

RESEARCH ARTICLE

Awareness, willingness to use, and history of HIV PrEP use among gay, bisexual, and other men who have sex with men in Nigeria

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Abstract

Background

Nigerian gay, bisexual, and other men who have sex with men (GBMSM) are disproportionately affected by HIV, with an estimated prevalence of between 11–35%. Pre-exposure prophylaxis (PrEP) has the potential to significantly decrease incident HIV infections among Nigerian GBMSM. Understanding the relationship between socio-demographic, sexual risk behavior, and psychosocial factors with PrEP awareness, willingness to use, and history of use among this group is pivotal to maximizing PrEP uptake.

Methods

Between March and June 2019, 419 participants completed an interviewer-administered survey assessing PrEP awareness, willingness to use, and history of use; socio-demographics; sexual risk behavior; and psychosocial factors. Bivariate and multivariable logistic regression were used to examine factors associated with PrEP awareness, willingness to use, and history of use.

Results

53.6% were aware of PrEP; 80.1% were willing to use PrEP; and 29.7% had previously used PrEP. In multivariable analysis, factors associated with an increased odds of PrEP awareness include residing in Abuja [adjusted odds ratio (aOR) 5.02; 95% confidence interval (CI): 2.13 to 11.83] and Lagos (aOR 12.30; 95% CI: 4.92 to 30.67) vs. residing in Plateau, living with HIV (aOR 2.56; 95% CI: 1.54 to 4.72), using location-based apps for seeking sexual partners (aOR 4.06; 95% CI: 2.28 to 7.24), having health insurance (aOR 2.31; 95% CI: 1.08 to 4.40), history of suicidal thoughts (aOR 2.05; 95% CI: 1.02 to 4.10), and history of PrEP use (aOR 45.5; 95% CI: 5.60 to 370.04). Decreasing clinically significant

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depressive symptoms was associated with lower willingness to use PrEP (aOR 0.96; 95% CI: 0.92 to 0.99). Lastly, factors associated with increased odds of having a history of PrEP use were those reporting 6 or more insertive anal sex acts in the last 30 days compared to those with none (aOR 5.76; 95% CI: 1.58 to 20.98) and being aware of PrEP (aOR 29.6; 95% CI: 3.78 to 231.84).

Discussion

Nearly half of the Nigerian GBMSM in this study had no prior awareness of PrEP, but after being informed about its potential benefits, the majority were willing to use it. However, PrEP uptake among Nigerian GBMSM remains low. Findings suggest that educational messages are necessary to ensure appropriate PrEP scale-up, especially tailored towards Nigerian GBMSM.

Introduction

Nigeria has the fourth largest human immunodeficiency virus (HIV) epidemic in the world, with a prevalence of 1.4% among the general adult population and an estimated 1.9 million people living with HIV [1]. Nigerian gay, bisexual and other men who have sex with men (GBMSM) bear a disproportionately higher burden of HIV, with an estimated prevalence of 11–35% [2]. Oral pre-exposure prophylaxis (PrEP) is a biomedical prevention approach that significantly reduces HIV acquisition when taken daily [3–5]. Given its efficacy, PrEP has the potential to significantly decrease new HIV infections among Nigeria GBMSM. In 2013, a consultation of community leaders, implementers, and academics from 17 African countries gathered to assess HIV prevention priorities for GBMSM and identified oral PrEP as a major biomedical prevention strategy [6]. Currently, PrEP is not widely available in Nigeria, however there are two ongoing implementation and demonstration projects with an estimated 400–600 individuals currently taking PrEP [7].

Gaining an in-depth understanding of awareness of and acceptability of PrEP among Nigerian GBMSM is crucial for preparing for PrEP uptake, once it becomes more widely available. To date, only a few studies have investigated PrEP awareness, acceptability, and current use among African GBMSM. A recently published study of 459 HIV-negative Kenyan GBMSM found that 64.3% had awareness of PrEP and 44.9% were willing to use PrEP in the future [8]. Another study of 137 GBMSM in Ghana found low awareness but high acceptability of PrEP [9]. These studies provide preliminary evidence of PrEP being acceptable by African GBMSM.

To date, there are no known published studies that have explored the relationship between socio-demographic, sexual risk behavior, and psychosocial factors with PrEP awareness, willingness to use PrEP, and history of PrEP use for HIV prevention among Nigerian GBMSM. The goal of the current study is to examine these relationships among a community-recruited sample of GBMSM in four diverse regions of Nigeria. Understanding these relationships will be helpful for designing successful intervention programs to increase PrEP uptake among this marginalized group.

Methods

Participants and procedures

Between March and June 2019, 413 GBMSM enrolled in the study and completed a quantitative assessment. Inclusion criteria were: 1) 18 years of age or older; 2) currently residing in one

of four Nigerian states (Abuja, Lagos, Delta or Plateau); 3) cis-gender male; and 4) having sex with another male.

Participants were recruited through community-based organizations (CBOs) in each of the four states and via snowball sampling. Outreach workers and peer educators at the respective CBOs shared information about the study with the target population during programming events (e.g., HIV testing and counseling, health education, advocacy events, etc.) and provided study contact information to individuals who were interested. Eligible participants were then asked to provide study information to their peer networks.

