



Knowledge, perceived availability, and acceptability of HIV Pre-Exposure Prophylaxis among Key Populations in Delta State, Nigeria

Glory Mbe Egom Nja¹, Lilian Chinwendu Okehie¹, Amalachukwu Esther Uzomba¹, Etim John John¹, Mbe Egom Nja²

¹Health Services Management and Health Policy Unit, Department of Public Health, Faculty of Allied Medical Sciences, University of Calabar, Nigeria

²Department of Statistics, Faculty of Physical Sciences, University of Calabar, Nigeria

Abstract

Context: HIV remains a major public health challenge among key populations (KPs) in Nigeria, despite substantial advances in prevention, diagnosis, and treatment interventions. HIV Pre-exposure prophylaxis (PrEP) efficacy depends heavily on its acceptability among high-risk groups.

Objective: This study assessed the knowledge, availability, and acceptability of PrEP and examined factors associated with its acceptability among KPs in Delta State, Nigeria.

Study design: A descriptive cross-sectional study was conducted among 602 KPs, aged 18-41 years, including female sex workers, men who have sex with men, people who inject drugs, and transgender persons, recruited from mapped hotspots through purposive sampling and peer referral. Data collected via structured interviewer-administered questionnaires were analyzed using descriptive statistics and chi-square tests ($p < 0.05$). PrEP acceptability was defined as the willingness to initiate PrEP and to recommend it to peers.

Results: PrEP acceptability was high (77.9%), and 79.5% of respondents were willing to recommend it to peers. Awareness of PrEP services (85.9%) and perceived availability (78.1%) were also high. Although 81.9% could recognize PrEP, only 29.9% correctly identified it as an HIV prevention method for HIV-negative individuals, and 46.0% demonstrated good knowledge. PrEP acceptability was significantly associated with respondents' socio-demographic characteristics and level of PrEP knowledge ($p = 0.001$). Information source, service outlets, local availability, affordability, and access to healthcare providers were significantly associated with acceptability ($p < 0.05$), whereas overall perceived availability and consistency of PrEP supply were not ($p = 0.105$).

Conclusion: Despite high awareness and availability, substantial knowledge gaps persist among KPs. Strengthening PrEP education and improving access to KP-friendly services are critical to enhancing acceptability and HIV prevention in Nigeria.

Key Words: HIV, Key Populations, Pre-Exposure Prophylaxis, Acceptability, Delta State, Nigeria.

Introduction

Human Immunodeficiency Virus (HIV) infection continues to pose a significant public health challenge

Corresponding Author:

Glory Mbe Egom Nja

Health Services Management and Health Policy Unit,
Department of Public Health, Faculty of Allied Medical Sciences,
University of Calabar, Nigeria

glonja2@gmail.com | ORCID: 0000-0002-3103-4663

DOI: 10.61386/imj.v19i3.1203

worldwide, despite notable progress in prevention, diagnosis, and treatment. Key populations, such as female sex workers (FSWs), men who have sex with men (MSM), people who inject drugs (PWIDs), and transgender persons, experience a disproportionate burden of HIV infection worldwide due to intersecting behavioural, social, legal, and

structural vulnerabilities. In Nigeria, key populations account for a significant proportion of new HIV infections, despite decades of prevention programming⁴⁻⁶. National protocols have prioritized oral pre-exposure prophylaxis (PrEP) as a core component of combination prevention, supported by targeted communication strategies to address delivery barriers in localized hotspots⁴⁻⁵. Although national HIV prevalence has declined in the general population, transmission among key populations remains disproportionately high due to inconsistent condom use, multiple sexual partnerships, inadequate access to prevention services, substance use, mobility, and social marginalization^{1,7-8}. These factors have heightened global and national interest in biomedical HIV prevention strategies, particularly pre-exposure prophylaxis (PrEP).

Pre-exposure prophylaxis (PrEP) is an evidence-based biomedical intervention in which HIV-negative individuals at substantial risk of HIV acquisition take antiretroviral medication. Consistent use of oral PrEP significantly reduces the risk of HIV transmission and is recommended by the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC) as part of comprehensive prevention strategies for key populations⁹⁻¹⁰. Since its introduction, PrEP implementation has expanded globally through facility-based, community-based, and differentiated delivery models. However, evidence indicates that uptake and sustained engagement with PrEP services are strongly influenced by awareness, accurate knowledge, perceived accessibility, and acceptability among target populations¹¹. Studies in sub-Saharan Africa show that although PrEP awareness has increased following intensified prevention interventions, a detailed understanding of eligibility, effectiveness, duration of use, and scope of prevention remains limited among many users and potential users^{8,12-14}. Macro-level surveillance data further reveal that increased recognition of PrEP has not consistently translated into functional health literacy or stable enrollment, highlighting significant implementation gaps among younger subpopulations⁷⁻⁸.

Perceptions of PrEP availability and accessibility significantly influence willingness to participate in HIV prevention programs. Although many

countries have incorporated PrEP into national HIV prevention frameworks, implementation outcomes reveal persistent gaps between policy availability and the accessibility of effective services¹⁵. Misconceptions about PrEP safety, side effects, and behavioral implications continue to undermine confidence in prevention services among key populations¹¹. Structural barriers, including limited service visibility, transportation challenges, stock-outs, stigma within healthcare settings, and insufficient key population-friendly delivery models, impede PrEP access and continuity of care^{16-17,10}. Recent studies indicate that provider accessibility, peer support systems, and community-linked service delivery models enhance engagement with PrEP services among vulnerable populations¹⁸⁻¹⁹.

