

Awareness and willingness to use pre-exposure prophylaxis (PrEP) and post-exposure prophylaxis (PEP) among sexually active adults in Ghana

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Abstract

Introduction: Advancement in biomedical science has led to the discovery of pre-exposure prophylaxis (PrEP) and post-exposure prophylaxis (PEP) as new strategies for prevention of human immunodeficiency virus (HIV). This current study was a quantitative analysis that sought to evaluate the awareness and willingness to use PrEP and PEP by sexually active adults in Ghana.

Material and methods: The study respondents consisted of 365 sexually active adults in Ghana. A questionnaire was designed and administered to participants online using respondent-driven sampling (RDS) approach. A χ^2 test and logistic regression were employed for the analysis.

Results: The study revealed a generally low awareness of PrEP and PEP. Only 25.2% of the respondents were aware of PrEP, while 20.3% were aware of PEP. Despite the low awareness rate, majority of respondents (69.3%) were willing to use PrEP and PEP for prevention of HIV. On the other hand, 30.7% of the respondents indicated their unwillingness to use PrEP and PEP citing the fear of undesirable side effects of the medications as the main reason for their decision.

Conclusions: This paper calls on policy-makers to intensify advocacy for the usefulness of PrEP and PEP. The Ghana Health Service and Ghana AIDS Commission should also ensure that PrEP and PEP services are increased and include all sexually active persons in Ghana. This will ensure a great success in mitigating HIV infections in Ghana.

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Introduction

Since the discovery of human immunodeficiency virus (HIV) and acquired immune deficiency syndrome (AIDS) in the early 1980s, over 30 million people globally have died from this deadly disease [1]. Africa is the most affected con-

continent. Although Africa represents about 12% of the global population, in 2013, the continent recorded a massive 71% of the global burden of HIV infections [2]. This disease, without cure, has significantly affected socio-economic conditions of many families and communities in Africa. In Ghana, the AIDS Commission reported that about 342,307

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people were living with HIV in 2019, while a total of 13,616 people died of HIV/AIDS in the same year [3].

Since 1980, there have been several interventions to prevent the spread of HIV and AIDS. Behavioral interventions aiming at helping people to change their sex and drug-use behaviors that predispose them to contracting HIV, have been very popular. These include campaigns on sex abstinence, faithfulness to sex partners, and discouragement of sharing injectable needles by drug users [4]. On biomedical front, the emphasis has been laid on correct and consistent use of condoms, and promotion of male circumcision, which has been demonstrated protective against HIV acquisition [5].

In recent times, advancement in biomedical science has led to the discovery of two new strategies for HIV prevention, including pre-exposure prophylaxis (PrEP) and post-exposure prophylaxis (PEP). PrEP involves intake of anti-retroviral drugs by HIV-negative persons before possible exposure to HIV. Several antiretroviral drugs are suggested as PrEP. The World Health Organization (WHO) recommends a combination of tenofovir disoproxil and truvada, or a combination of tenofovir disoproxil and lamivudine, while the United States Food and Drug Administration (FDA) recommends a combination of emtricitabine and tenofovir alafenamide in addition to truvada [6, 7]. The effectiveness of PrEP for HIV prevention has been proven over the years. A review of more than 18 PrEP trials revealed that consistent daily uptake of PrEP is highly effective when compared with placebo or no PrEP [8, 9].

PEP, on the other hand, is a 28-day course of antiretroviral medication taken within 72 hours of a possible exposure to HIV. The WHO recommends tenofovir combined with either lamivudine or emtricitabine for adults, while zidovudine and lamivudine are recommended for children aged 10 and below [10]. Studies have shown that after initial exposure to HIV, the virus replicates within the dendritic cells of the skin and mucosa before it spreads through the lymphatic vessels, and subsequently develops into a systemic infection. PEP, therefore, takes advantage of this delay in systemic spread by blocking replication of the initial inoculum of the virus, and thereby preventing the establishment of HIV infection [11]. PEP has shown to be highly effective in preventing HIV transmission in both occupational and non-occupational exposures [12].