Study activities took place in private offices within our partner CBOs. The study was approved by the institutional review boards at Brown University and the Nigerian Institute of Medical Research. Informed verbal consent was obtained from each participant prior to enrolling them in study. Each participant completed an interviewer administered behavioral survey. Participants were compensated 4,000 Naira (10 US dollars) for their participation.

Measures

Demographics. Participants were asked their age, relationship status, education level and sexual orientation.

Social marginalization. Participants were asked their monthly income, employment status, financial hardship, and any history of incarceration.

Sexual health. Participants were asked their sexual position, HIV status, and any history of sexually transmitted infections (STIs), any STIs in the last year, number of receptive and insertive anal sex partners in the last 30 days, condom use at last anal sex, and any usage of geo-social networking apps.

Healthcare access. Participants were asked whether or not they had a current primary care provider (yes/no), health insurance (yes/no), and whether they had been unable to access healthcare in the last year due to costs (yes/no).

Mental health. Participants were asked about depressive symptoms using the Center for Epidemiologic Studies Depression Scale (CES-D) [10], a 20-item scale used to screen for clinically significant depressive symptoms. The items were scored on a 4-point scale from 0–3, with a higher score indicating higher levels of depressive symptoms. Previous suicide thoughts were assessed by asking participants: “Have you ever thought about ending your life or committing suicide?” (yes/no). Internalized homophobia was assessed using a three-item scale scored on 5-point Likert scale [11], with a higher score indicating higher levels of internalized homophobia.

Substance use. Participants were asked about their alcohol and drug use. Problematic alcohol use was assessed with the AUDIT-C [12], a 3-item screening for heavy drinking or alcohol dependence. The AUDIT-C is scored on a scale of 0–12; a score of 4 or greater indicated hazardous drinking. Participants were asked about having ever used recreational drugs, including (marijuana, tramadol, rophynol (flunitrazepam), codeine, poppers (alkyl nitrites), and cocaine) (yes/no).

PrEP awareness, willingness to use PrEP and history of using PrEP. To assess PrEP awareness, participants were asked: “Have you heard of pre-exposure prophylaxis (PrEP) for HIV prevention?” (yes/no). To assess willingness to use PrEP, participants were provided some brief information about PrEP (i.e., PrEP is one pill taken once daily by HIV-negative people to reduce their risk of HIV infection) and then asked: “Would you be willing to take an oral pill every day to prevent getting HIV infection?” (willing/not willing/not sure, dichotomized into willing/not willing or not sure). We excluded participants who self-reported currently living with HIV as there are not eligible to take PrEP. To assess history of PrEP use,

participants were asked: “Have you ever taken PrEP to prevent HIV?” (yes/no). We excluded participants who self-reported living with HIV and those currently residing in Delta or Plateau state, where PrEP is currently unavailable.

Data analysis

We assessed the distribution (percentages and means) of all variables by PrEP awareness, willingness to use, and history of use. Chi-square global tests of independence were used to assess independent association between variables. Bivariate logistic regression was conducted to assess the association between socio-demographic, sexual risk behavior, and psychosocial factors and the three PrEP-related outcomes (PrEP awareness, willingness to use PrEP, and history of PrEP use). It was determined that a sample size of 400 GBMSM (100 recruited in each of the four states) would provide 80% power to detect a 30% or greater difference in PrEP awareness between the four States sampled at a two sided .05 significance level. Variables significant at the $p < 0.05$ level in the bivariate models were retained in each of the three multivariable models assessing these outcomes. Data were analyzed using SAS version 9.4 (Cary, NC).

Results

As seen in [Table 1](#), Participants ranged in age from 18 to 60 years (mean = 29.2, SD = 5.8), with 59.4% identifying as bisexual, and 62.3% were single. More than a third (37.7%) of the sample was living with HIV and 32.1% had an STI diagnosis in the last year. Almost half (48.8%) had a primary care provider but only 15.6% had health insurance. The depression scores ranged from 0 to 60 with a mean score of 10.0 (SD = 11.5); 23.7% of participants had a score of 16 or higher, indicating moderate to severe depression. 18.9% of participants were indicated for hazardous drinking and history of drug use were prevalent: marijuana (42.2%), tramadol (15.2%), rophynol (15.1%), codeine (24.1%), poppers (8.6%), cocaine (7.1%). More than half the sample (53.6%) were aware of PrEP, 80.1% were willing to use PrEP, and 29.7% had a history of PrEP use.

PrEP awareness

In multivariable analysis ([Table 2](#)), factors associated with an increased odds of PrEP awareness include residing in Abuja [adjusted odds ratio (aOR) 5.02; 95% confidence interval (CI): 2.13 to 11.83] and Lagos (aOR 12.30; 95% CI: 4.92 to 30.67) vs. residing in Plateau, living with HIV (aOR 2.56; 95% CI: 1.54 to 4.72), using location-based apps for seeking sexual partners (aOR 4.06; 95% CI: 2.28 to 7.24), having health insurance (aOR 2.31; 95% CI: 1.08 to 4.40), history of suicidal thoughts (aOR 2.05; 95% CI: 1.02 to 4.10), and history of PrEP use (aOR 45.5; 95% CI: 5.60 to 370.04).