Documented evidence indicates that PrEP acceptability among key populations is influenced by a complex interplay of socio-demographic, psychosocial, and behavioral factors¹¹. Individuals with higher perceived HIV risk, prior exposure to prevention messaging, and greater trust in healthcare systems are more likely to express willingness to use PrEP^{14,2}. However, increased visibility alone does not ensure uptake if potential users encounter hostile clinical environments, fear of antiretroviral medications, limited understanding of eligibility, or negative experiences with providers¹³. These behavioral and structural factors align with the Health Belief Model (HBM), which conceptualizes health-related decision-making as a function of perceived susceptibility, severity, benefits, barriers, cues to action, and self-efficacy²⁰. In this study, knowledge of PrEP, perceived service accessibility, exposure to HIV prevention information, confidence in PrEP's effectiveness, and willingness to initiate or continue PrEP are identified as key determinants of PrEP acceptability among key populations.

Most Nigerian PrEP studies are multisite, national, or focused on young key populations, while fewer examine the combined relationship among knowledge, perceived availability, and acceptability across key populations in a single location. This has left a gap in empirical evidence on how knowledge, perceived availability, and acceptability of PrEP integrate among key populations in subnational contexts, such as Delta

State. Addressing this gap is critical for identifying the interconnected determinants that influence willingness to use PrEP among at-risk populations. This study therefore assessed knowledge, perceived availability, and acceptability of PrEP, as well as associated factors, among key populations in Delta State, Nigeria. The findings will provide evidence to inform targeted HIV prevention strategies designed to improve PrEP literacy, accessibility, and acceptance among key populations in Nigeria.

Materials and Methods

Study Design

This study employed a facility- and community-based cross-sectional design to assess the knowledge, perceived availability, and acceptability of HIV Pre-Exposure Prophylaxis (PrEP) among key populations. The KPs include Female Sex Workers, Men who have Sex with Men, People Who Inject Drugs, and Transgender persons in Delta State, Nigeria. The cross-sectional design was deemed appropriate for estimating the distribution of PrEP-related outcomes and identifying associated factors among high-risk populations at a single point in time.

Study Setting

This study was conducted in Delta State, located in Nigeria's South-South geopolitical zone, which comprises 25 Local Government Areas across three senatorial districts. The state has an estimated population of over 5.6 million and contains documented hotspots for key population activities relevant to HIV prevention programming. At the time of the study, Delta State had documented sex-work hotspots across major towns, with approximately 107 brothels documented across major towns; major clients were trailer drivers and commercial bus operators, raising public health concerns related to unprotected transactional and casual sex²¹⁻²².

Study Population/Eligibility Criteria

The study population comprised Female Sex Workers (FSW), Men who have Sex with Men (MSM), People Who Inject Drugs (PWID), and Transgender (TG) persons operating within identified urban and peri-urban hotspots in the state. Eligible participants were HIV-negative individuals

aged 18 years and above who self-identified as key population members, had resided in the study area for at least six months, and were willing to provide informed consent and participate in the study. Individuals who were known to be HIV-positive or critically ill at the time of data collection were excluded.

Sample size determination

The minimum sample size was determined using Cochran's formula for estimating a single population proportion²³, assuming a 95% confidence level ($Z = 1.96$), an expected PrEP acceptability of 50%, and a 4% margin of error. This yielded a minimum sample size of 576 respondents; after allowing for a 5% non-response rate, the required sample size was 606.

Sampling Technique

A multi-stage sampling approach was used to recruit participants from mapped key population hotspots in the study setting. Initial hotspot identification was conducted in collaboration with community-based organizations and peer educators working with key populations in the state. This approach is widely used in key population research where sampling frames are not readily available. Purposive and peer-referral techniques were adopted to ensure adequate representation of key populations in hidden and hard-to-reach subgroups.

Study Variables/Measurement

The primary outcome variable was PrEP acceptability, defined as willingness to initiate PrEP, perceived suitability of PrEP as an HIV prevention strategy, and intention to recommend PrEP to peers. Acceptability was operationalized as a binary variable (accepted or willing to initiate vs. not accepted or not willing to initiate) based on participants' responses. The independent variables included: (i) respondents' socio-demographic characteristics (age, sex, education, marital status, occupation, income); (ii) knowledge of PrEP (correct meaning, correct identification, correct duration of use). Each correct answer on the PrEP knowledge questionnaire was scored 1, and each incorrect answer was scored 0. Scores were summed, and the mean was derived. Respondents scoring below 5 were categorized as having poor

knowledge, those scoring 5-10 as having moderate knowledge, and those scoring 11-15 as having good knowledge. Using a composite score of correctly answered items, respondents were categorized as having “poor knowledge”, “moderate knowledge”, or “good knowledge” based on predetermined cut-off points; and (iii) perceived availability of PrEP services (awareness, stock availability, geographic access, provider access, affordability, facility and community availability, visibility). The mediating factors included perceived susceptibility to HIV, perceived benefits of PrEP, perceived barriers, and cues to action, consistent with the Health Belief Model²⁰ (Figure 1).

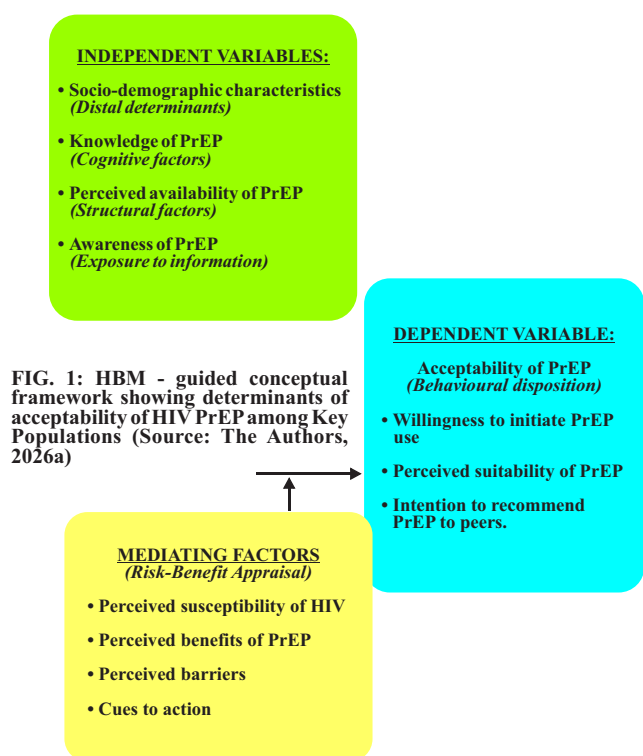


FIG. 1: HBM - guided conceptual framework showing determinants of acceptability of HIV PrEP among Key Populations (Source: The Authors, 2026a)