In Ghana, studies on PEP are very limited, and mostly on occupational exposure. Although it has been proven to be effective in Ghana, there are reports of low adherence to PEP guidelines and treatment course [13]. Intolerance of adverse events from the use of PEP has been cited as a major reason for truncating PEP among health professionals [14]. Although sex is the major transmission route to HIV, our search revealed that there is no study on awareness and willingness to use PrEP and PEP among sexually active adults in Ghana. This research, therefore, seeks to examine the level of awareness and willingness to use PrEP and PEP for HIV prevention among sexually active adults in Ghana.

Theoretical underpinning of the study

The current study is underpinned by the Theory of Planned Behavior (TPB) [15, 16]. TPB consists of three distinct constructs that are centered on human behavior within an environment or a society. These are behavioral beliefs (beliefs about probable consequences of practiced behavior), normative beliefs (beliefs about prescriptive expectations of other people), and control beliefs (beliefs about presence of factors that may enable or obstruct performance of a behavior) [16]. This theory has been applied in related studies to examine a person's adherence and intention to use an available medication to prevent or cure a disease, such as human immunodeficiency virus/ acquired immunodeficiency syndrome (HIV/AIDS) [17, 18]. Therefore, TPB was employed in this study to generally evaluate and describe, which background characteristics of the respondents are associated with awareness and willingness to use PrEP or PEP in the Ghanaian population. This study evaluated how each theoretical construct of TPB might influence the intention to use PrEP or PEP in general population using an online questionnaire. This approach could be beneficial in future studies involving specific high-risk sexual groups. However, the basic understanding of TPB was helpful in explaining the level of awareness and willingness to use PrEP or PEP in the present study.

Material and methods

Study design

The study was conducted between January and April, 2021 using an online survey. The study was an open survey, in which any self-reported individual, 18 years of age and older, and a resident of Ghana could participate by accessing a customized online study link.

Recruitment of respondents and sample size

Study link was posted on different social media platforms, including Facebook, WhatsApp, and Telegram. Respondent-driven sampling (RDS) was also applied to recruit respondents, especially from the hard-to-reach population, including homosexuals and bisexuals. RDS is based on peer referrals, in which initial 'seeds' are identified and requested to recruit an additional respondent with similar characteristics. To ensure that qualified respondents, who were 18 years old or older and sexually active responded to the questionnaire, preliminary questions, including age and sexual intercourse within the past year were asked. Respondents, who indicated they were less than 18 years old and had had no sexual intercourse within the past year were excluded from accessing the main questionnaire. All respondents were restricted to one response. A Google form used for the online questionnaire had an option that restricts a respondent to one response only, and this was activated. Also, prior to ac-

cessing the questions, Google requested each respondent's G-mail address to verify whether the respondent has previously responded. Those who had already given their responses were denied access to avoid duplications. In all, a total of 365 respondents were recruited.

Data collection instrument and measures

The online questionnaire mainly included the following domains: demographics, and awareness and willingness to use either PrEP or PEP. Data collection instrument used in this study consisted of three parts. First, background characteristics included age (age groups: 18-25, 26-35, 36-45, and 46 or more), education (junior high school [JHS], senior high school [SHS]), marital status (never married, married, separated/divorced), region (Greater Accra, Western, Western North Central, Volta, Oti, Eastern, Ashanti, Brong Ahafo, Bono East, Ahafo, Northern, Savanna, Northeast, Upper East, Upper West), religion (atheist, Christian, Islam, Traditional), and sexual orientation (heterosexual, bisexual, homosexual). The second and third parts consisted of dichotomous responses (yes or no). These were assigned to the dependent variables (awareness and willingness to use PEP or PrEP). All questions were closed-ended. The questionnaire was pre-tested, involving two adults from two locations (Accra and Wa) in Ghana. This was done to ensure the data collection instrument actually produced suitable responses, and to further standardize the instrument for replication purposes.

Data analysis

Statistical significance tests were assessed using a *p*-value less than 0.5, and Stata version 13 was applied to process the data. Descriptive measures involving frequencies and percentages were initially used to ascertain the distribution of background characteristics of respondents among awareness and willingness to use PEP and PrEP. At this stage, χ^2 test was employed to examine the associations between dependent variables (awareness and willingness) and independent variables (background characteristics). However, to effectively examine predictors of awareness and willingness to use PEP or PrEP, logistic regression was used for analysis. Two sets of logistic regression models were generated to determine factors associated with either awareness of PEP and PrEP or willingness to use PEP and PrEP. With each of these sets of logistic regression analysis, the results were presented indicating odds ratio and adjusted odds ratio (AOR) with their respective 95 percent confidence intervals (95% CI). In addition, each set of logistic regression contained bi-variate and multi-variate results. To produce meaningful results, the dependent variables (awareness and willingness) were dichotomous with '0 = no' and '1 = yes' responses, and all independent variables had categorical responses. Additionally, post-test regression analysis was performed to confirm that each independent variable had a variance inflation factor (VIF) less than 10.

