

Awareness and use of pre-exposure and postexposure prophylaxes among Nigerian university students

Findings from a cross-sectional survey

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Abstract

Despite the recent advances in biomedical preventive strategies, young adults—especially adolescent girls—continue to be disproportionately at risk of acquiring HIV. To avert this trend, it is critical that access to HIV preventive strategies, such as pre-exposure prophylaxis (PrEP) and postexposure prophylaxis be expanded, especially in sub-Saharan Africa, where young adults are known to engage in risky sexual practices. This study examined awareness levels and use of pre-exposure prophylaxis (PrEP) and postexposure prophylaxis (PEP) among Nigerian university students.

A cross-sectional survey was conducted among 800 students selected using stratified random sampling at 2 Nigerian universities. Descriptive and inferential statistics were used for data analysis on 784 complete responses.

The levels of awareness of PrEP and PEP were 18.9% and 25.4%, respectively. Ever tested for human immunodeficiency virus [HIV] (AOR: 1.58; 95% CI: 1.04–2.42) and knowledge of partner's HIV status (AOR: 1.87; 95% CI: 1.25–2.79) were the significant determinants of awareness to PrEP. In contrast, only ever tested for HIV (AOR: 1.50; 95% CI: 1.02–2.19), knowledge of partner's HIV status (AOR: 1.55; 95% CI: 1.07–2.24), ever used condoms (AOR: 1.65; 95% CI: 1.04–2.62), and nude exchanges (AOR: 1.62; 95% CI: 1.13–2.31) were independent determinants of awareness of PEP. Only a few students had seen (5.6%) or used (1.5%) any prophylaxes.

The study findings indicate a low level of awareness and use of PrEP and PEP. To ensure no one is left behind in the goal of elimination of new HIV infections, intervention to expand access to these preventive strategies is needed in the study settings.

Abbreviations: AIDS = acquire immunodeficiency syndrome, HIV = human immunodeficiency virus, PEP = postexposure prophylaxis, PrEP = pre-exposure prophylaxis.

Keywords: Nigeria university students, postexposure prophylaxis, pre-exposure prophylaxis, preventive strategies

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All relevant data and material is available through the corresponding author on reasonable request.

The Ethical Review Committees of the University of Fort Hare and the Ondo State Ministry of Health approved the study protocol. The inclusion of participants was voluntary and informed consent was obtained from every participant. The confidentiality and anonymity of respondents were also guaranteed. The study was conducted in accordance with all relevant guidelines and regulations.

The authors have no conflicts of interest to disclose.

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1. Introduction

Despite the recent advances in biomedical preventive strategies, young adults—especially adolescent girls—continue to be disproportionately at risk of acquiring HIV.^[1–5] In all regions of the world, young adults account for the largest percentages of new HIV infections^[6] and are by far the more likely to die from HIV-related causes.^[7–9] Acquire immunodeficiency syndrome (AIDS) is now the leading cause of death among young people (aged 10–24) in sub-Saharan Africa (the region with the highest burden of HIV) and the second leading cause globally.^[7–9] To avert this trend, it is critical that access to HIV preventive strategies, such as pre-exposure prophylaxis (PrEP) and post-exposure prophylaxis^[10] be expanded, especially in sub-Saharan Africa, where young adults are known to engage in risky sexual practices.^[11–18]

The emergence of PrEP and PEP as preventive tools has increased the optimism toward eliminating new HIV transmission.^[19] Pre-exposure prophylaxis and PEP have proven to be efficacious in reducing the risk of HIV transmission in many clinical trials.^[19–21] The PEP is relevant for emergency intervention in order to decrease the risk of acquiring HIV infections following sexual exposure to an HIV infected partner.^[22] PrEP involves the administration of antiretroviral drugs to an uninfected person, before potential HIV exposure, in order to

reduce the risk of infection.^[20] When the virus enters the body, the replication of HIV becomes restrained by PrEP, thereby preventing establishment of permanent infection.^[19–21] As such, PrEP and PEP are effective prevention strategies against HIV infection. When used consistently, they offer an additional safety net for individuals with high-risk sexual behaviors.^[19–21,23]