Willingness to use PrEP

In multivariable analysis ([Table 2](#)), decreasing clinically significant depressive symptoms was associated with lower willingness to use PrEP (aOR 0.96; 95% CI: 0.92 to 0.99).

History of PrEP use

In the multivariable model ([Table 2](#)), factors associated with increased odds of having a history of PrEP use were those reporting 6 or more insertive anal sex acts in the last 30 days compared to those with none (aOR 5.76; 95% CI: 1.58 to 20.98) and being aware of PrEP (aOR 29.6; 95% CI: 3.78 to 231.84).

Table 1. Socio-demographic, sexual risk behavior, and psychosocial factors associated with PrEP awareness, willingness to use PrEP, and history of PrEP use among Nigerian GBMSM from March-June 2019 (N = 413).

	Total Sample (N = 413)	Awareness of PrEP (n = 401)		P	Willingness to Use PrEP (n = 251)		P	PrEP Use (n = 138)		P
		Aware of PrEP (n = 215, 53.6%)	Unaware of PrEP (n = 186, 46.4%)		Willing (n = 201, 80.1%)	Not Willing/ Not Sure (n = 50, 19.9%)		History of PrEP Use (n = 41, 29.7%)	No history of PrEP Use (n = 97, 70.3%)	
Site										
Abuja	104 (26.1)	74 (71.2)	30 (28.8)	<0.0001	39 (73.6)	14 (26.4)	0.49	18 (33.3)	36 (66.7)	0.54
Delta	100 (25.1)	31 (31.0)	69 (69.0)		56 (84.9)	10 (15.1)		-	-	
Lagos	109 (27.4)	91 (83.5)	18 (16.5)		64 (79.0)	17 (21.0)		23 (28.4)	58 (71.6)	
Plateau	85 (21.4)	19 (22.4)	66 (77.7)		39 (81.3)	9 (18.7)		-	-	
Socio-Demographics										
Age										
Mean (SD)	29.2 (5.80)	29.9 (5.16)	29.7 (7.09)	0.72	28.9 (5.80)	30.8 (5.74)	0.04	28.0 (5.60)	29.6 (5.74)	0.13
Relationship Status										
Single	250 (62.3)	146 (58.4)	104 (41.6)	0.01	130 (83.3)	26 (16.7)	0.09	30 (32.9)	61 (67.0)	0.24
Not Single	151 (37.7)	69 (45.7)	82 (54.3)		71 (74.7)	24 (25.3)		11 (23.4)	36 (76.6)	
Education										
SSS or lower	182 (45.4)	78 (42.9)	104 (57.1)	<0.0001	86 (81.1)	20 (18.9)	0.46	16 (27.1)	43 (72.9)	0.67
Some Uni or Vocation Sch	86 (21.5)	40 (46.5)	46 (53.5)		46 (83.6)	9 (16.4)		6 (27.3)	16 (72.7)	
College degree or higher	109 (27.2)	83 (76.2)	26 (23.9)		57 (79.2)	15 (20.8)		14 (30.4)	32 (69.6)	
Other	24 (6.0)	14 (56.3)	10 (41.7)		12 (66.7)	6 (33.3)		5 (45.5)	6 (54.5)	
Sexual Orientation										
Gay/Homosexual	162 (40.6)	92 (56.8)	70 (43.2)	0.26	68 (76.4)	21 (23.6)	0.30	17 (31.5)	37 (68.5)	0.56
Bisexual	237 (59.4)	121 (51.1)	116 (48.9)		131 (81.9)	29 (18.1)		22 (26.8)	60 (73.2)	
Monthly Income (in Naira)										
0–10000	103 (26.0)	50 (48.5)	53 (51.5)	0.008	47 (85.5)	8 (14.5)	0.20	7 (21.9)	25 (78.1)	0.35
10,000–30,000	106 (26.7)	46 (43.4)	60 (56.6)		62 (84.9)	11 (15.1)		12 (35.3)	22 (64.7)	
30,000–50,000	79 (19.9)	44 (55.7)	35 (44.3)		41 (75.9)	13 (24.1)		11 (40.7)	16 (59.3)	
50,000–100,000	56 (14.1)	35 (62.5)	21 (37.5)		24 (80.0)	6 (20.0)		5 (29.4)	12 (70.6)	
100,000+	52 (13.1)	37 (71.2)	15 (28.8)		23 (67.7)	11 (32.3)		5 (19.2)	21 (80.8)	
Employment Status										
Employed	323 (80.5)	169 (52.3)	154 (47.7)	0.29	159 (79.5)	41 (20.5)	0.65	31 (30.4)	71 (69.6)	0.77
Unemployed	78 (19.5)	46 (59.0)	32 (41.0)		42 (82.4)	9 (17.6)		10 (27.8)	26 (72.2)	
Financial Hardship										
Yes	241 (60.7)	128 (53.1)	113 (46.9)	0.79	119 (82.1)	26 (17.9)	0.39	26 (33.3)	52 (66.7)	0.22
No	156 (39.3)	85 (54.5)	71 (45.5)		80 (77.7)	23 (22.3)		14 (23.7)	45 (76.3)	
History of Incarceration										
Yes	88 (22.2)	46 (52.3)	42 (47.7)	0.77	34 (87.2)	5 (12.8)	0.21	2 (11.8)	15 (88.2)	0.09
No	309 (77.8)	167 (54.0)	142 (46.0)		164 (78.5)	45 (21.5)		38 (31.9)	81 (68.1)	
Sexual Health										
Sexual Position										
Bottom/Versatile Bottom	108 (27.4)	60 (55.6)	48 (44.4)	0.82	50 (83.3)	10 (16.7)	0.61	9 (24.3)	28 (75.7)	0.37
Versatile	118 (29.9)	64 (54.2)	54 (45.8)		57 (81.4)	13 (18.6)		11 (40.7)	16 (59.3)	
Versatile Top/Top	168 (42.6)	87 (51.8)	81 (48.2)		89 (77.4)	26 (22.6)		21 (30.0)	49 (70.0)	