Data Collection Instrument

Data were collected using a structured, interviewer-administered questionnaire adapted from validated instruments used in prior PrEP studies among key populations. The instrument was organized into sections covering socio-demographic characteristics, knowledge of PrEP, perceived availability and access to PrEP, acceptability, and utilization of PrEP. Content validity was ensured through expert review in HIV prevention and public health research. The instrument was pretested with a comparable population outside the study area, and

necessary modifications were made to ensure clarity, cultural appropriateness, and reliability

Data Collection Procedure

Data were collected by four trained research assistants experienced in working with key populations and familiar with KP-friendly approaches. To minimize social desirability and response bias and enhance disclosure, the questionnaire was administered face-to-face using standardized interviewer-administered techniques in safe, confidential, and KP-friendly environments, including community hotspots and designated outreach centers. Data collection was conducted between May and December 2023.

Data Management and Analysis

Data were entered, cleaned, and analyzed using Statistical Package for the Social Sciences (SPSS) version 26. Descriptive statistics (frequencies, percentages, means, and standard deviations) were used to summarize study variables. Inferential statistics using Pearson chi-square tests was

Table 1: Respondents' socio-demographic characteristics

Variables	Frequency (n=602)	Percentage (%)
Types of KPs		
FSWs	277	46.0
MSM	180	29.9
PWIDs	85	14.1
TG	60	10.0
Sex		
Male	300	49.8
Female	302	50.2
Age (in years)		
18-25	349	58.0
26-33	216	35.9
34-41	37	6.1
Marital status		
Single	457	75.9
Married	48	8.0
Widowed	12	2.0
Divorced	25	4.2
Separated	60	10.0
Children under KPs care		
None	384	63.8
1-3	120	19.9
Above 3	98	16.3
Highest educational level		
No formal education	84	14.0
Primary education	73	12.1
Secondary education	264	43.9
Tertiary education	181	30.1
Monthly income		
No monthly income	253	42.0
Below N18,000	48	8.0
N18,000-N30,000	85	14.1
Above N30,000	216	35.9
Religion		
Christianity	518	86.0
Islam	84	14.0

conducted to examine associations between independent variables and PrEP acceptability. P-values < 0.05 were considered significant for hypothesis testing.

Ethical Considerations

Ethical approval was obtained from the Delta State Ministry of Health Research Ethics Committee (MOHREC), under number HM/596/T2/111, dated January 17, 2023. Permission was also obtained from community-based organizations and key population gatekeepers. Participants were informed of the study's purpose. Participation was voluntary, and informed consent was obtained from all respondents prior to participation. Confidentiality was maintained through anonymized data collection and secure data-handling procedures. Participants were informed of their right to withdraw at any time without consequence. All procedures complied with national ethical guidelines for HIV-related research among vulnerable populations.

Acceptability of PrEP among respondents

PrEP acceptability was high: 469 respondents (77.9%) were willing to initiate PrEP. Among the 590 respondents with complete responses to the other acceptability items, 469 (79.5%) considered PrEP suitable for HIV prevention and were willing to recommend it to peers (Table 2).

Table 3: Respondents' knowledge of PrEP

PrEP Acceptability	Frequency (n = 602)	Percentages (%)
Acceptability to initiate of PrEP use		
Accepted	469	77.9
Not accepted	133	22.1
PrEP suitability for HIV prevention		
Suitable	469	79.5
Not suitable	121	20.5
*Missing values		
Willingness to recommend PrEP to other KPs		
Willing	469	79.5
Not willing	121	20.5
*Missing values		

Respondents' Knowledge of PrEP

Knowledge gaps were evident despite high recognition of PrEP. Only 29.9% correctly identified its purpose, 46.2% knew the correct

medicines, and 28.1% knew the appropriate duration of use. Misconceptions were also common regarding PrEP use during pregnancy and breastfeeding. Overall, 44.2% had poor knowledge, 9.8% moderate knowledge, and 46.0% good knowledge (Table 3 and Figure 2).

Table 3: Respondents' knowledge of PrEP

Variables	Frequency (n=602)	Percentage (%)
Meaning of PrEP		
Prevention of STIs other than HIV	422	70.1
Prevention of HIV among HIV-negative persons	180	29.9
Ability to recognize PrEP		
Able to recognize PrEP	493	81.9
Not able to recognize PrEP	109	18.1
Knowledge of the correct drugs used for PrEP		
Knew PrEP when shown	278	46.2
Did not know	324	53.8
Duration of PrEP use		
1 month - 1 year	433	71.9
Until exposure to risky sexual behaviours stops	169	28.1
PrEP use among pregnant women		
PrEP cannot be used by pregnant women	386	64.1
PrEP can be used by pregnant women	216	35.9
PrEP use among breastfeeding mothers		
PrEP cannot be used by breastfeeding mothers	422	70.1
PrEP can be used by breastfeeding mothers	180	29.9
Age eligibility for PrEP use		
PrEP is not prohibited for persons under 18 years	434	72.1
PrEP is prohibited for persons under 18 years	168	27.9
Consistent PrEP use prevents condom use during sex		
PrEP use does not prevent condom use during sex	349	58
PrEP use prevents condom use during sex	253	42

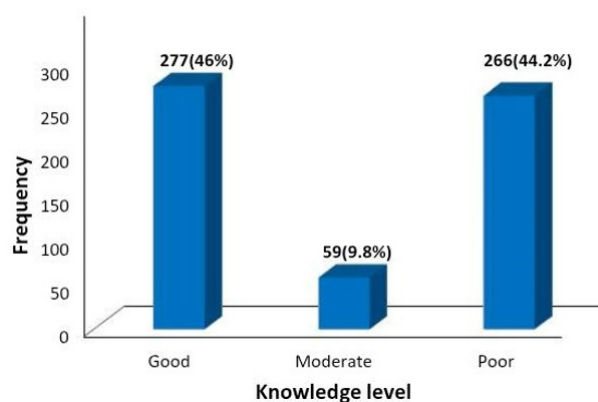


FIG. 2: Respondents' overall mean PrEP knowledge scores

Perceived availability and accessibility of PrEP Services

Perceived availability and awareness of PrEP services were high (78.1% and 85.9%, respectively). Health facilities were the principal source of information and service outlet. Most respondents reported no stock-outs (78.1%), free or affordable services (83.9%), easy provider access (84.7%), and that PrEP was readily available where they lived (67.3%) (Table 4).