Ethical issues

On the online questionnaire, each respondent was well-informed about the study before their consent was sought. Also, all questions were carefully asked to obtain objective and unbiased responses. Additional consent was obtained to publish the responses without disclosing any traceable identity.

Results

Only 3.6% and 3.3% of the respondents have ever used PrEP and PEP, respectively (not shown in the chart form). Among the 365 respondents of the study, 88.2% were heterosexuals. Approximately 5.7% were bisexuals and 6.0% were homosexuals (Table 1). About 78.9% were young people between the ages of 18 and 35, while the remaining 21.1% were over 35 years old. The majority of the respondents were from the two most populous regions in Ghana, including Greater Accra (40%) and Ashanti (32.3%).

Regarding awareness of PrEP, only 25.2% of the respondents were aware, while 74.8% had no knowledge of PrEP. Also, 69.3% of the individuals were willing to use PrEP as medication to avoid contracting HIV, while 30.7% were unwilling to use PrEP. Regarding PEP, only 20.3% of the respondents were aware of PEP as a method for HIV prevention. The remaining 79.7% had no knowledge about PEP. Moreover, 62.7% of the participants were willing to accept PEP medication for preventing HIV transmission, while 37.3% were unwilling to utilize PEP.

For factors associated with PrEP awareness, individuals aged between 26-35 and 36-45 years (AOR: 4.01 [1.64-9.80] and 3.68 [1.17-11.59], respectively) were more likely to be aware of PrEP compared with those aged 18-25 years (Table 2). Moreover, people with diploma/bachelor's degree (AOR: 0.19 [0.48-0.74]) were less likely to be aware of PrEP compared with JHS educational level. Married couples (AOR: 0.29 [0.13-0.67]) had a lower likelihood of PrEP awareness compared with never married respondents. Likewise, bisexuals and homosexuals (AOR: 53.15 [7.03-401.48] and 19.96 [4.46-89.32], respectively) were more likely to be aware of PrEP compared with heterosexuals. Individuals, who knew their HIV status from between 7 to 12 months and over 12 months (AOR: 4.12 [1.09-15.50] and 3.25 [1.47-7.18], respectively) were more aware of PrEP than those who never tested for HIV.

In addition, the results of logistic regression revealed that age, sexual orientation, and sexual intercourse within the past 12 months were found to be significant predictors of willingness to use PrEP for HIV prevention (Table 2). Respondents aged between 26 and 35 years had 65% (AOR: 0.35 [0.17-0.71]) lower likelihood of being willing to use PrEP medication compared with those aged 18-25 years. Additionally, bisexuals (AOR: 13.52 [1.472-123.67]) were more likely to utilize PrEP as an intervention for HIV prevention compared with heterosexuals. Also, people who have not had sexual intercourse for the past 12 months

Table 1. Background characteristics of the respondents regarding awareness and willingness to use pre-exposure prophylaxis (PrEP) and post-exposure prophylaxis (PEP)

