International Journal of
Health Sciences
(IJHS)

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International Journal of Health Sciences
ISSN: 2710-2564 (Online)
Vol. 8, Issue No. 4, pp. 23 - 39, 2025
www.carijournal.org

Prevalence of Awareness and Factors Associated with Acceptability of HIV Pre-Exposure Prophylaxis among Female University Students Aged 18 to 24 Years in Rwanda

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Accepted: 13th October, 2025, Received in Revised Form: 11th November, 2025, Published: 12th November, 2025

Abstract

Purpose: HIV Pre-Exposure Prophylaxis (PrEP) is a key prevention tool for people at substantial risk of HIV like young women (YW). This study determined the prevalence and factors associated with PrEP acceptability among YW in Rwanda.

Methodology: This study was a cross-sectional study that gathered quantitative information from 455 YW students in selected universities in Rwanda. A structured questionnaire was used to collect participants' information about their socio-demography, along with PrEP awareness and acceptability. The data were analyzed using STATA 17 descriptively and a logistic regression model was built to determine factors associated with the PrEP acceptability.

Findings: Of the participants, 87.5% had heard of PrEP, and 87.9% expressed willingness to use it when advised by a healthcare provider. Students unaware of PrEP were significantly more likely to accept it [aOR: 13.8], while those informed about both pill and injectable forms had higher acceptability [aOR: 15.8–20.4]. Students reporting no barriers and those likely to recommend PrEP were also more accepting [aOR: 4.5 and 153, respectively].

Unique contribution to theory, practice and policy: The study highlights high awareness and acceptability, though concerns about oral PrEP's pill burden persist. Enhancing education to counter myths and expanding access to injectable PrEP could improve uptake among YW in Rwanda.

Keywords: *HIV Pre-Exposure Prophylaxis (PrEP), HIV prevention*

1. Background of the study

HIV Pre-Exposure Prophylaxis (PrEP) is the use of antiretrovirals by HIV-negative individuals to reduce the risks of getting infected by HIV/AIDS. In the year 2014, the USA Food and Drug Administration (FDA) accepted tenofovir-emtricitabine, known as Truvada, to be a PrEP medication (Underhill et al., 2014). The WHO endorsed this innovative approach for HIV prevention in 2015 for people with a high probability of getting HIV infection (WHO, 2019). There are various formulations of PrEP (pre-exposure prophylaxis), including those containing Tenofovir-based medications and the long-acting injectable Cabotegravir. Moving forward, advancements in PrEP continue to expand options for users, enhancing efficacy, adherence, and accessibility (WHO, 2021).

In 2018, Rwanda Biomedical Centre (RBC) started to use Truvada as PrEP drugs (RBC, 2018). As of October 2023), PrEP was recommended to people with high probability of HIV acquisition including: HIV negative partners of a people living with HIV (PLHIV) whos viral load is above 200 copies/mL of blood or not on ART, Female Sex Workers(FSWs), young females from 18 to 24 years old, and Men having sex with men (MSM).

Despite the world's effort to provide universal access to HIV prevention services, around 1,300,000 people acquired HIV in 2022 worldwide. There is increasing evidence that adolescent girls and young women at a disproportionate risk of acquiring the diseases as compared to males of the same age and adults aged 25 years and above. According to the Rwanda population-based HIV Impact Assessment (PHIA) data, HIV prevalence was 3 folds in females aged 20 to 24 years (1.8%) than in males in the same age band (0.6%) (WHO, 2023).

HIV pre-exposure prophylaxis (PrEP) is a new and innovative approach in HIV prevention. Since 2015 when the WHO recommended countries to use it as an additional prevention method. Studies on PrEP awareness, acceptability and utilization have been done in different countries in developed countries like USA (Janosik, 2020) and Sweden(Nguyen & Mayerhofer, 2022) among others. In Africa, there are few similar studies including those in South Africa and Tanzania (Shamu et al., 2021).

Although PrEP services date nearly a decade (since 2015) (WHO, 2019), there is still limited literature on its awareness level among adolescent girls and women aged 18 to 24. Current evidence shows that AGYW who are sexually active, with multiple sexual partners, or practicing transactional sex are at high risk of HIV and thus, eligible for HIV PrEP. However, awareness and acceptability levels along with factors associated with readiness to use them once identified as eligible remain scarce. Awareness level ranges from 15 to 61% among university students in the USA(Okeke et al., 2021). The rate is relatively lower rates in Africa going up to 49% in South Africa countries. However, the rates are unknown in many African countries including Rwanda.