Table 4: Respondents' perceived availability and accessibility of PrEP services

Variables	Frequency (n = 602)	Percentage (%)
PrEP Availability		
High availability	470	78.1
Low availability	132	21.9
Awareness of PrEP service services		
Aware	517	85.9
Not aware	85	14.1
Source of PrEP information		
Friends	84	14.8
Schools	12	2.1
Health facilities	433	76.5
News/social media	13	2.3
Health workers who visit Brothels for follow-up	24	4.2
*Missing values		
Consistency of PrEP supply		
Consistent with no stock-outs	470	78.1
Occasional stock-outs	132	21.9
PrEP availability where KPs live		
Readily available and accessible	397	67.3
Limited access	181	30.7
*Missing values		
Common outlets for accessing PrEP		
Church	73	6.8
Market	24	4.4
Health facility	433	79.9
At the Bothels	12	2.2
*Missing values		
Affordability of PrEP services		
Free and affordable	505	83.9%
Not free	97	16.1%
Amount in Naira ever paid for PrEP		
Less than 2,000	49	8.1
2,000-5,000	12	2.0
>5,000-10,000	24	4.0
Above 10,000	12	2.0
Access to healthcare providers offering PrEP(n=555)		
Easy access	469	84.7
Limited access	85	15.3
*Missing values		
Perceived PrEP availability to influence utilization		
PrEP availability can influence uptake	517	85.9
PrEP availability cannot influence uptake	85	14.1

Factors associated with prep acceptability among key populations

Respondents' socio-demographic characteristics

and PrEP acceptability

PrEP acceptability varied significantly by age, sex, key-population type, educational level, marital status, number of children under respondents' care, monthly income, and religion (all $p < 0.05$). Acceptability was highest among transgender persons and FSWs and lowest among PWIDs; females also reported higher acceptability than males. Findings of complete acceptability in some small categories should be interpreted cautiously (Table 5).

Table 5: Association between socio-demographic characteristics and PrEP Acceptability

Socio-demographic Characteristics	PrEP Acceptability			df	χ^2	P-value
	Accepted	Not Accepted	Total			
Age (in years)				2	22.954	0.001*
18-25	276(79.0)	73(20.9)	349(58.0)			
26-33	156(72.2)	60(27.8)	216(35.9)			
34-41	37(100)	0(0)	37(6.1)			
Total	469(77.9)	133(22.1)	602(100)			
Sex				1	34.101	0.001*
Male	204(68.0)	96(32.0)	300(49.8)			
Female	265(87.7)	37(12.3)	302(50.2)			
Total	469(77.9)	133(22.1)	602(100)			
Type of KPs				3	170.068	0.001*
FSW	253(91.3)	24(8.7)	277(46.0)			
MSM	132(73.3)	48(26.7)	180(29.9)			
PWID	24(28.2)	61(71.8)	85(14.1)			
TG	60(100)	0(0)	60(9.9)			
Total	469(77.9)	133(22.1)	602(100)			
Highest educational level				3	20.849	0.001*
No formal education	72(85.7)	12(14.3)	84(13.9)			
Primary education	61(83.6)	12(16.4)	73(12.1)			
Secondary education	216(81.8)	48(18.2)	264(43.9)			
Tertiary education	120(66.3)	61(33.7)	181(30.1)			
Total	469(77.9)	133(22.1)	602(100)			
Marital status				4	54.166	0.001*
Single	324(70.9)	133(29.1)	457(75.9)			
Married	48(100)	0(0)	48(7.9)			
Widowed	12(100)	0(0)	12(1.9)			
Divorced	25(100)	0(0)	25(4.2)			
Separated	60(100)	0(0)	60(9.9)			
Total	469(77.9)	133(22.1)	602(100)			
Children under KP's care				2	57.174	0.001*
None	264(68.8)	120(31.3)	384(63.8)			
1-3	120(100)	0(0)	120(19.9)			
Above 3	85(86.7)	13(13.3)	98(16.3)			
Total	469(77.9)	133(22.1)	602(100)			
Monthly income				3	60.978	0.001*
No monthly income	205(81.0)	48(18.9)	253(42.0)			
Below N18,000	24(50.0)	24(50.0)	48(7.9)			
N18,000-N30,000	48(56.5)	37(43.5)	85(14.1)			
Above N30,000	192(88.9)	24(11.1)	216(35.9)			
Total	469(77.9)	133(22.1)	602(100)			
Religion				1	27.684	0.001*
Christianity	385(74.3)	133(25.7)	518(86.0)			
Islam	84(100)	0(0)	84(13.9)			
Total	469(77.9)	133(22.1)	602(100)			

Figures in parentheses represent percentages (%) *Statistical significance based on P-value < 0.05