However, for PEP and PrEP to have population-level impact on the reduction of HIV transmission, there is a need to increase the level of awareness, acceptability, and utilisation. In other words, young adults need to be aware of these preventive options before and when they are in need of them. A review of recent studies indicates that the level of awareness of prophylaxis among young adults, who mostly are at risk of contracting HIV, ranges from as low as 28% to 85.2%.^[1,24–27] What is more, awareness of both PrEP and PEP in sub-Saharan Africa where HIV is prevalent, is considerably lower compared to developed countries.^[1,19,27–29] Studies have shown that young adults are willing to use PrEP and PEP; however, lack of public education on the existence of PEP and PrEP, discomfort in talking to a medical provider about sexual health and the level of risky sexual behavior among others are barriers to accessing these medications.^[28,30]

Nigeria is among the 6 countries with the highest burden of HIV in sub-Saharan Africa; the region with almost half of all new HIV infections globally.^[2,3,31] A study estimated that more than 45% of new infections in Nigeria would occur among persons who reported “low risk” sex suggesting that all youths should be targeted for preventive intervention rather than targeting “men who have sex with men” (MSM) and female sex workers (FSW) alone.^[32] Nigeria has the second largest number of PLHIV; yet, the level of HIV test uptake is relatively low in Nigeria.^[33,34] HIV testing is the basic in the HIV cascade. Individuals who had tested for HIV could perhaps have better knowledge about HIV prevention, including PrEP and PEP. While many studies have investigated the determinant of PrEP and PEP awareness, little is known about the impact of HIV testing uptake on the awareness and use of PrEP and PEP. In addition, while there are studies on awareness of PEP among health workers in Nigeria,^[22,35–38] to our knowledge, no studies exist on the level of awareness and use of PrEP and PEP among young adults in the country. Such information could stimulate public debates on HIV prevention policy. Uptake HIV testing among young adults in sub-Saharan Africa is suboptimal.^[39–42] This study aims to examine the level of awareness and use of PrEP and PEP among Nigerian youth. It also seeks to determine the correlates of awareness of these preventive measures. The study was conducted among university students because they are known to engage in risky sexual practices.^[16,43,44] University students, unlike other young adults, tend to delay or postpone marriage in Nigeria. Thus, they are faced with significant risk of contracting HIV due to their engaging in unprotected sex with multiple sexual partners.^[31,32]

2. Methods

This cross-sectional study was conducted using an interviewer-administered questionnaire. Experienced and well-trained research assistants were recruited to administer a pretested questionnaire to students at 2 Nigerian universities. Nasarawa State University was selected for the study because of its location in a high HIV prevalence state and the University of Ilorin in a state with low prevalence of HIV.^[45] Before administering the questionnaires, a pilot study was conducted in another university

and among 20 participants who were not included in the main study. Feedback from these participants was used to improve the questionnaire. The University of Fort Hare and Ondo State Ministry of Health Ethical Review Committees approved the study protocol. The inclusion of participants was voluntary and informed consent was obtained from every participant. The confidentiality and anonymity of respondents were also guaranteed. The study was conducted in accordance with all relevant guidelines and regulations.

2.1. Participants and sampling methods

The study was conducted at the University of Ilorin and Nasarawa State University, both in the North Central region of Nigeria, between February and April 2018. The total population of students at the University of Ilorin and Nasarawa State University was approximately 45,000 students. To ensure a representative sample of each university, sample size was calculated separately. A sample of 400 participants at a confidence level of 95%, confidence interval of ± 5 , adjusted for missing responses, was required in each university. Participants were selected using stratified random sampling. To ensure representativeness, participants were stratified by sex, year of study and faculty of study and probability proportion to size was selected in each strata. Since the proportions of male to female students at both universities were nearly equal, we included 400 male and 400 female students in the study. However, the data analysis was limited to 784 participants with complete responses.

2.2. Measures

The questionnaire consisted of 3 sections with close-ended and open-ended questions, which allowed the effective capturing of structured responses on the level of awareness, knowledge, and use of PrEP and PEP. Data on socio-demographic variables such as age, sex, level of study, type of home and school residence, religious practices, and faculty of study were obtained through the first part of the questionnaire. The second section consisted of a number of questionnaire items, which probed the sexual behavior of respondents by assessing their level of high-risk sexual behavior, alcohol use, cigarette smoking habits, and the use of condoms. The third section examined the level of awareness, knowledge and use of PrEP and PEP. Respondents answered questions probing their knowledge of HIV, awareness of the existence of PrEP and PEP, knowledge of where to obtain the drugs, the cost, identification of the drugs, and their utilization.