In Rwanda, PrEP services started in 2018 with HIV negative people living with HIV infected persons in the so called discordant couples. Later in 2019, Female sex workers and Men who have

Sex with Men (MSM) were also eligible to use PrEP. It is 2023 that all people reporting or identified to have sex with someone living with HIV and young females aged 18 to 24 years were allowed to use PrEP according to the 2023 National HIV guidelines in Rwanda(RBC, 2022). Since the introduction of the program in 2018, there has been limited evidence about awareness and acceptability of PrEP especially among people eligible for the service including Female sex workers, Men having sex with men, HIV-negative people living or having sex with known HIV-positive who are not virally suppressed, or young women aged 18 to 24 years.

Despite the availability of PrEP services in all public health facilities in Rwanda, there are limited studies on the awareness and acceptability of the service in the country. Consequently, factors associated with the unawareness are not well understood especially in young people. Therefore, this study determined the prevalence and factors associated with HIV PrEP acceptability among young women students aged between 18 to 24 years in selected universities in Rwanda.

2. Methods

2.1. Study design

The present study was a quantitative cross-sectional study in design. It used survey approach to gather required data by interviewing the study participants.

2.2. Setting

Rwanda is a country in Eastern Africa region known a country of thousand hills due to its hilly geography. The study was conducted in 5 universities selected from 5 regions of Rwanda including University of Rwanda/Remera Campus in Kigali city, University of Rwanda/Huye Campus in Southern Province, INES Ruhengeri in Northern Province, Kibogora Polytechnique/Nyamasheke in Western Province, and East African University Rwanda/ Nyagatare Campus in Eastern province of Rwanda. Below are figures illustrating the selected universities.

2.3. Participants

a. Inclusion and exclusion criteria

The inclusion criteria were being AGYW aged 18 to 24 years and not married or cohabiting by the time of data collection. The exclusion criteria were not being at their campuses/university by the time of data collection and those who were having visual impairments which prevent them from answering self-administered questionnaire using their smartphones or computers.

Sampling design and sample size

Sample size for this study is calculated using the following Cochran formula(Nanjundeswaraswamy & Divakar, 2021)

$n = \frac{Z^2 p(1-p)}{d^2}$ where:

Z is degree of confidence (1.96) considering 95% confidence interval (CI)

p is the probability of accepting PrEP services held at 50%, highest variability, as no other studies conducted in Rwanda for reference.

d is the margin of error to allow of 5%

$$n = \frac{1.96^2 0.5(1-0.5)}{0.05^2}$$

$$= \frac{3.8416 \times 0.5 \times 0.5}{0.0025} = 384$$

The formula shows that to have a generalizable number of young women, 384 people were needed. However, to compensate for possible missing data and non-responsiveness of the students, we assumed a non-response rate of 15.5% in the following Cochran adjustment for response rate.

$$\mathrm{n} = 1 + \frac{n0}{1 - non - response\ rate}$$

$$\mathrm{n} = \frac{384}{1 - 15.5} \approx 455$$

Therefore, a total of 455 young women were enrolled in the study.

A systematic sampling strategy was used to select the university female students aged 18 to 24 years, known as adolescent girls and young women (AGYW), to respond to the study questionnaire. During the selection of the AGYW, A Research Assistant sat at the entrance/exit gate of the selected universities and recruited every 6th AGYW who was entering the university. Sampled students were shared a Google form link to provide their responses to an online questionnaire. Thus, only those who had time and willingness to participate in the study were enrolled. Recruitment of the female students ceased upon reaching the sample size for each university according to Table 1.

Table 1: Comparison of anticipated and actual sample size distribution by university

University name	Estimated population-2023	Anticipated sample size		Actual sample size	
		Sample size	Proportion	Collected	Percent
UR/Remera Campus	1649	112	25%	108	23.7
UR/Huye Campus	2233	152	33%	142	31.2
INES Ruhengeri	1,640	112	25%	105	23.1
Kibogora Polytechnic	750	51	11%	55	12.1
EAUR/ Nyagatare Campus	400	27	6%	45	9.9
All	**6,672**	**455**	**100**	**455**	**100**

Source: Published numbers of students (internet)

2.4. Data collection

After obtaining an ethical approval, I wrote letter applying for data collection in selected universities. Data collection started right after obtaining data collection approval from the university's management. It was done by 4 Research Assistants, 1 in each university. However, the questionnaire was self-administered. The role of the Research Assistants was recruitment of study participants by introducing to them and providing any clarification required by the study participant. The questionnaire started with a brief description of the study and a question on informed consent. It was a self-administered online as a google form questionnaire which was shared to the participant either on WhatsApp or on email. Below is the structure of the data collection instrument.