Characteristic	n (%)	PrEP				PEP			
		Aware	p-value	Willing	p-value	Aware	p-value	Willing	p-value
Age group (years)			0.000		0.003		0.000		0.211
18-25	184 (50.41)	34 (18.48)		134 (72.83)		25 (13.59)		123 (66.85)	
26-35	104 (28.49)	42 (40.38)		62 (59.62)		40 (38.46)		58 (55.77)	
36-45	48 (13.15)	11 (22.92)		41 (85.42)		6 (12.50)		32 (66.67)	
≥ 46	29 (7.95)	5 (17.24)		16 (55.17)		3 (10.34)		16 (55.17)	
Education level			0.677		0.498		0.767		0.441
JHS	19 (5.21)	7 (36.84)		11 (57.89)		4 (21.05)		10 (52.63)	
SHS	60 (16.44)	15 (25.00)		39 (65.00)		10 (16.67)		35 (58.33)	
Diploma/ Bachelor	220 (60.27)	53 (24.09)		158 (71.82)		44 (20.00)		138 (62.73)	
Masters/ Doctorate	66 (18.08)	17 (25.76)		45 (68.18)		16 (24.24)		46 (69.70)	
Marital status			0.001		0.066		0.038		0.032
Never married	219 (60.00)	66 (30.14)		156 (71.23)		54 (24.66)		141 (64.38)	
Married	133 (36.44)	20 (15.04)		85 (63.91)		18 (13.53)		76 (57.14)	
Separated/ Divorced	13 (3.56)	6 (46.15)		12 (92.31)		2 (15.38)		12 (92.31)	
Region*			0.155		0.002		0.563		0.030
Greater Accra	146 (40.00)	45 (30.82)		107 (73.29)		30 (20.55)		95 (65.07)	
Western	9 (2.47)	1 (11.11)		5 (55.56)		1 (11.11)		4 (44.44)	
Western North	7 (1.92)	2 (28.57)		5 (71.43)		0 (0.00)		4 (57.14)	
Eastern	10 (2.74)	3 (30.00)		4 (40.00)		4 (40.00)		3 (30.00)	
Central	19 (5.21)	3 (15.79)		15 (78.95)		5 (26.32)		15 (78.95)	
Ashanti	118 (32.33)	28 (23.73)		90 (76.95)		26 (22.03)		79 (66.95)	
Ahafo	3 (0.82)	1 (33.33)		1 (33.33)		1 (11.11)		1 (33.33)	
Bono East	12 (3.29)	3 (25.00)		6 (50.00)		3 (25.00)		6 (50.00)	
Northern	2 (0.55)	0 (0.00)		0 (0.00)		0 (0.00)		0 (0.00)	
Savanna	2 (0.55)	0 (0.00)		0 (0.00)		0 (0.00)		0 (0.00)	
Upper West	28 (7.67)	2 (7.14)		16 (57.14)		2 (7.14)		18 (64.29)	
Upper East	7 (1.92)	2 (28.57)		2 (28.57)		2 (28.57)		2 (28.57)	
Oti	2 (0.55)	2 (100.00)		2 (100.00)		0 (0.00)		2 (100.00)	
Religion			0.245		0.165		0.345		0.451
Atheist	12 (3.29)	4 (33.33)		7 (58.33)		2 (16.67)		6 (50.00)	
Christian	295 (80.82)	79 (26.78)		200 (67.80)		65 (22.03)		189 (64.07)	
Islam	39 (10.68)	5 (12.82)		29 (74.36)		4 (10.26)		21 (53.85)	
Traditional	19 (5.21)	4 (21.05)		17 (89.47)		3 (15.79)		13 (68.42)	
Sexual orientation			0.000		0.006		0.000		0.002
Heterosexual	322 (88.22)	55 (17.08)		216 (67.08)		45 (13.98)		192 (59.63)	
Bisexual	21 (5.75)	18 (85.71)		21 (100.00)		15 (71.43)		20 (95.24)	
Homosexual	22 (6.03)	19 (86.36)		16 (72.73)		14 (63.64)		17 (77.27)	

*Fisher's exact test

Table 2. Logistic regression models for predictors of awareness and willingness of pre-exposure prophylaxis (PrEP)