(Continued)

Table 1. (Continued)

	Total Sample (N = 413)	Awareness of PrEP (n = 401)		P	Willingness to Use PrEP (n = 251)		P	PrEP Use (n = 138)		P
		Aware of PrEP (n = 215, 53.6%)	Unaware of PrEP (n = 186, 46.4%)		Willing (n = 201, 80.1%)	Not Willing/ Not Sure (n = 50, 19.9%)		History of PrEP Use (n = 41, 29.7%)	No history of PrEP Use (n = 97, 70.3%)	
Self-Reported HIV Status										
Positive/Unknown	151 (37.7)	91 (60.3)	60 (39.7)	0.04	N/A	N/A	N/A	N/A	N/A	N/A
Negative	250 (62.3)	124 (49.6)	126 (50.4)		N/A	N/A	N/A	N/A	N/A	N/A
Any History of STIs										
Yes	176 (44.0)	103 (58.5)	73 (41.5)	0.090	81 (80.2)	20 (19.8)	0.95	16 (37.21)	27 (62.8)	0.21
No	224 (56.0)	112 (50.0)	112 (50.0)		119 (79.9)	30 (20.1)		25 (26.6)	69 (73.4)	
STIs in last year										
Yes	127 (32.1)	70 (55.1)	57 (44.9)	0.62	56 (78.9)	15 (21.1)	0.81	13 (41.9)	18 (58.1)	0.08
No	269 (67.9)	141 (52.4)	128 (47.6)		142 (80.2)	35 (19.8)		27 (25.7)	78 (74.3)	
# of Receptive Anal sex acts in the last 30 days										
0	179 (44.8)	87 (48.6)	92 (51.4)	0.05	96 (78.7)	26 (21.3)	0.95	16 (23.5)	52 (76.5)	0.31
1	56 (14.0)	33 (58.9)	23 (41.1)		28 (80.0)	7 (20.0)		6 (37.5)	10 (62.5)	
2–3	82 (20.5)	42 (51.2)	40 (48.8)		46 (83.6)	9 (16.4)		12 (41.4)	17 (58.6)	
4–5	52 (13.0)	28 (53.9)	24 (46.1)		21 (77.8)	6 (22.2)		3 (18.8)	13 (81.2)	
6+	31 (7.8)	24 (77.4)	7 (22.6)		9 (81.8)	2 (18.2)		3 (37.5)	5 (62.5)	
# of Insertive Anal sex acts in the last 30 days										
0	134 (33.7)	68 (50.8)	66 (49.2)	0.69	66 (77.7)	19 (22.3)	0.87	8 (19.1)	34 (80.9)	0.05
1	50 (12.6)	26 (52.0)	24 (48.0)		26 (81.3)	6 (18.7)		4 (20.0)	16 (80.0)	
2–3	97 (24.4)	49 (50.5)	48 (49.5)		52 (83.9)	10 (16.1)		11 (30.6)	25 (69.4)	
4–5	55 (13.8)	33 (60.0)	22 (40.0)		29 (80.6)	7 (19.4)		6 (33.3)	12 (66.7)	
6+	62 (15.6)	36 (58.1)	26 (41.9)		25 (75.8)	8 (24.2)		11 (55.0)	9 (45.0)	
Condom Use last anal sex										
Yes	310 (78.3)	181 (58.4)	129 (41.6)	0.0005	159 (78.7)	43 (21.3)	0.35	37 (30.8)	83 (69.2)	0.46
No	86 (21.7)	32 (37.2)	54 (62.8)		39 (84.8)	7 (15.2)		4 (22.2)	14 (77.8)	
Geosocial App Usage										
Yes	214 (53.4)	148 (69.2)	66 (30.8)	<0.0001	99 (80.5)	24 (19.5)	0.87	22 (29.3)	53 (70.7)	0.92
No	187 (46.6)	67 (35.8)	120 (64.2)		102 (79.7)	26 (20.3)		19 (30.2)	44 (89.8)	
Healthcare Access										
Primary care Provider										
Yes	196 (48.8)	112 (57.1)	84 (42.9)	0.17	96 (81.4)	22 (18.6)	0.63	21 (31.3)	46 (68.7)	0.68
No	205 (51.1)	103 (50.2)	102 (49.8)		105 (78.9)	28 (21.1)		20 (28.2)	51 (71.8)	
Health Insurance										
Yes	62 (15.6)	43 (69.3)	19 (30.7)	0.007	32 (74.4)	11 (25.6)	0.32	8 (29.6)	19 (70.4)	0.98
No	335 (84.4)	170 (50.8)	165 (49.2)		167 (81.1)	39 (18.9)		32 (29.4)	77 (70.6)	
Unable to assess medical care due to cost in last year										
Yes	173 (43.1)	83 (48.0)	90 (52.0)	0.05	81 (77.9)	23 (22.1)	0.57	11 (23.9)	35 (76.1)	0.29
No	228 (56.9)	132 (57.9)	96 (42.1)		120 (81.6)	27 (18.4)		30 (32.6)	62 (67.4)	