2.3. Statistical analysis

Data were coded and entered into Statistical Package for Social Sciences (SPSS version 19, Chicago, IL). We first examined the descriptive statistics for all study variables. To examine the correlates of awareness to PrEP and PEP, we fitted binary regression models at a 95% confidence level. The first model was an unadjusted model that examined the independent effect of age, sex, ever tested for HIV, knows partner HIV status, discussed HIV with sexual partner, HIV risk perceptions, and sexual behavior on awareness of PrEP and PEP. Discussion of HIV with sexual partner and perceived risk of contracting HIV were collinear with knowing partners HIV state and were removed from the second models. The alpha value for statistical significance was set at 0.05

Table 1
Demographic characteristics of study participants.

Variables	All participants 784 (100)	Male 402 (51.3%)	Female 382 (48.7%)
Sex			
Age			
Below 20 y	219 (27.9)	76 (18.9)	143 (37.4)
20–24 y	384 (49.0)	207 (51.5)	177 (46.3)
Above 24 y	181 (23.1)	119 (29.6)	62 (16.2)
Year of study			
First year	244 (31.1)	120 (29.9)	124 (32.5)
Second year	188 (24.0)	82 (20.4)	106 (27.7)
Third year	139 (17.7)	75 (18.7)	64 (16.8)
Fourth year	168 (21.4)	94 (23.4)	74 (19.4)
Fifth year	31 (4.0)	22 (5.5)	9 (2.4)
Postgraduate	14 (1.8)	9 (2.2)	5 (1.3)
Residence type			
University residence	156 (19.9)	61 (15.2)	95 (24.9)
Off-campus residence	627 (80.1)	340 (84.8)	287 (75.1)
Living arrangement			
I live alone	237 (30.7)	116 (29.4)	121 (31.9)
Live with 1 room mate	315 (40.8)	161 (40.9)	154 (40.6)
Have more than 1 room mate	221 (28.6)	117 (29.7)	104 (27.4)
Religious background			
Christian orthodox	304 (38.9)	166 (41.3)	138 (36.3)
Christian Pentecostal	270 (34.5)	131 (32.6)	139 (36.6)
Muslim	200 (25.6)	99 (24.6)	101 (26.6)
Others	8 (1.0)	6 (1.5)	2 (0.5)

3. Results

The analysis was limited to 784 participants who had submitted complete responses. Average age of participants was 21.8 years

(SD = 4.4). Most participants were below 24 years, resided in off-campus residences and were Christians (Table 1).

3.1. Awareness of pre-exposure prophylaxis (PrEP)

As shown in Table 2, only 18.9% of the study participants were aware of PrEP. Awareness of PrEP was highest among males, aged above 24 years, students who had tested for HIV, discussed HIV with their partners or knew their partner's HIV status. In the unadjusted regression model, there was no significant association between the level of PrEP awareness and the following demographic characteristics; sex, age, and types of residence. In the adjusted regression model, only ever tested for HIV (AOR: 1.58; 95% CI: 1.04–2.42) and knowledge of partner's HIV status (AOR: 1.87; 95% CI: 1.25–2.79) were the significant determinants of PrEP awareness. Students who had ever tested for HIV were twice more likely to be aware of PrEP compared to those who had not. Similarly, students who knew their partner's HIV status had increased odds of being aware of PrEP compared to those who did not.

3.2. Awareness of postexposure prophylaxis

As presented in Table 3, only a quarter of the students were aware of postexposure prophylaxis. Awareness of PEP was not associated with sex and age. In the unadjusted logistic regression, types of residence, ever tested for HIV, knowledge of partner's HIV status, discussion of HIV with partners, condom use, nude exchanges, and perceptions of HIV transmission risk were associated with awareness of PEP. In the adjusted regression model, only ever tested for HIV (AOR: 1.50; 95% CI: 1.02–2.19), knowledge of partner's HIV status (AOR: 1.55; 95% CI:

Table 2
Adjusted and unadjusted logistic regression models showing determinants of awareness of Pre-exposure prophylaxis among Nigerian university students.