Table 6: Association between respondents' PrEP knowledge and PrEP acceptability

PrEP Acceptability	Respondents' PrEP Knowledge				df	χ^2	P-value
	Poor knowledge	Moderate knowledge	Good knowledge	Total			
Willingness to initiate PrEP use					2	105.985	0.001*
Accepted	157(33.5)	47 (10.0)	265(56.5)	469(77.9)			
Not accepted	109(81.9)	12 (9.0)	12(9.0)	133(22.1)			
PrEP suitability for HIV prevention (n = 590)					2	26.228	0.001*
Suitable	193(41.2)	35 (7.5)	241(51.4)	469(79.5)			
Not suitable	61(50.4)	24 (19.8)	36(29.8)	121(20.5)			
Willingness to recommend PrEP (n = 590)					2	26.228	0.001*
Willing	193(41.2)	35 (7.5)	241(51.4)	469(79.5)			
Not willing	61(50.4)	24 (19.8)	36(29.8)	121(20.5)			

Figures in parentheses represent percentages. *Statistically significant at $p < 0.05$. Denominators below 602 reflect missing responses

Table 7: Respondents' perceived PrEP availability/accessibility and PrEP acceptability

Perceived PrEP Availability/Accessibility	PrEP Acceptability			df	χ^2	P-value
	Accepted	Not Accepted	Total			
Availability of PrEP				1	2.635	0.105
High availability	373(79.4)	97(20.6)	470(78.1)			
Low availability	96(73.5)	36(27.3)	132(21.9)			
Total	469(77.9)	133(22.1)	602 (100)			
Awareness of PrEP services				1	111.797	0.001*
Aware	433(83.8)	84(16.2)	517(85.9)			
Not aware	36(42.4)	49(57.6)	85(14.1)			
Total	469(77.9)	133(22.1)	602(100)			
Source of PrEP information				4	101.301	0.001*
Friends	48(57.1)	36(42.9)	84(14.8)			
Schools	12(100)	0(0)	12(2.1)			
Health facilities	373(86.1)	60(13.9)	433(76.5)			
News/Social media	0(0)	13(100)	13(2.3)			
Health workers who visit	24(100)	0(0)	24(4.2)			
Brothels for follow-up						
Total	457(80.7)	109(19.3)	566(100)			
* Missing values						
Common outlets for accessing PrEP				3	285.329	0.001*
Church	36(49.3)	37(50.7)	73(6.8)			
Market	0(0)	24(100)	24(4.4)			
Health facility	421(97.2)	12(2.8)	433(79.9)			
Brothels	12(100)	0(0)	12(2.2)			
Total	469(86.5)	73(13.5)	542(100)			
* Missing values						
Consistency of PrEP supply				1	2.635	0.105
No stock-outs	373(79.4)	97(20.6)	470(78.1)			
Occasional stock-outs	96(73.5)	36(27.3)	132(21.9)			
Total	469(77.9)	133(22.1)	602(100)			
PrEP Affordability				1	70.088	0.001*
Free and affordable	421(83.4)	84(16.6)	505(85.6)			
Not free	36(42.4)	49(57.6)	85(14.4)			
Total	457(77.5)	133(22.5)	590(100)			
* Missing values						
PrEP availability where KPs live:				2	112.660	0.001*
Readily available and accessible	361(90.9)	36(9.1)	397(67.3)			
Limited access	96(53.0)	85(46.9)	181(30.7)			
Total	469(79.5)	121(20.5)	590(100)			
* Missing values						
Ease of access to healthcare workers				1	36.151	0.001*
Easy access	397(84.6)	72(15.4)	469(84.7)			
Limited access	48(56.5)	37(43.5)	85(15.3)			
Total	445(80.3)	109(19.7)	554(100)			
* Missing values						

Figures in parentheses represent percentages. *Statistically significant at $p < 0.05$. Denominators below 602 reflect missing responses.

Respondents' PrEP knowledge and PrEP acceptability

Respondents' PrEP knowledge was significantly associated with willingness to initiate PrEP ($\chi^2 = 105.985$, $df = 2$, $p = 0.001$), perceived suitability for HIV prevention, and willingness to recommend it to peers ($\chi^2 = 26.228$, $df = 2$, $p = 0.001$ for both). Good knowledge was more common among respondents who accepted it, considered it suitable, or would recommend it, whereas poor knowledge predominated among those who did not accept it (Table 6).

Respondents' perceived PrEP availability/accessibility and PrEP acceptability

Overall perceived availability was not significantly associated with PrEP acceptability ($\chi^2 = 2.635$, $df = 1$, $p = 0.105$). However, awareness, information source, service outlet, affordability, local availability, and ease of access to healthcare workers were significantly associated with acceptability (all $p < 0.05$). Respondents informed through formal or provider-based channels, and those reporting readily accessible local services or providers generally demonstrated higher acceptability. Consistency of PrEP supply was not significantly associated with acceptability (Table 7).

Discussion

This study assessed perceived availability, knowledge, and acceptability of PrEP among key populations in Delta State. Although awareness, perceived availability, and acceptability were generally high, important knowledge gaps remained. Acceptability varied across socio-demographic groups and was associated with PrEP knowledge and specific dimensions of service accessibility, highlighting the combined importance of cognitive and structural influences on prevention decisions^{8,24-25}.

Acceptability of PrEP among Key Populations

The present study demonstrated high

acceptability of PrEP among key populations in Delta State, Nigeria, with most respondents expressing willingness to use, or recommend PrEP for HIV prevention. This finding suggests increasing recognition of PrEP as an effective biomedical HIV prevention strategy among vulnerable populations disproportionately affected by HIV infection. The high acceptability observed may reflect expanding HIV prevention campaigns, increasing community awareness, and growing integration of PrEP into HIV prevention programmes targeting key populations in sub-Saharan Africa. Recent regional studies across Nigeria, South Africa, Kenya, and other African settings consistently show that willingness to use PrEP remained high among female sex workers, men who have sex with men, transgender persons, and other high-risk groups despite persistent implementation challenges^{26,18,15,17}. Recent global evidence further suggests that the acceptability of PrEP increases where communities perceive HIV risk to be high and where HIV prevention messaging is integrated into trusted healthcare systems and peer-led interventions^{27,10}. The particularly high acceptability observed among female sex workers and transgender respondents in the present study may reflect heightened HIV risk perception and greater exposure to HIV prevention interventions within these groups. Conversely, lower acceptability among people who inject drugs suggests persistent psychosocial and structural barriers that may undermine engagement with biomedical HIV prevention services. Similar disparities across key population subgroups have been documented in recent African implementation studies, in which stigma, criminalization, social exclusion, and weak linkages to healthcare systems negatively affected PrEP engagement among marginalized populations^{16,27-29}. These findings align with the Health Belief Model, which proposes that preventive health behaviours are influenced by perceived susceptibility to disease, perceived benefits of interventions, and perceived barriers to action³⁰. In the present study, respondents who perceived PrEP as effective and suitable for HIV prevention demonstrated greater willingness to accept PrEP, suggesting that confidence in PrEP effectiveness positively influenced acceptability among key populations.