(Continued)

Table 1. (Continued)

	Total Sample (N = 413)	Awareness of PrEP (n = 401)		P	Willingness to Use PrEP (n = 251)		P	PrEP Use (n = 138)		P
		Aware of PrEP (n = 215, 53.6%)	Unaware of PrEP (n = 186, 46.4%)		Willing (n = 201, 80.1%)	Not Willing/ Not Sure (n = 50, 19.9%)		History of PrEP Use (n = 41, 29.7%)	No history of PrEP Use (n = 97, 70.3%)	
Mental Health										
Depressive Symptoms (CESD-20)	10.0 (11.5)	12.1 (13.0)	10.2 (11.0)	0.11	11.0 (12.0)	6.9 (7.9)	0.02	10.9 (11.5)	10.2 (11.6)	0.75
Suicide Ideation										
Yes	86 (21.5)	59 (68.6)	27 (31.4)	0.002	41 (85.4)	7 (14.6)	0.33	6 (22.2)	21 (77.8)	0.33
No	314 (78.5)	155 (49.4)	159 (50.6)		160 (79.2)	42 (20.8)		35 (31.8)	75 (68.2)	
Internalized Homophobia	7.1 (3.4)	7.26 (3.4)	8.66 (3.6)	< 0.0001	7.84 (3.5)	7.88 (3.31)	0.94	7.3 (3.3)	7.3 (3.2)	0.99
Substance Use										
Hazardous Drinking (AUDIT-C)										
Yes	78 (18.9)	48 (63.2)	28 (36.8)	0.06	39 (73.6)	14 (26.4)	0.18	11 (31.4)	24 (68.6)	0.80
No	335 (81.1)	167 (51.4)	158 (48.6)		162 (81.8)	36 (18.2)		30 (29.1)	73 (70.9)	
Lifetime Marijuana Use										
Yes	168 (42.2)	98 (58.3)	70 (41.7)	0.10	83 (76.2)	26 (23.8)	0.15	20 (29.4)	48 (70.6)	0.89
No	230 (57.8)	115 (50.0)	115 (50.0)		116 (83.5)	23 (16.5)		19 (28.4)	48 (71.6)	
Lifetime Tramadol Use										
Yes	59 (15.2)	35 (59.3)	24 (40.7)	0.35	28 (80.0)	7 (20.0)	0.95	9 (45.0)	11 (55.0)	0.09
No	330 (84.8)	174 (52.7)	156 (47.3)		165 (80.5)	40 (19.5)		28 (26.2)	79 (73.8)	
Lifetime Rohypnol Use										
Yes	59 (15.1)	25 (42.4)	34 (57.6)	0.07	31 (81.6)	7 (18.4)	0.82	8 (38.1)	13 (61.9)	0.25
No	333 (84.9)	184 (55.3)	149 (44.7)		164 (80.0)	41 (20.0)		28 (25.7)	81 (74.3)	
Lifetime Codeine Use										
Yes	95 (24.1)	45 (47.4)	50 (52.6)	0.17	43 (76.8)	13 (23.2)	0.38	13 (38.2)	21 (61.8)	0.12
No	299 (75.9)	166 (55.5)	133 (44.5)		155 (82.0)	34 (18.0)		24 (24.2)	75 (75.8)	
Lifetime Poppers Use										
Yes	34 (8.6)	28 (82.4)	6 (17.6)	0.0004	14 (58.3)	10 (41.7)	0.005	3 (15.0)	17 (85.0)	0.15
No	369 (91.4)	183 (50.8)	177 (49.2)		184 (82.5)	39 (17.5)		35 (30.7)	79 (69.3)	
Lifetime Cocaine Use										
Yes	28 (7.1)	21 (75.0)	7 (25.0)	0.02	13 (61.9)	8 (38.1)	0.03	6 (37.5)	10 (62.5)	0.39
No	364 (92.9)	189 (51.9)	175 (48.1)		185 (81.9)	41 (18.1)		32 (27.1)	86 (72.9)	
PrEP Indicators										
Awareness of PrEP										
Aware of PrEP	215 (53.6)	N/A	N/A	N/A	94 (47.2)	105 (52.8)	0.17	39 (40.6)	57 (59.4)	< 0.0001
Unaware of PrEP	186 (46.4)	N/A	N/A		29 (58.0)	21 (42.0)		1 (2.5)	39 (97.5)	
Willingness to use PrEP										
Willing	201 (80.1)	94 (47.2)	105 (52.8)	0.17	N/A	N/A	N/A	34 (32.1)	72 (67.9)	0.17
Not Willing/Not Sure	50 (19.9)	29 (58.0)	21 (42.0)		N/A	N/A		6 (19.4)	25 (80.6)	
PrEP Use										
History of PrEP Use	41 (29.7)	39 (97.5)	1 (2.5)	< 0.0001	34 (85.0)	6 (15.0)	0.17	N/A	N/A	N/A
No History of PrEP Use	97 (70.3)	57 (59.4)	39 (40.6)		72 (74.2)	25 (25.8)		N/A	N/A	