Variables	Aware 147 (18.9)	Not aware 632 (81.1)	UOR	AOR
Sex				
Male	84 (21.2)	314 (78.9)	1.35 (0.94–1.94)	1.46 (0.99–2.17)
Female (ref)	63 (16.5)	318 (83.5)		
Age				
Below 20 y	40 (18.6)	175 (81.4)	0.81 (0.49–1.32)	0.77 (0.44–1.35)
20–24 y	67 (17.5)	316 (82.5)	0.74 (0.48–1.16)	1.07 (0.67–1.70)
Above 24 y (ref)	40 (22.1)	141 (77.9)		
Residence type				
University residence	24 (15.4)	132 (84.6)	0.74 (0.46–1.19)	0.73 (0.43–1.23)
Off-campus residence (ref)	123 (19.8)	499 (80.2)		
Ever tested for HIV				
Yes	91 (23.0)	304 (77.0)	1.74 (1.20–2.51) [‡]	1.58 (1.04–2.42) [†]
No (ref)	56 (14.7)	325 (85.3)		
Knows partners HIV status				
Yes	74 (25.3)	218 (74.7)	2.03 (1.40–2.94) [*]	1.87 (1.25–2.79) [†]
No (ref)	66 (14.3)	394 (85.7)		
Discussed HIV with partner				
Yes	64 (22.7)	218 (77.3)	1.53 (1.06–2.23) [†]	N/A
No (ref)	75 (16.1)	392 (83.9)		
Think HIV you can contract HIV				
Yes	23 (24.0)	73 (76.0)	1.45 (0.87–2.41)	1.31 (0.77–2.23)
No	120 (17.9)	551 (82.1)		

AOR = adjusted odd ratio, UOR = unadjusted odd ratio.

^{*} P value < .001; P value < .005.

[†] P value < .05.

[‡] P value < .005.

N/A: Model adjusted for confounding variable (discussed HIV with sexual partners).

Table 3**Adjusted and unadjusted logistic regression models showing determinants of awareness of Post-exposure prophylaxis.**

Variables	Aware 197 (25.4)	Not aware 580 (74.6)	UOR	AOR
All participants				
Sex				
Male	106 (26.7)	291 (73.3)	1.16 (0.84–1.60)	1.17 (0.82–1.67)
Female (ref)	91 (23.9)	289 (76.1)		
Age				
Below 20 y	55 (25.7)	159 (74.3)	0.99 (0.63–1.55)	0.69 (0.40–1.18)
20–24 y	95 (24.9)	287 (75.1)	0.94 (0.63–1.42)	0.88 (0.57–1.34)
Above 24 y (ref)	47 (26.0)	134 (74.0)		
Residence type				
University residence	29 (18.6)	127 (81.4)	0.61 (0.40–0.95) †	0.64 (0.40.1.05)
Off-campus residence (ref)	168 (27.1)	452 (72.9)		
Ever tested for HIV				
Yes	118 (29.9)	277 (70.1)	1.62 (1.17–2.25)*	1.50 (1.02–2.19) †
No (ref)	79 (20.8)	300 (79.2)		
Knows partners HIV status				
Yes	90 (30.8)	202 (69.2)	1.66 (1.19–2.32)*	1.55 (1.07–2.24) †
No (ref)	97 (21.2)	361 (78.8)		
Discussed HIV with partner				
Yes	85 (30.1)	197 (69.9)	1.56 (1.11–2.18) †	N/A
No (ref)	101 (21.7)	364 (78.3)		
Do you think you can contract HIV				
Yes	32 (33.3)	64 (66.7)	1.59 (1.01–2.52) †	N/A
No (ref)	160 (23.9)	509 (76.1)		
Ever sent or received nude pictures				
Yes	93 (30.8)	209 (69.2)	1.59 (1.14–2.21) †	1.62 (1.13–2.31) †
No	102 (21.9)	364 (78.1)		
Ever used a condom				
Yes	150 (27.9)	388 (72.1)	1.77 (1.18–2.64) †	1.65 (1.04–2.62) †
No (ref)	37 (18.0)	169 (82.0)		

AOR=adjusted odd ratio, UOR=unadjusted odd ratio.

* *P* value < .005.† *P* value < .05.

N/A: model adjusted for confounding variables (do you think you contract HIV and discussed HIV with sexual partners).

1.07–2.24), ever used condom (AOR: 1.65; 95% CI: 1.04–2.62), and nude exchanges (AOR: 1.62; 95% CI: 1.13–2.31) were the independent determinants of PEP. Students who had ever tested for HIV were one and a half times more likely to be aware of PEP compared to those who never tested for HIV. Students who claimed to have ever exchanged nude pictures were 1.6 times more likely to be aware of PEP compared to those who never exchanged nude pictures. Those who ever used condom were more likely to state that they were aware of PEP compared to those who had never used a condom.

Table 4**Knowledge of and use of PrEP and PEP.**

Variables	Frequencies	Percent
Do you know where to get either of them?		
Yes	82	10.6
No	693	89.4
Do you know how much they cost?		
Yes	30	3.9
No	749	96.1
Have you seen them?		
Yes	44	5.6
No	735	94.4
Have you used any of them?		
Yes	12	1.5
No	767	98.5

3.3. Knowledge and use of PrEP and PEP

As indicated in Table 4, only 10% of the students knew where to obtain PEP and PrEP. A very few of the respondents knew how much it cost, have seen it, and have ever used it.