2.5. Data collection tools

This study used a structured questionnaire, delivered as a google form. It was capturing information on socio-demographic characteristics of the study participants, their knowledge on HIV prevention including PrEP and PEP, and their perceived vulnerability to HIV and PrEP benefits along with their willingness or acceptability to use PrEP. This questionnaire was developed based on the theories, the health belief model(Shmueli, 2021) and theory of planned behavior(Ajzen, 1985).

2.6. Bias

To ensure validity of the questionnaire, this study developed the questions based on findings from previous similar findings and approved theories of human behaviors towards health services (the theory of planned behavior and health belief model). This means that questions from previous similar studies were adopted, and the set questionnaire were reviewed by my three (3) fellow researchers. Moreover, to reduce bias, the questionnaire was piloted to ensure that it collects what it is intended to collect (validity). The testing was done on 25 young women from the University of Rwanda identify and fix accuracy, translation, and comprehensiveness issues.

2.7. Statistical methods

Gathered data were analyzed using STATA 15 at univariable, bi-variable and multivariable analysis levels. Socio-demographic characteristics of the Young women (YW) university students were descriptively presented using mean, frequency distribution and percentage. Various YW characteristics including socio-demographics, knowledge, perceived risks, benefits, and barriers were cross-tabulated with acceptability (1. Yes/No) computing chi-square test to determine significance of association which were set at a p value less than 0.05. Lastly, logistic regression analysis was used to assess the strength of associated between participants' characteristics and acceptability of PrEP use (1. Yes/No). Only variables with p value less than 0.05 at bi-variable analysis level were included in the logistic regression model.

3. Results

This section describes the study population and presents the findings on Pre-Exposure Prophylaxis (PrEP) awareness, acceptability, and the factors associated with its acceptability among adolescent and young women enrolled in universities across Rwanda.

3.1. Demographic characteristics of the study participants

This study collected data from 455 female students aged between 18 and 24 years with mean age 19 years were enrolled in the study. Of them, larger proportions were from UR-Huye campus (31.2%), in year one of their university education (45.1%), in economic category III and IV (71.6%), from rural areas (63.3%), and protestant religion (38.2%). Nearly all of them were single (98.9%). Table 2 shows further details about demographic information of the study participants.

Table 2: Demographic characteristics of the study participants

Variable	Frequency	Percent
University		
EAUR Nyagatare	45	9.9
INES Ruhengeri	105	23.1
Kibogora Polytechnic	55	12.1
UR/HUYE	142	31.2
UR/CMHS	108	23.7
University level of education (in Year)		
Year 1	205	45.1
Year 2	164	36.0
Year 3	70	15.4
Year 4	16	3.5
Marital status		
Single	450	98.9
Married	5	1.1
Economic category of her family		
Economic category 1 or 2	129	28.4
Economic category 3 or 4	325	71.6
Area of origin (rural/urban)		
Rural	288	63.3
Urban	167	36.7
Religion		
Catholic	140	30.8
Protestant	174	38.2
Adventist	89	19.6
Muslin and others	52	11.4
Total	**455**	**100.0**

UR: University of Rwanda, UR/CMHS: University of Rwanda college of medicine and health sciences, EAUR: East African University Rwanda (EAUR)/ Nyagatare Campus.

4.2.1. Proportion of young women university students aware of HIV PrEP services

To assess the proportion of female students aware of PrEP, participants were asked whether they had ever heard of PrEP, as well as when and where they first became aware of it. Out of the 455 female students surveyed, the majority (87.6%) reported having heard of PrEP. Most had been aware of it for two to three years (62.3%), primarily knew about the pill form (75.9%), and cited

school as their main source of information (59.0%). Additionally, Figure 1 indicates that 87.9% of the participants expressed willingness to use PrEP if identified as eligible. Further information is found in Table 3 and Figure 1.