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Table 2. Unadjusted and adjusted associations with PrEP awareness, willingness to use PrEP, and history of PrEP use among Nigerian GBMSM from March–June 2019.

	Awareness of PrEP (n = 401)		Willingness to Use PrEP (n = 251)		PrEP Use (n = 138)	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Site						
Abuja	8.57 (4.41–16.64) [§]	5.02 (2.13–11.83)*	0.64 (0.25–1.66)		1.26 (0.60–2.65)	
Delta	1.56 (0.80–3.03) [§]	1.16 (0.52–2.62)	1.29 (0.48–3.47)		N/A	
Lagos	17.56 (8.56–36.01) [§]	12.3 (4.92–30.67) [§]	0.87 (0.35–2.14)		Ref	
Plateau	Ref	Ref	Ref		N/A	
Socio-Demographics						
Age Mean (SD)	1.01 (0.97–1.04)		0.95 (0.89–0.99)*	1.04 (0.99–1.10)	0.95 (0.89–1.02)	
Relationship Status						
Single	1.67 (1.11–2.51)*	1.13 (0.64–2.01)	1.69 (0.90–3.16)		1.61 (0.72–3.60)	
Not Single	Ref	Ref	Ref		Ref	
Education						
SSS or lower	Ref		Ref		Ref	
Some Uni or Vocation Sch	1.16 (0.69–1.94)		1.19 (0.50–2.82)		1.01 (0.34–3.03)	
College degree or higher	4.26 (2.51–7.23)		0.88 (0.42–1.87)		1.18 (0.50–2.75)	
Other	1.87 (0.79–4.42)		0.47 (0.16–1.39)		2.24 (0.60–8.37)	
Sexual Orientation						
Gay/Homosexual	Ref		Ref		Ref	
Bisexual	1.26 (0.84–1.88)		0.72 (0.38–1.35)		1.25 (0.59–2.66)	
Monthly Income (in Naira)						
0–10000	Ref		Ref		Ref	
10,000–30,000	0.81 (0.47–1.40)		0.96 (0.36–2.57)		1.95 (0.65–5.82)	
30,000–50,000	1.33 (0.74–2.40)		0.54 (0.20–1.42)		2.46 (0.79–7.65)	
50,000–100,000	1.77 (0.91–3.44)		0.68 (0.21–2.19)		1.49 (0.39–5.67)	
100,000+	2.62 (1.28–5.34)*		0.36 (0.13–1.01)		0.85 (0.24–3.08)	
Employment Status						
Employed	0.76 (0.46–1.26)		0.83 (0.37–1.85)		1.14 (0.49–2.64)	
Unemployed	Ref		Ref		Ref	
Financial Hardship						
Yes	0.95 (0.63–1.42)		1.32 (0.70–2.47)		1.61 (0.75–3.45)	
No	Ref		Ref		Ref	
History of Incarceration						
Yes	0.93 (0.58–1.50)		1.87 (0.69–5.05)		0.28 (0.06–1.31)	
No	Ref		Ref		Ref	
Sexual Health						
Sexual Position						
Bottom/Versatile Bottom	1.16 (0.72–1.89)		1.46 (0.65–3.28)		0.75 (0.30–1.86)	
Versatile	1.10 (0.69–1.77)		1.28 (0.61–2.70)		1.60 (0.64–4.04)	
Versatile Top/Top	Ref		Ref		Ref	
Self-Reported HIV Status						
Positive/Unknown	1.54 (1.02–2.32)*	2.56 (1.54–4.72) [§]	N/A		N/A	
Negative	Ref	Ref	N/A		N/A	
Any History of STIs						
Yes	1.41 (0.95–2.10)		1.02 (0.54–1.92)		1.64 (0.76–3.53)	
No	Ref		Ref		Ref	

(Continued)

Table 2. (Continued)

