 (5.1%)	
	University	48 (32.0%)	36 (30.8%)	
Access to condom	No	82 (55.0%)	69 (59.0%)	0.535
	Yes	67 (45.0%)	48 (41.0%)	
Heard of PEP	No	40 (27%)	4 (3.4%)	< 0.001*
	Yes	108 (73%)	113 (96.6%)	
Source of information	Friends	26 (24.3%)	24 (21.2%)	0.275
	Journals	21 (19.6%)	15 (13.3%)	
	Radio/TV	13 (12.1%)	17 (15.0%)	
	HCP	25 (23.4%)	39 (34.5%)	
	Other MSM	22 (20.6%)	17 (15.0%)	
Know where to get PEP	No	118 (78.1%)	12 (10.0%)	< 0.001*
	Yes	33 (21.9%)	108 (90.0%)	
PEP available at health facility	No	53 (35.1%)	21 (17.5%)	< 0.001*
	Yes	50 (33.1%)	84 (70.0%)	
	Don't know	48 (31.8%)	15 (12.5%)	
Comfortable to discuss sexuality with health care provider	No	91 (61.1%)	47 (41.6%)	0.007*
	Yes	43 (28.9%)	47 (41.6%)	
	Don't know	15 (10.1%)	19 (16.8%)	
Free PEP in the country	No	72 (48.6%)	74 (66.7%)	< 0.001*
	Yes	16 (10.8%)	26 (23.4%)	
	Don't know	60 (40.5%)	11 (9.9%)	
Able to afford PEP	No	64 (65.3%)	67 (62.6%)	0.689
	Yes	34 (34.7%)	40 (37.4%)	
Age group	18 to 30 years	73 (48.7%)	62 (51.7%)	0.054
	31 to 50 years	61 (40.7%)	35 (29.2%)	
	> 50 years	16 (10.7%)	23 (19.2%)	
Knowledge level of HIV	Low knowledge (≤ 80)	73 (48.7%)	66 (55.5%)	0.272
	High knowledge (> 80)	77 (51.3%)	53 (44.5%)	
Knowledge level of PEP	Low knowledge (≤ 80)	101 (86.3%)	103 (88.0%)	0.845
	High knowledge (> 80)	16 (13.7%)	14 (12.0%)	
Discrimination in the society	No	52 (34.4%)	43 (35.5%)	0.475
	Yes	99 (65.6%)	78 (64.5%)	
Stigma	No	52 (34.4%)	50 (41.3%)	0.149
	Yes	99 (65.6%)	71 (58.5%)	
Blackmailed	No	115 (76.2%)	101 (83%)	0.091
	Yes	36 (23.8%)	20 (16.5%)	
Physical violence	No	113 (74.8%)	89 (73.6%)	0.459
	Yes	38 (25.2%)	32 (26.4%)	
Refused housing	No	121 (80.1%)	85 (70.2%)	0.041*
	Yes	30 (19.9%)	36 (29.8%)	
Refused access to healthcare and services	No	124 (82.1%)	101 (83.5%)	0.449
	Yes	27 (17.9%)	20 (16.5%)	
Detained by the police	No	120 (79.5%)	90 (74.4%)	0.198
	Yes	31 (20.5%)	31 (25.6%)	

(continued on next page)

Table 3 (continued)

		PEP not used	PEP used	P-value
Fired or refused a job	No	120 (79.5%)	97 (80.2%)	0.505
	Yes	31 (20.5%)	24 (19.8%)	
Abusive language or insults at the church or place of worship	No	117 (77.5%)	76 (62.8%)	0.006
	Yes	34 (22.5%)	45 (37.2%)	

*Significant at P = 0.05.

Table 4
Results of logistic regression on using PEP.

Variable		OR	CI (95%)	P-value
Age group	18 – 30 years	Ref	NA	NA
	31 – 50 years	-1.25	0.09; 0.97	0.04
	> 50 years	-1.36	0.07; 0.91	0.04
Education level	No education	Ref	NA	NA
	Vocational	1.46	1.62, 11.56	0.04
Heard of PEP	No	Ref	NA	NA
	Yes	-1.86	0.03, 0.71	0.02
Know where to get PEP	No	Ref	NA	NA
	Yes	-3.93	0.01, 0.05	< 0.001
Refused housing	No	Ref	NA	NA
	Yes	-1.05	0.13, 0.94	0.04

help them reduce the number of casual partners. Our study found that some MSM incorrectly believed that washing one's genitals after sex and pulling out the penis ejaculation were effective methods to prevent from getting HIV during sex. Effort to correct this misconception is needed.