Characteristic	Awareness		Willingness	
	OR	AOR	OR	AOR
Age group				
18-25	1.00	1.00	1.00	1.00
26-35	2.98 (1.74, 5.13)*	4.01 (1.64, 9.80)*	0.63 (0.38, 1.02)	0.35 (0.17, 0.71)*
36-45	1.31 (0.61, 2.83)	3.68 (1.17, 11.59)*	0.99 (0.51, 1.95)	0.68 (0.27, 1.64)
≥ 46	0.92 (0.33, 2.58)	1.77 (0.46, 6.77)	0.61 (0.27, 1.35)	0.67 (0.26, 1.80)
Education level				
JHS	1.00	1.00	1.00	1.00
SHS	0.57 (0.19, 1.71)	0.59 (0.14, 2.45)	1.26 (0.44, 3.55)	1.59 (0.48, 5.23)
Diploma/Bachelor	0.54 (0.20, 1.45)	0.19 (0.48, 0.74)*	1.51 (0.59, 3.88)	1.58 (0.51, 4.85)
Masters/Doctorate	0.594 (0.20, 1.75)	0.27 (0.05, 1.29)	2.07 (0.73, 5.87)	3.28 (0.91, 11.91)
Marital status				
Never married	1.00	1.00	1.00	1.00
Married	0.41 (0.23, 0.72)*	0.29 (0.13, 0.67)*	0.74 (0.47, 1.15)	0.82 (0.45, 1.49)
Separated/Divorced	1.98 (0.64, 6.13)	0.41 (0.49, 3.58)	6.64 (0.85, 52.01)	6.66 (0.73, 60.85)
Religion				
Atheist	1.00	1.00	1.00	1.00
Christian	0.73 (0.21, 2.49)	1.01 (0.17, 5.94)	1.78 (0.56, 5.66)	2.49 (0.70, 8.86)
Islam	0.29 (0.06, 1.34)	0.35 (0.04, 3.07)	1.16 (0.32, 4.25)	1.53 (0.35, 6.60)
Traditional	0.53 (0.10, 2.72)	0.10 (0.01, 1.45)	2.16 (0.48, 9.60)	2.68 (0.51, 13.99)
Sexual orientation				
Heterosexual	1.00	1.00	1.00	1.00
Bisexual	29.12 (8.29, 102.30)*	53.15 (7.03, 401.48)*	13.54 (1.79, 102.14)*	13.52 (1.47, 123.67)*
Homosexual	30.74 (8.79, 107.50)*	19.96 (4.46, 89.32)*	2.30 (0.82, 6.39)	2.45 (0.78, 7.70)
Sexual intercourse (in the past 12 months)				
Yes	1.00	1.00	1.00	1.00
No	1.44 (0.81, 2.58)	1.05 (0.46, 2.39)	1.63 (1.00, 2.64)*	1.87 (1.06, 3.29)*
Last HIV test				
Never tested	1.00	1.00	1.00	1.00
< 3 months	16.70 (3.07, 90.76)*	6.23 (0.08, 450.60)	1.67 (0.32, 8.85)	0.37 (0.04, 3.29)
3-6 months	2.38 (0.79, 7.19)	4.11 (0.91, 18.57)	5.69 (1.27, 25.33)*	3.93 (0.83, 18.57)
7-12 months	5.46 (2.05, 14.50)*	4.12 (1.09, 15.50)*	1.56 (0.57, 4.24)	1.33 (0.70, 2.21)
> 12 months	4.05 (2.33, 7.05)*	3.25 (1.47, 7.18)*	1.06 (0.67, 1.68)	1.24 (0.70, 2.21)

(AOR: 1.87 [1.06-3.29]) were more likely to use PrEP compared with those who never tested for HIV.

With regard to PEP awareness, age, marital status, sexual orientation, sexual intercourse within the past 12 months, and the period of HIV test were significant determinants (Table 3). Individuals aged between 26 and 35 (AOR: 3.47 [1.43-8.44]) were more likely to be aware of PEP than those aged 18-25 years. Married and separated or divorced people (AOR: 0.22 [0.09-0.53] and 0.02 [0.00-0.33], respectively) were less likely to be aware of PEP than those who were single. Again, bisexuals and homosexuals (AOR: 42.57 [6.07-298.62] and 8.05 [2.27-28.54], respectively) were more likely to be aware of PEP

compared with heterosexuals. Others who had not had sex for the past 12 months preceding the survey (AOR: 4.37 [1.51-12.58]) were more likely to be aware of PEP. Finally, respondents who knew their HIV status 12 months ago at the time of the survey (AOR: 5.23 [2.22-12.35]) were more likely to be aware of PEP compared with those who never tested for HIV.

As for willingness to use PEP to prevent HIV, only age was significant factor (Table 3). Respondents between the ages of 26 and 35 (AOR: 0.46 [0.22-0.95]) were less likely to accept PEP medication compared with those aged 18-25 years.