	Awareness of PrEP (n = 401)		Willingness to Use PrEP (n = 251)		PrEP Use (n = 138)	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
STIs in last year						
Yes	1.12 (0.73–1.70)		0.92 (0.47–1.82)		2.09 (0.90–4.82)	
No	Ref		Ref		Ref	
# of Receptive Anal sex acts in the last 30 days						
0	Ref	Ref	Ref		Ref	
1	1.52 (0.83–2.79)	1.61 (0.67–3.84)	1.08 (0.43–2.76)		1.95 (0.61–6.20)	
2–3	1.11 (0.66–1.87)	0.93 (0.43–1.99)	1.38 (0.60–3.19)		2.29 (0.91–5.80)	
4–5	1.23 (0.66–2.29)	0.63 (0.27–1.50)	0.95 (0.35–2.59)		0.75 (0.19–2.97)	
6+	3.63 (1.49–8.84)*	1.90 (0.56–6.45)	1.22 (0.25–5.99)		1.95 (0.42–9.07)	
# of Insertive Anal sex acts in the last 30 days						
0	Ref		Ref		Ref	Ref
1	1.05 (0.55–2.01)		1.25 (0.45–3.47)		1.06 (0.28–4.06)	1.35 (0.32–5.66)
2–3	0.99 (0.59–1.67)		1.50 (0.64–3.49)		1.87 (0.66–5.33)	2.58 (0.80–8.30)
4–5	1.46 (0.77–2.75)		1.19 (0.45–3.15)		2.13 (0.61–7.39)	1.67 (0.46–6.08)
6+	1.34 (0.73–2.47)		0.90 (0.35–2.32)		5.19 (1.61–16.74)*	5.76 (1.58–20.98)*
Condom Use last anal sex						
Yes	2.37 (1.45–3.87)[§]	1.84 (0.90–3.76)	0.66 (0.28–1.59)		1.56 (0.48–5.06)	
No	Ref	Ref	Ref		Ref	
Geosocial App Usage						
Yes	4.02 (2.65–6.09)[§]	4.06 (2.28–7.24)[§]	1.05 (0.57–1.95)		0.96 (0.46–2.00)	
No	Ref	Ref	Ref		Ref	
Healthcare Access						
Primary care Provider						
Yes	1.32 (0.89–1.96)		1.16 (0.62–2.17)		1.16 (0.56–2.42)	
No	Ref		Ref		Ref	
Health Insurance						
Yes	2.20 (1.23–3.93)[§]	2.31 (1.08–4.40)*	0.68 (0.32–1.47)		1.01 (0.40–2.55)	
No	Ref	Ref	Ref		Ref	
Unable to assess medical care due to cost in last year						
Yes	0.67 (0.45–0.99)*	1.17 (0.65–2.10)	0.79 (0.43–1.48)		0.65 (0.29–1.45)	
No	Ref	Ref	Ref		Ref	
Mental Health						
Depressive Symptoms (CESD-20)						
	1.01 (0.99–1.03)		1.04 (1.01–1.08)*	0.96 (0.92–0.99)*	1.01 (0.97–1.04)	
Suicide Ideation						
Yes	2.24 (1.35–3.72)[§]	2.05 (1.02–4.10)*	1.54 (0.64–3.67)		0.61 (0.23–1.65)	
No	Ref	Ref	Ref		Ref	
Internalized Homophobia						
	0.89 (0.84–0.95)[§]	0.96 (0.88–1.04)	0.99 (0.91–1.09)		1.00 (0.89–1.12)	
Substance Use						
Hazardous Drinking (AUDIT-C)						
Yes	1.62 (0.97–2.71)		0.62 (0.31–1.26)		1.12 (0.49–2.56)	
No	Ref		Ref		Ref	

(Continued)

Table 2. (Continued)

	Awareness of PrEP (n = 401)		Willingness to Use PrEP (n = 251)		PrEP Use (n = 138)	
	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Lifetime Marijuana Use						
Yes	1.40 (0.94–2.09)		0.63 (0.34–1.19)		1.05 (0.50–2.22)	
No	Ref		Ref		Ref	
Lifetime Tramadol Use						
Yes	1.31 (0.75–2.30)		0.97 (0.40–2.38)		2.31 (0.87–6.16)	
No	Ref		Ref		Ref	
Lifetime Rohypnol Use						
Yes	0.60 (0.34–1.04)		1.11 (0.46–2.69)		1.78 (0.67–4.74)	
No	Ref		Ref		Ref	
Lifetime Codeine Use						
Yes	0.72 (0.45–1.15)		0.73 (0.35–1.50)		1.94 (0.84–4.44)	
No	Ref		Ref		Ref	
Lifetime Poppers Use						
Yes	4.51 (1.83–11.16) §	3.48 (0.83–14.62)	0.30 (0.12–0.72) §	2.65 (0.84–8.36)	0.40 (0.11–1.45)	
No	Ref	Ref	Ref	Ref	Ref	
Lifetime Cocaine Use						
Yes	2.78 (1.15–6.70) §	0.88 (0.22–3.56)	0.36 (0.14–0.93) *	1.77 (0.51–6.21)	1.61 (0.54–4.80)	
No	Ref	Ref	Ref	Ref	Ref	
PrEP Indicators						
Awareness of PrEP						
Aware of PrEP	N/A		0.65 (0.35–1.21)		57.10 (7.80–417.97) §	29.62 (3.78–231.84) §
Unaware of PrEP	N/A		Ref		Ref	Ref
Willingness to use PrEP						
Willing	0.65 (0.35–1.21)		N/A		1.97 (0.74–5.24)	
Not Willing/Not Sure	Ref		N/A		Ref	
PrEP Use						
History of PrEP Use	26.68 (3.52–202.40) §	45.53 (5.60–370.04) §	1.97 (0.74–5.24)		N/A	
No History of PrEP Use	Ref	Ref	Ref		N/A	