Table 3: Proportion of young women University students aware of HIV PrEP services

Variables	Frequency	Percent
Ever heard about PrEP		
Yes	398	87.5
No	57	12.5
If Yes, period have been aware		
One years or less	150	37.7
2 to 3 years	248	62.3
Which method of PrEP are you		
Pill	302.0	75.9
others-Injectable/vag	29.0	7.3
Not sure which type	67.0	16.8
Where did you heard about PrEP?		
At School	235	59.0
Radio or Television	153	38.4
Health facility or others	10	2.5

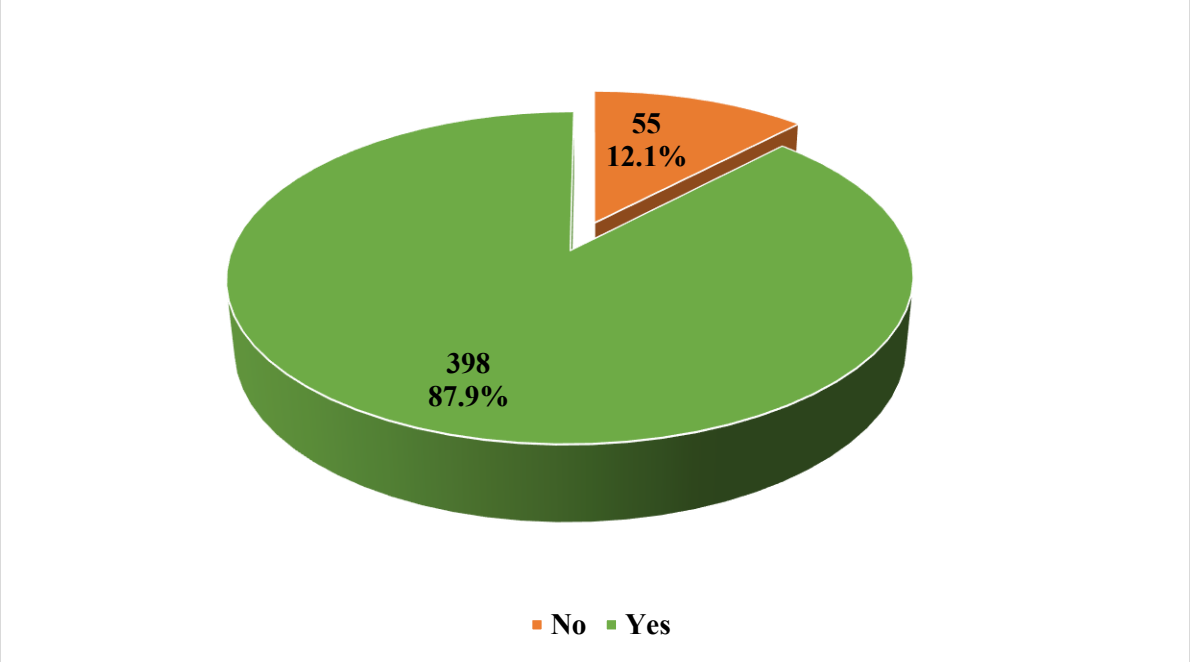

Figure 1: Prevalence of HIV PrEP acceptability among young women university students

4.2.1. Socio-demographic factors associated with acceptability HIV PrEP services

To determine the factors associated with acceptability of PrEP among female university students, participants' characteristics including demographic, PrEP related knowledge, and self-reported perceived risks to HIV infections. Significantly higher prevalence rates ($p<0.05$) of PrEP acceptability were among students ever heard about PrEP (90.7%), heard about oral/pill PrEP (94.0%), heard PrEP on radio or television (92.2%), aware that PrEP is one way of preventing HIV (95.0%), aware that PrEP is the use of ARVs to prevent HIV infection (93.1%), aware that only people at high risk of HIV are eligible for PrEP (92.9%), ever heard about PrEP (90.7%), and heard once a day pill (96.7%). Table 4 provides further information.

Table 4: Socio-demographic factors associated with acceptability HIV PrEP services

Variables	N	Whether ready to take PrEP once identified eligible		X_2 Value	p value
		No	Yes		
University*					
EAUR Nyagatare	45	9(20.0)	36(80.0)	7.3010	0.121
INES Ruengeri	103	15(14.6)	88(85.4)		
Kibogora Plytechnic	55	2(3.6)	53(96.4)		
UR HUYE	142	15(10.6)	127(89.4)		
UR/CMHS	108	14(13.0)	94(87.0)		
University level of education (in Year)					
Year 1	204	31(15.2)	173(84.8)	4.6815	0.197
Year 2	163	18(11.0)	145(89.0)		
Year 3	70	4(5.7)	66(94.3)		
Year 4	16	2(12.5)	14(87.5)		
Years remaining to complete you university					
2 years or less	236	22(9.3)	214(90.7)	3.7430	0.053
3 years or more	216	33(15.3)	183(84.7)		
Marital status					
Single	448	55(12.3)	393(87.7)	0.6987	0.403
Married	5	0(0.0)	5(100)		
Economic category of her family					
I or II	127	20(15.8)	107(84.2)	2.1180	0.146
III or IV	325	35(10.8)	290(89.2)		
Area of origin (rual/urban)					
Rural	286	37(12.9)	249(87.1)	0.4606	0.497
Urban	167	18(10.8)	149(89.2)		
Religion					
Catholic	139	14(10.1)	125(89.9)	1.0659	0.785
Protestant	173	24(13.9)	149(86.1)		
Adventist	89	11(12.4)	78(87.6)		
Muslin and others	52	6(11.5)	46(88.5)		