Respondents cited several reasons why they would be unwilling to use PrEP or PEP (Table 4), which included

Table 3. Logistic regression models for predictors of awareness and willingness of post-exposure prophylaxis

Characteristic	Awareness		Willingness	
	OR	AOR	OR	AOR
Age group				
18-25	1.00	1.00	1.00	1.00
26-35	3.97 (2.23, 7.08)*	3.47 (1.43, 8.44)*	0.55 (0.33, 0.91)*	0.46 (0.22, 0.95)*
36-45	0.90 (0.35, 2.35)	1.23 (0.34, 4.41)	2.18 (0.92, 5.18)	2.26 (0.78, 6.54)
≥ 46	0.73 (0.20, 2.60)	1.85 (0.39, 8.80)	0.45 (0.20, 1.02)	0.57 (0.22, 1.49)
Education level				
JHS	1.00	1.00	1.00	1.00
SHS	0.75 (0.20, 2.73)	0.77 (0.14, 4.03)	1.35 (0.47, 3.87)	1.47 (0.44, 4.88)
Diploma/Bachelor	0.93 (0.29, 2.96)	0.33 (0.07, 1.50)	1.85 (0.71, 4.82)	1.96 (0.63, 6.04)
Masters/Doctorate	1.20 (0.34, 4.13)	0.48 (0.89, 2.63)	1.55 (0.54, 4.44)	1.56 (0.42, 5.68)
Marital status				
Never married	1.00	1.00	1.00	1.00
Married	0.47 (0.26, 0.85)*	0.22 (0.09, 0.53)*	0.71 (0.45, 1.13)	0.83 (0.45, 1.55)
Separated/Divorced	0.55 (0.11, 2.58)	0.02 (0.00, 0.33)*	4.84 (0.61, 38.05)	4.09 (0.45, 36.94)
Religion				
Atheist	1.00	1.00	1.00	1.00
Christian	1.41 (0.30, 6.61)	4.77 (0.49, 45.89)	1.50 (0.46, 4.86)	1.87 (0.52, 6.69)
Islam	0.57 (0.09, 3.58)	3.01 (0.22, 40.40)	2.07 (0.53, 8.02)	2.76 (0.61, 12.52)
Traditional	0.93 (0.13, 6.62)	0.37 (0.02, 5.99)	6.07 (0.94, 39.04)	5.69 (0.78, 41.29)
Sexual orientation				
Heterosexual	1.00	1.00	–	
Bisexual	15.38 (5.67, 41.73)*	42.57 (6.07, 298.62)*		
Homosexual	10.77 (4.27, 27.13)*	8.05 (2.27, 28.54)*		
Sexual intercourse (in the past 12 months)				
Yes	1.00	1.00	1.00	1.00
No	3.18 (1.46, 6.92)*	4.37 (1.51, 12.58)*	1.28 (0.77, 2.13)	1.40 (0.78, 2.52)
Last HIV test				
Never tested	1.00	1.00	1.00	1.00
< 3 months	31.78 (5.64, 178.88)*	9.82 (0.52, 185.14)	2.66 (0.31, 22.60)	0.51 (0.03, 7.65)
3-6 months	4.54 (1.42, 14.44)*	3.16 (0.77, 12.89)	0.96 (0.34, 2.65)	0.81 (0.25, 2.56)
7-12 months	5.44 (1.81, 16.37)*	2.65 (0.68, 10.27)	1.03 (0.37, 2.82)	1.24 (0.40, 3.78)
> 12 months	6.74 (3.49, 12.98)*	5.23 (2.22, 12.35)*	0.96 (0.59, 1.56)	1.03 (0.56, 1.89)

possible undesirable side effects, inadequate information on PrEP and PEP, commitment to abstaining from sex, regular condom use, being already HIV-infected, and being committed to one sex partner.

Discussion

In general, the results of the present study revealed a low awareness of PrEP and PEP among the adult population of Ghana. Only 25.2% of the individuals were aware of PrEP, while 20.3% were aware of PEP. This is not a major surprise, since the PEP and PrEP awareness have been reported to

be low in both developed and developing countries [19]. However, bisexuals and homosexuals reported high awareness of PrEP and PEP in the current study. About 85.7% and 71.4% of bisexuals were aware of PrEP and PEP, respectively. Homosexuals also showed a higher rate of 86.4% and 63.6% awareness of PrEP and PEP, respectively. This is in contrast with other studies indicating that key populations that are mostly targets for HIV prevention interventions have lower knowledge and awareness of PEP and PrEP [20, 21]. The high awareness rate of PEP and PrEP among homosexuals and bisexual people in Ghana could be attributed to the fact that PrEP and PEP services are available only to key populations,

Table 4. Reasons for not wanting to use pre-exposure prophylaxis (PrEP) or post-exposure prophylaxis (PEP)

Reasons	n	%
Possible undesirable side effects	12	25.00
Do not know much about PrEP and PEP	9	18.75
I need to abstain from sex	5	10.42
I do not have unprotected sex	5	10.42
I am not infected	5	10.42
I already have the virus	3	6.25
I am committed to my partner	6	12.50
It is the first time I'm hearing about PrEP and PEP	3	6.25
Total	48	100.00

including sex workers, men who have sex with men, and sero-discordant couples [2].