Socio-demographic characteristics and PrEP acceptability among Respondents

PrEP acceptability varied across socio-demographic groups, suggesting that prevention decisions reflect differences in risk perception, programme exposure, social circumstances, and access to information. Age-related variation may be influenced by HIV-prevention literacy, perceived vulnerability, autonomy, and confidence in PrEP, as reported in other sub-Saharan African studies^{1,10,12,15,31-33}. Within the Health Belief Model, age may modify perceived susceptibility and benefits; age-sensitive communication is therefore needed. The complete acceptability observed in some small categories should, however, be interpreted cautiously.

Female respondents also demonstrated higher acceptability than males, possibly reflecting differences in perceived HIV vulnerability, exposure to HIV prevention information, and receptiveness to preventive health interventions. The significant association between key population subgroups and PrEP acceptability further suggests that HIV risk perception and exposure to HIV prevention programmes vary across vulnerable groups. Female sex workers and transgender respondents demonstrated particularly high acceptability, consistent with evidence showing that populations with heightened HIV vulnerability and greater exposure to targeted HIV prevention messaging are more likely to perceive PrEP as beneficial and suitable for HIV prevention^{1,16,34-35}.

Educational attainment and income were also significantly associated with PrEP acceptability, suggesting that socioeconomic resources and health literacy may shape perceptions toward biomedical HIV prevention interventions. Respondents with higher levels of education and socioeconomic advantage may have greater access to health information and HIV prevention resources, thereby strengthening confidence in PrEP and its perceived benefits. Similar observations have been reported in recent studies across sub-Saharan Africa, where educational attainment and socioeconomic position were associated with more favourable attitudes toward HIV prevention interventions, including PrEP^{36,18,28;37-39}. The findings indicate that PrEP acceptability among key populations is influenced by a combination of socio-demographic, cognitive,

and structural factors. Addressing disparities in HIV prevention knowledge, improving access to reliable information, and ensuring equitable access to PrEP services may enhance willingness to use PrEP, strengthen perceptions of its suitability, and encourage peer endorsement of PrEP among vulnerable populations in Nigeria.

Knowledge of PrEP and PrEP Acceptability among Key Populations

Knowledge emerged as a central correlate of PrEP acceptability. Respondents who understood its purpose, eligibility, and preventive benefits were more likely to accept and recommend it, indicating that awareness alone is insufficient. This agrees with studies identifying accurate knowledge as a determinant of favourable PrEP attitudes, while misconceptions about safety, effectiveness, and eligibility undermine confidence^{1,10,13,15–16,18,33,37–41}. Within the Health Belief Model, improved knowledge may strengthen perceived benefits and reduce perceived barriers³⁰, supporting the need for focused PrEP literacy interventions among key populations.

Perceived availability/accessibility and acceptability of PrEP among Key Populations

Service accessibility also shaped acceptability. Respondents were more receptive when information came from formal sources and when services and providers were visible, reachable, and trusted. This is consistent with evidence that provider engagement, accurate communication, and differentiated or community-linked delivery strengthen confidence in PrEP^{1,3,7,10,15–16,18,28,35,37–38}. Provider counselling may clarify misconceptions and act as a cue to action by reinforcing perceived benefits and reducing barriers²⁰. However, the lack of association with overall perceived availability or supply consistency suggests that broad availability measures may conceal the specific components of access that matter most to potential users.

Strengths and Limitations

This study provides a broad assessment of PrEP acceptability among key population groups in Delta State, enabling comparisons across populations that are often studied separately. Another strength is the use of a theory-informed approach, which enabled

the study to examine not only socio-demographic factors but also knowledge-related and service-access factors that may influence willingness to use PrEP. The inclusion of a relatively large number of respondents also strengthens the stability of the estimates and supports the relevance of the findings for HIV prevention programming among key populations in the study setting.

However, the cross-sectional nature of the study means that the observed associations cannot be interpreted as causal relationships. Because the information was obtained directly from participants, some responses may not fully reflect their actual experiences or behaviours. This is particularly possible for sensitive HIV-related issues, where respondents may forget details, under-report risk behaviours, or give answers they consider more acceptable to the interviewer. Furthermore, the use of purposive and peer-referral recruitment was appropriate for reaching hidden and stigmatized populations; however, it may limit the extent to which the findings can be generalized to all key populations in Delta State or beyond.

Conclusion

PrEP acceptability was high among key populations in Delta State but varied across socio-demographic groups. Greater knowledge and access to credible information, local services, and supportive healthcare providers were associated with more favourable acceptance. PrEP programmes should therefore combine targeted education with visible, affordable, and key population-friendly delivery, particularly for groups reporting lower acceptability. These measures may strengthen informed PrEP adoption and the contribution of biomedical prevention to HIV control in Nigeria.

Acknowledgements

The authors acknowledge the key-population respondents for their time, honest responses, and valuable information regarding PrEP knowledge, availability, and acceptability. We also appreciate the healthcare workers and brothel managers who facilitated the study and the Delta State Ministry of Health for granting ethical approval.

Declarations:

Funding: The authors declared that no funding was received for this study.

Competing interests: The authors declared no conflicts of interest related to the publication.

Availability of data and materials: The data used in this study are included in the manuscript.