Eight factors were associated with the use of PEP. Consistent with previous literature, education level was associated with the use of PEP (Hugo et al., 2016). PEP being free in the country was associated with PEP use. Many countries in Sub Sahara regions are still impoverished, having free PEP available at health facility can be an important facilitator to the utilization of the services. Comfort to discuss sexuality with a healthcare provider was associated with PEP use, however, it is concerning that a significant number of respondents found themselves uncomfortable to discuss their sexuality with health care providers. Correspondingly, Okall, and colleagues (Okall et al., 2016) found over 60% of MSM uncomfortable seeking health services from public hospitals. A possible explanation for MSM discomfort with healthcare providers, and healthcare system is that healthcare providers may not adequately be equipped with skills to serve MSM. For instance, if MSM meet health care providers who hold judgmental views towards same sex acts; it can result in stigma, discrimination or prejudice, which may result in discomfort in healthcare delivery systems. This not only can affect them in using PEP, but can also potentially affect quality of healthcare services as concealed information could be detrimental to clinical decision. There is a need to improve sensitivity competency of health care providers when serving MSM patients. Although such finding is not exactly unexpected - MSM in many sub-Saharan Africa countries faced various homophobic experiences (Fay et al., 2011). In our study, > 95% of respondents experienced at least one form of harassment, with stigma, discrimination, abuse or insult at church or place of worship, physical violence, housing refusal and blackmail being the most common forms. Our study found being refused housing to be associated with PEP use. Being refused housing is rooted in the rampant stigma that MSM face at different levels: family, community, and the larger society. These human rights violations should be removed to effectively decrease the HIV incidence among MSM population, and to promote maximum use of existing health care services. Previous studies have documented association between homophobic experiences and mental health problems in MSM (Choi and Paul, 2013; Safren and Mitchell, 2017). Future research contribution to identify

mental health challenges in MSM is needed. It is also worth noting that our results showed a percentage of MSM were married to women, presumably to avoid the harassment and stigmatism when labelled as homosexual (Chakrapani and Boyce, 2011). This has important social and public health implications as their sexual interactions with female partners made the HIV transmission not only restricted to the MSM population.

With all factors considered, MSM who had heard of PEP and knew where to get PEP had increased odds of using PEP. This is not surprising. However, having heard of PEP did not translate to actually understanding what PEP was. The results of our study showed the knowledge on PEP was relatively low (59%), with the biggest misconception being that about 92% of respondents thought PEP could prevent further HIV infection. This requires urgent clarifications, as the implication is significant. People wrongly believe PEP could completely prevent HIV infection could potentially be wrongfully encouraged to practice unprotected sex, and in turn increase their risk of contracting infection. Similar to the results from a previous study on PEP in South Africa (Hugo et al., 2016) increasing PEP awareness alone may not be sufficient; promoting the correct PEP messages is essential.

In this study, only half of respondents knew where to get PEP suggesting in order to promote optimal PEP use, it is paramount to ensure the locations that provides PEP are made known to the public. LGBTQ organizations, Ministries of Health and healthcare providers must take an active role in ensuring the availability of PEP but also share such information to the MSM population.

This study identified PEP use among MSM in 22 Sub-Saharan African countries and some of the barriers to the utilization. However, the results of the study must be seen in light of some limitations. First, the respondents of this survey were referred by the MSM/LGBTQ associations, they may have already received similar education related to HIV prevention and PEP use from the associations. Such selection bias can limit our generalizability.

Second, the sample size reached was relatively small, which may affect the generalizability of our study findings. We had relatively lower response rates from West Africa countries despite the LGBTQ organizations based in those countries accepted to participate in the study compared to East Africa - where Rwanda had the largest percentage of respondents. Cautions must be taken when generalizing our results to countries with a lower number of respondents.

Third, although PEP was clearly explained in the introduction of the study, in both invitation letters sent to the LGBTQ organizations and participants, and in the consent message, we could not eliminate the potential for misclassification between PEP and PrEP. Furthermore the variations in HIV programmes among different countries may affect the interpretation of data.

Additionally, PEP uptake in our study seemed higher than other studies, since it was an online survey, we were unable to verify accuracy of the self reported numbers.

Based on our findings, efforts to continue strengthen educational programs among MSM are needed in many areas - understanding of PEP, promoting safe sex practices, reducing number of sexual partners. Establishing stigma-free healthcare settings, where MSM can comfortably discuss their healthcare needs is also necessary. Providing free or affordable PEP services at health facilities and properly marketing PEP availability can facilitate the use of PEP.

Credit authorship contribution statement

Sandra Isano: Conceptualization, Methodology, Formal analysis, Writing - original draft, Writing - review & editing, Project administration. **Rex Wong:** Formal analysis, Writing - original draft, Writing - review & editing, Supervision. **Jenae Logan:** Resources, Writing - original draft. **Soha El-Halabi:** Methodology, Software. **Ziad El-Khatib:** Conceptualization, Formal analysis, Methodology, Project Administration, Supervision, Writing - review & editing.

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Authors' contributions

SI, and ZEK developed the initial research proposal of this study. SI led the manuscript writing with significant support from RW, ZEK, and JL. SH contributed in setting up the online survey and study design. All authors have contributed to the manuscript.

Competing interest

The authors declare that they have no competing interests.

Ethics approval and consent to participate

We obtained Informed consent from all study participants. This study was approved by The Institutional Review Board (IRB) at the University of Global Health Equity in Rwanda (Protocol #: 0052).

Consent for publication

Consent was obtained from the study participants.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.pmedr.2020.101100>.

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