The low awareness of PrEP and PEP among the study respondents suggests that publicity on PrEP and PEP as a useful strategy for HIV prevention by health authorities is insufficient. Promotional efforts on HIV prevention in Ghana published in mass-media, including television, radio, and press, are mostly concentrated on condom use, and neglect other interventions, such as prevention of mother-to-child transmission of HIV, and PrEP and PEP utilization. Therefore, it is necessary for stakeholders in HIV prevention in Ghana to embark on consistent promotional efforts targeted at increasing PrEP and PEP visibility and usage among populations at risk.

It is important to re-emphasize that people who tested for HIV more than seven months prior to the study were more aware of PrEP than those who recently conducted a test. This could be attributed to the disruption of HIV counselling and testing exercises in Ghana as a result of the COVID-19 pandemic. The emergence of the COVID-19 pandemic dramatically shifted public health attention from almost all other diseases in Ghana to the pandemic. For more than six months, all other health's needs received little to no attention. There have been reports of instances, where drugs for HIV treatment, which also double drugs for PrEP, were unavailable due to logistical constraints [22, 23].

Although only 3.6% and 3.3% of the respondents have used PrEP and PEP, respectively, an encouraging number of 69.3% and 62.7% were willing to utilize PrEP and PEP, respectively. This reveals that despite low awareness of PrEP and PEP, the majority of the respondents viewed PrEP and PEP as useful strategies for HIV prevention. However, bisexuals and homosexuals had a higher willingness to use PrEP and PEP, while 100% of bisexuals and 72% homosexuals were willing to accept PrEP; a lower proportion (67.1%) of heterosexuals were willing to do the same. Moreover, as 95.2% of bisexuals and 77.3% of homosexuals exhibited higher willingness to accept PEP, approximately 59.6% of heterosexuals were less likely to do the same. This is in agreement with other findings,

which suggested that people who engage in high-risk sexual behaviors are more willing to use PrEP and PEP [24, 25].

A key reason for refusing to accept PrEP and PEP, as reported among the participants, is an undesirable side effect of the medication. This has been reported in other studies among sex workers, men who have sex with men (MSM), and heterosexuals [26-28]. This indicates the need to intensify education on PrEP and PEP regarding known and unknown side effects. Restar *et al.* [26] proposed that careful messaging on side effects as well as counselling is the key to increase the interest on PrEP and PEP uptake.

Having a university diploma or degree was associated with awareness of PrEP. This is in line with other studies conducted among men who have sex with men in Brazil, Spain, the United States, and France, showing that attending college is a predictor of PrEP and PEP awareness [29, 30]. With this in mind, it is therefore important that health educators on HIV prevention in Ghana adapt their campaigns to individuals with little or no education by providing information on PEP and PrEP in a comprehensive way.

Despite the novelty of this study in examining the aspect of HIV prevention that has a paucity in literature in Ghana, it has few limitations. The type of sampling method used could have prevented or missed some populations at risk from responding to the questions across all the 16 regions in Ghana. This weakens the findings, which might be generalized.

Conclusions

The present study demonstrated that awareness of PrEP and PEP among sexually active people in Ghana is very low. However, people identified as bisexuals and homosexuals have a higher awareness rate of PrEP and PEP as useful strategies for HIV prevention. Notwithstanding, most sexually active individuals will be willing to use PrEP and PEP for the prevention of HIV. The commonest reason for unwillingness to use PrEP and PEP is the fear of undesirable side effects of the medication. As a result, this paper urges health policy-makers to intensify their advocacy on the efficacy of PrEP and PEP as well as dismiss myths about the medication. The Health Service and Ghana AIDS Commission should also ensure that PrEP and PEP services are prepared to include all sexually active people in Ghana. This will ensure a great success in mitigating HIV infections in Ghana.

Conflict of interest

The authors declare no conflict of interest.

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