Authors contribution

GMEN.: Conceptualization, methodology, validation, data curation, formal analysis, visualization, software, supervision, validation, writing – original draft, writing – review & editing. LCO.: Conceptualization, methodology, data curation, investigation, project planning and administration, writing – original draft, review & editing. AEU.: Software, writing – original draft. J.J.E.: Formal analysis, visualization, writing – original draft. MEN.: Methodology, formal analysis, visualization, software, writing – original draft, writing – review & editing. All authors read and approved the final version of the manuscript.

References

1. Joint United Nations Programme on HIV/AIDS. The urgency of now: AIDS at a crossroads—Global AIDS update 2024. Geneva: UNAIDS; 2024. Available from: <https://www.unaids.org/en/resources/documents/2024/global-aids-update-2024>
2. World Health Organization. Implementation tool for pre-exposure prophylaxis of HIV infection: module on clinical management and service delivery. Geneva: World Health Organization; 2024. Available from: <https://www.who.int/publications/i/item/9789240097230>
3. Bekker L-G, Beyrer C, Quinn TC, Kazatchkine M, Ryan O, Kavanagh MM. The global response to HIV and the path to ending the epidemic by 2030. *Lancet*. 2023;402(10414):1753-1772.
4. Federal Ministry of Health. National guidelines for HIV prevention, treatment, and care. Abuja: National AIDS and STIs Control Programme; 2020. Available from: <https://naca.gov.ng>
5. National Agency for the Control of AIDS. National HIV self-testing and pre-exposure prophylaxis communication strategy. Abuja: National Agency for the Control of AIDS; 2022. Available from: <https://naca.gov.ng>
6. National Agency for the Control of AIDS. Nigeria HIV/AIDS indicator and impact survey report. Abuja: National Agency for the Control of AIDS; 2024.
7. Olakunde BO, Ujam C, Ndukwe CD, Falola-Anoemuah Y, Olaifa Y, Oladele TT, et al. Barriers to the uptake of oral pre-exposure prophylaxis among young key populations in Nigeria. *Int J STD AIDS*. 2023;35(5):346-351. doi:10.1177/09564624231220099.
8. Olakunde BO, Folala-Anoemuah Y, Ujam C, Ndukwe CD, Olaifa Y, Yahaya HB, et al. Awareness and uptake of oral pre-exposure prophylaxis among adolescent and young key populations in Nigeria: a secondary data analysis of the 2020 Integrated Biological and Behavioural Surveillance Survey. *AIDS Care*. 2024;36(1):146-152.
9. Centers for Disease Control and Prevention, US Public Health Service. Preexposure prophylaxis for the prevention of HIV infection in the United States. 2021 update: a clinical practice guideline. Atlanta: Centers for Disease Control and Prevention; 2021. Available from: <https://stacks.cdc.gov/view/cdc/112360>
10. World Health Organization. Consolidated guidelines on differentiated HIV testing services. Geneva: World Health Organization; 2024. Available from: <https://www.who.int/publications/i/item/9789240096394>
11. Durosini-Etti O, Nwala EK, Oki F, Ikpeazu A, Godwin E, Umoh P, et al. Communication needs for improved uptake of PrEP and HIVST services among key populations in Nigeria: a mixed-method study. *AIDS Res Ther*. 2021;18. doi:10.1186/s12981-021-00411-6.
12. Geldsetzer P, Chebet JJ, Tarumbiswa T, Phate-Lesihla R, Maponga C, Mandara E, et al. Knowledge and attitudes about HIV pre-exposure prophylaxis: evidence from in-depth interviews and focus group discussions with policy makers, healthcare providers, and end-users in Lesotho. *PLOS Glob Public Health*. 2022;2(10). doi:10.1371/journal.pgph.0000762.
13. Ajayi AI, Onyango MA, Mbachu CO, Nwala AI. Awareness of, willingness to use, and uptake of