§ P<0.01

*P<0.05

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Discussion

This is the first quantitative study that we are aware of to explore PrEP awareness, willingness to use PrEP, and history of PrEP use among GBMSM in Nigeria and West Africa. Nearly half (46.4%) of the Nigerian GBMSM in this study had no prior awareness of PrEP, but after being informed about its potential benefits, the majority (80.1%) were willing to use it. Furthermore, PrEP uptake among Nigerian GBMSM remains low (29.7%). Our findings align with a recent review article that found relatively low PrEP awareness (16.9–44.3%) but higher willingness to use PrEP (53.3–74.8%) among GBMSM in low and middle income countries [13].

We found that residing Lagos and Abuja was significantly associated with PrEP awareness compared to residing in Plateau. This finding is likely explained by the recent availability of PrEP among GBMSM in these two states.

Additionally, we found that people living with HIV had higher PrEP awareness compared to those who reported being HIV uninfected. Since recruitment occurred through CBOs, some of which provide HIV testing and counseling, and antiretroviral therapy, it is possible that people living with HIV may have been counselled on the efficacy of PrEP to decrease HIV transmission among serodiscordant sexual partnerships [14]. We found that individuals who had used location-based apps for seeking sexual partners had increased odds of being PrEP aware, compared to those who reported non-use. This finding supports recommendation for using geosocial networking apps (e.g., Grindr, Badoo, etc) as potentially effective medium for dissemination of PrEP messaging as rollout expands in Nigeria, especially given that more than half of the sample (53.4%) reported using these apps and these apps have been previously associated with greater number of sexual partners, condomless anal sex, and increased incidence of HIV and other sexually transmitted infections [15, 16]. This is especially relevant in Nigeria where homosexuality is criminalized and limited safe spaces exist for GBMSM, with many resorting to these apps to meet other GBMSM for a friendship, relationship, and/or sex.

GBMSM with clinically significant depressive symptoms had a decreased odds of willingness to use PrEP. This finding highlights how mental health issues might affect interest in PrEP uptake, which is particularly important as psychosocial health problems has been associated with increased risk for HIV infection among GBMSM [17–19]. A recently published study found that experiencing 4 or more psychosocial health problems (i.e. depressive symptoms, post-traumatic stress disorder, alcohol dependence, tobacco use, and hard-drug use)—compared to experience none or one psychosocial health problem—was significantly associated with increasing number of male sexual partners among Nigerian GBMSM [20]. Previous research has highlighted the need to screen for mental health problems among GBMSM PrEP users, as it may lead to suboptimal PrEP adherence [21] and overall health [22].

We found that having 6 or more insertive anal sex partners in the last 30 days and being aware of PrEP were significantly associated with history of PrEP use. This finding may provide evidence that the current ongoing demonstration trial of PrEP in Nigeria is capturing those who are at most risk and PrEP awareness translating to PrEP uptake. This finding highlights the need for a PrEP awareness campaign, on various platforms, that provides easily understood, evidence-based information about PrEP. This campaign will help increase health literacy both around PrEP specifically and more generally on various other topics related to sexual health. Information about effectiveness, costs, and common side effects should be provided. The campaign should include testimonials from trusted GBMSM community members, to add credibility and relatability of the health campaign. Also, key stakeholders such as GBMSM community opinion leaders, CBOs, and geosocial networking apps are major channels for dissemination of information about PrEP to Nigerian GBMSM. Intentional engagement of these groups, at every step, is pivotal to increasing PrEP knowledge among Nigerian GBMSM, which would facilitate PrEP uptake and adherence.

These findings should be examined in the context of some study limitations. The cross-sectional design limits our ability to draw causal inferences from our findings. In addition, participants were mainly recruited through GBMSM community-based organizations and GBMSM social networks, thus findings may not be generalizable to GBMSM who do not seek services at these CBOs or are outside of these social networks. In addition, many of the measures relied on participant recall/self-report (e.g., HIV status); future studies should use more objective measurements when possible.

Despite these limitations, this is among the first known quantitative analyses of PrEP awareness/acceptability among Nigerian GBMSM. Additionally, this is the first study to sample GBMSM from four distinct regions of the country, which provided for a diverse sample of varied experiences.

Conclusions

Taken together, we found that nearly half of the Nigerian GBMSM in this study had no prior awareness of PrEP, but after being informed about its potential benefits, the majority were willing to use it. Furthermore, PrEP uptake among Nigerian GBMSM remains low. Findings suggest that educational messages are necessary to ensure appropriate PrEP scale-up, especially tailored towards Nigerian GBMSM.

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