4. Discussion

This study determined the rate of PrEP and PEP awareness and use; it also examined the factors associated with PEP and PrEP awareness. Our findings showed that the level of awareness of both prophylaxes was low. The rate of PrEP awareness reported in this study is similar to a study conducted among MSMs in New York^[46] but much lower than other studies' findings in developed countries.^[47–51] Clearly, awareness of PEP and PrEP is low among Nigerian youths and it is not surprising that the level of use is also very low. These findings have huge implication for prevention of HIV in Nigeria, which is one of the countries heavily burdened by HIV. There is a need to empower all youths with comprehensive HIV prevention packages including knowledge and access to PEP and PrEP in the study setting. Each and every youth needs to have knowledge of how to protect him/herself before, when, and after they are at risk of contracting HIV.

Several differences were noted in the level of awareness of PrEP and PEP. While there were no significant differences in sex, age, and awareness of PrEP and PEP, a higher proportion of students who had tested for HIV and discussed HIV with their partners reported awareness of both prophylaxes compared to those who

had not. After controlling for demographic factors, ever tested for HIV and knowledge of partner's HIV status remained associated with awareness of PrEP. Previous studies have linked recent HIV testing with awareness of PrEP.^[47–51] HIV testing provides people with the opportunity of learning about how to prevent HIV. Thus, this finding suggests that promotion of HIV testing could be a useful target for future interventional research focused on improving awareness of PrEP. HIV testing is the basic HIV care cascade, which is important for early detection, diagnosis and linkage to care. Roll out HIV testing also benefits individuals who tested negative because the HIV counselling provided prior to the test would equip them with knowledge of HIV prevention such as PrEP and PEP.

Our study also shows that awareness of PEP is associated with the use of condoms, the exchange of nude pictures, HIV testing and knowledge of partner's HIV status. These findings suggest, among other things, that students who had never used a condom are either unconcerned about contracting HIV/other sexually transmitted diseases or they are not sexually active. This study suggests that people who engaged in unprotected sex with casual partners often become aware of available prevention tools like PEP. In other words, individuals who are concerned about contracting HIV and engaged in preventive behavior are more likely to be aware of PEP.

The other finding of this study is the low level of knowledge and use of PEP and PrEP. This is not surprising considering that these preventive methods are still relative new in the study setting. Those in need of these medications do not know about their existence. As such, individuals with a perceived need of preventing HIV before/after unprotected sex are unable to benefit from using PrEP and PEP in the study setting. It is also worth noting that many individuals who are raped may not report to hospitals; this suggests that they are, on many occasions, unable to prevent themselves from contracting HIV. Providing youths with knowledge of PrEP and PEP would improve their health seeking behavior, especially when raped. There is considerable evidence in the literature indicating the need for PrEP and PEP among Nigerian youths, especially the university students.^[2,5,8,31,32] This confirms that there is an unmet need of preventive strategies in this study population. The agency of the states and the federal government such as the National Agency for the Control of AIDS^[52] should expand access to pre-exposure and nonoccupational postexposure prophylaxis in the study settings as well as in the country at large.

4.1. Limitations

Although this study provides insights on the awareness, knowledge, and use of PrEP and PEP in Nigeria, the findings must be placed in the context of its limitations. First, the use of a cross-sectional design to collect data does not allow causality inference to be drawn from our results. In addition, our sample selection could lead to volunteer bias because only those who were willing to participate were included in the study. Lastly, this study cohort had a higher educational level compared to the general population in Nigeria, thus limiting the generalizability of these findings to the overall youth population in the country. It is concerning that in this highly educated sample such a low level of awareness of PrEP and PEP was reported.

5. Conclusion

There is a low level of awareness, knowledge, and use of PEP and PrEP among Nigerian university students. Awareness of PrEP and

PEP is associated with recent HIV testing, knowledge of partner's HIV status, condom use, and exchange of nude pictures. In order to ensure that no one is left behind in the goal of elimination of new HIV infections, awareness campaigns, public education, and community engagement are needed to expand access to these preventive strategies in the study settings.

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Author contributions

AIA conceptualized the study. AIA, KOI, WA, and OVA contributed to the design and implementation of the study. AIA and KOI drafted the manuscript. All authors read the final version of the manuscript.

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