- pre-exposure prophylaxis among key populations in Nigeria: a multi-center cross-sectional study. *BMC Public Health*. 2021;21(1):1341.
14. Eshun-Wilson I, Ford N, Mody A, Beres L, Schwartz S, Baral S, et al. Strengthening implementation guidelines for HIV service delivery: considerations for future evidence generation and synthesis. *PLoS Med*. 2023;20(3).
 15. Nagai H, Ankomah A, Fuseini K, Adiibokah E, Semahegn A, Tagoe H. HIV pre-exposure prophylaxis uptake among high-risk population in sub-Saharan Africa: a systematic review and meta-analysis. *AIDS Patient Care STDS*. 2024;38(2). doi:10.1089/apc.2023.0117.
 16. Hartmann M, Nyblade L, Otticha S, Marton T, Agot K, Roberts ST. The development of a conceptual framework on PrEP stigma among adolescent girls and young women in sub-Saharan Africa. *J Int AIDS Soc*. 2024;27(2):e26213. doi:10.1002/jia2.26213.
 17. Peck ME, Yaacoubian H, Peters PJ. Progress toward UNAIDS global HIV pre-exposure prophylaxis targets: CDC-supported oral pre-exposure prophylaxis—37 countries, 2017–2023. *MMWR Morb Mortal Wkly Rep*. 2024;73(47):1082–1086. doi:10.15585/mmwr.mm7347a3.
 18. Mpirirwe R, Segawa I, Ojiambo KO. HIV pre-exposure prophylaxis uptake, retention, and adherence among female sex workers in sub-Saharan Africa: a systematic review. *BMJ Open*. 2024;14. doi:10.1136/bmjopen-2023-076545.
 19. Stoebenau K, Heise L, Gibbs A. Peer support dynamics and community-linked delivery channels for structural health intervention adherence. *Glob Public Health*. 2024;19(1). doi:10.1186/s12889-024-19152-y.
 20. Rosenstock IM. Historical origins of the Health Belief Model. *Health Educ Monogr*. 1974;2(4):328–335.
 21. National Population Commission. Revised national policy on population for sustainable development. Abuja: Federal Republic of Nigeria; 2022. Available from: <https://nationalpopulation.gov.ng>
 22. Delta State Ministry of Health. Delta State health profile and epidemiological data report. Asaba: Delta State Government; 2022. Available from: <https://deltastate.gov.ng>
 23. Cochran WG. Sampling techniques. 2nd ed. New York: John Wiley & Sons, 1963.
 24. Ajayi AI, Ismail KO, Adeniyi OV, Akpan W. Awareness and use of pre-exposure and post-exposure prophylaxes among Nigerian university students: findings from a cross-sectional survey. *Medicine*. 2018;97(36). doi:10.1097/MD.00000000000012226.
 25. Delgado AJ, Cossman JS, BeLue R. An analysis of sexual health behaviors and sociodemographic characteristics influencing HIV knowledge and current status in Bexar County, Texas. *Research Square*. 2024. doi:10.21203/rs.3.rs-5440882/v1.
 26. Kumar P, Das C, Kumar A, Sahu D, Rai S, Godbole S, et al. Diversity in HIV epidemic transitions in India: an application of HIV epidemiological metrics and benchmarks. *PLoS One*. 2022;17(7).
 27. Joint United Nations Programme on HIV/AIDS. AIDS, crisis, and the power to transform: 2025 Global AIDS Update. Geneva: UNAIDS; 2025. Available from: <https://www.unaids.org/en/resources/document/s/2025/2025-global-aids-update>.
 28. Stoebenau K, Muchanga G, Ahmad SSO. Barriers and facilitators to uptake and persistence on PrEP among key populations in Southern Province, Zambia: a thematic analysis. *BMC Public Health*. 2024;24:1617. doi:10.1186/s12889-024-19152-y.
 29. Sanni OF, Umoh P, Kalaiwo A, Abang R, Oguntonade A, Amechi P, et al. Pre-exposure prophylaxis and HIV prevention among key populations in Nigeria. *Int J MCH AIDS*. 2024;13:e013. doi:10.25259/IJMA_6_2023.
 30. Rosenstock IM. The Health Belief Model and preventive health behavior. *Health Educ Monogr*. 1974;2(4):354–386.
 31. Celum CL, Delany-Moretlwe S, Baeten JM, van der Straten A, Hosek S, Bukusi EA, et al. HIV pre-exposure prophylaxis for adolescent girls and young women in Africa: from efficacy trials to delivery. *J Int AIDS Soc*. 2019;22(Suppl 4). doi:10.1002/jia2.25298.
 32. Shamu S, Shamu P, Khupakonke S, Farirai T, Chidarikire T, Guloba G, et al. Pre-exposure

- prophylaxis awareness, attitudes, and uptake willingness among young people: gender differences and associated factors in two South African districts. *Glob Health Action*. 2021;14(1):1886455. doi:10.1080/16549716.2021.1886455.
33. Chen-Charles J, Joseph Davey D, Toska E, Seeley J, Bekker L-G. PrEP uptake and utilization among adolescent girls and young women in sub-Saharan Africa: a scoping review. *AIDS Behav*. 2025;29(6):1876-1896. doi:10.1007/s10461-025-04656-4.
 34. Ibiloye O, Decroo T, Masquillier C, Okonkwo P, Lynen L, Jwanle P, et al. Realist evaluation of a community-based antiretroviral therapy programme for key populations in Benue State in Nigeria. *BMC Infect Dis*. 2024;24(1):892. doi:10.1186/s12879-024-09808-w.
 35. World Health Organization. Differentiated and simplified pre-exposure prophylaxis for HIV prevention: update to WHO implementation guidance. Geneva: World Health Organization; 2022. Available from: <https://www.who.int/publications/i/item/9789240053694>
 36. Cassidy T, Ntuli N, Kilani C, Malabi N, Rorwana B, Mutseyekwa T, et al. Delivering PrEP to young women in a low-income setting in South Africa: lessons for providing both convenience and support. *AIDS Behav*. 2022;26(1):147-159. doi:10.1007/s10461-021-03366-x.
 37. Ogunbajo A, Iwuagwu S, Williams R, Biello K, Mimiaga MJ. Awareness, willingness to use, and history of HIV PrEP use among gay, bisexual, and other men who have sex with men in Nigeria. *PLoS One*. 2019;14(12). doi:10.1371/journal.pone.0226384.
 38. Nja GME, Okechie LC. HIV pre-exposure prophylaxis utilization among key populations in Delta State, Nigeria: patterns, accessibility, and barriers. *Glob J Pure Appl Sci*. 2026;32(3):605-620. <https://dx.doi.org/10.4314/gjpas.v32i4.10>
 39. Nja GME, Efimba BM, Etim JJ, Uzomba AE, Elgoraish AG, Idehen CI. Knowledge, perceptions, and predictors of acceptability of HIV self-testing services among primary healthcare workers in Calabar Metropolis, Nigeria: a cross-sectional descriptive study. *Ibom Med J*. 2026b;19(3). In press.
 40. Zia Y, Etyang L, Nyerere B, Nyamwaro C, Mogaka F, Mwangi M, et al. Structural influences on delivery and use of oral HIV PrEP among adolescent girls and young women seeking post-abortion care in Kenya. *EClinicalMedicine*. 2024;68:102416. doi:10.1016/j.eclinm.2023.102416.
 41. Ssuna B, Kansiime W, Mukiza N, Mbonye M, Mutesasira A. Factors associated with willingness to use oral pre-exposure prophylaxis in a fisher-folk community in peri-urban Kampala, Uganda. *BMC Public Health*. 2022;22(1). doi:10.21203/rs.3.rs-4943952/v1.
 42. Ssuna B, Armstrong-Hough M, Ngaybe MGB, Kalibbala D, Kalyango JN, Kiweewa FM. Low knowledge levels and high willingness to use oral pre-exposure prophylaxis among key populations in Kampala, Uganda: implications for targeted educational interventions. *Research Square*. 2024. doi:10.21203/rs.3.rs-4943952/v1.