Variables	N	Whether ready to take PrEP once identified eligible		X_2 Value	p value
		No	Yes		
Ever heard about HIV pre-exposure prophylaxi s (PrEP)					
Yes	397	37(9.3)	360(90.7)	23.9649	**<0.01**
No	56	18(32.1)	38(67.9)		
How long have been aware of PrEP					
One years or less	149	16(10.7)	133(89.3)	0.5678	0.451
2 to 3 years	248	21(8.5)	227(91.5)		
Which method of PrEP are you aware of					
Pill	302	18(6.0)	284(94.0)	32.7534	**<0.01**
others-Injectable/vag	28	6(21.4)	22(78.6)		
None	123	31(25.2)	92(74.8)		
Where did you hear about PrEP?					
At School	234	24(10.3)	210(89.7)	22.4698	**<0.01**
Radio or Television	153	12(7.8)	141(92.2)		
Health facility or others	63	19(30.2)	44(69.8)		
PrEP is one way of HIV prevention					
Yes	319	16(5.0)	303(95.0)	51.8935	**<0.01**
No/Not sure	133	39(29.3)	94(70.7)		
PrEP is administration of ARVs to stop HIV virus infection					
Yes	374	26(6.9)	348(93.1)	55.1771	**<0.01**
No/Not sure	78	29(37.2)	49(62.8)		
Only people who are at high risk of HIV are eligible					
Yes	182	13(7.1)	169(92.9)	7.1993	**0.007**
No/Not sure	270	42(15.6)	228(84.4)		
PrEP is given to HIV negative people					
Yes	175	20(11.4)	155(88.6)	0.1461	0.702
No/Not sure	277	35(12.6)	242(87.4)		
Prior to PrEP initiation, HCPs assess good renal function					
Yes	282	16(5.7)	266(94.3)	29.5895	**<0.01**
No/Not sure	170	39(22.9)	131(77.1)		
PrEP services are voluntarily given (after verbal consent)					
Yes	49	4(8.2)	45(91.8)	0.8248	0.364
No/Not sure	403	51(12.7)	352(87.3)		
People taking PrEP are regularly follow up by a HCP					
Yes	220	22(10.0)	198(90.0)	1.8853	0.170
No/Not sure	232	33(14.2)	199(85.8)		
In Rwanda, PrEP drugs can be accessed from a pharmacy					

Variables	N	Whether ready to take PrEP once identified eligible		X_2 Value	p value
		No	Yes		
Yes	113	11(9.7)	102(90.3)	0.8349	0.361
No/Not sure	339	44(13.0)	295(87.0)		
In Rwanda, PrEP drugs can be accessed from a health facility					
Yes	404	35(8.6)	369(91.3)	43.7243	**<0.001**
No/Not sure	48	20(41.7)	28(58.3)		
PrEP has side effects like diarrhea, abdominal cramps					
Yes	93	9(9.7)	84(90.3)	0.6797	0.410
No/Not sure	359	46(12.8)	313(87.2)		
Risks to HIV					
Ever had sex in a lifetime					
Yes	282	25(8.9)	257(91.1)	7.5162	**0.006**
No	171	30(17.5)	141(82.5)		
If ever had sex, age at first sex					
Never done sex	84.000	18(21.4)	66(78.6)	10.0163	**0.007**
17 years below4-17	71	5(7.0)	66(93.0)		
18 years and above 18	209	20(9.6)	189(90.4)		
Number of sexual partners have you had in the last 3 months					
No sex partner	357	45(12.6)	312(87.4)	0.5237	0.77
One sex partner	88	10(11.4)	78(88.6)		
two or three	3	0(0.0)	3(100)		
Based on your behavior in the past, do you think you are at risk of HIV					
Yes	24	2(8.3)	22(91.7)	0.3445	0.557
No/Not sure	429	53(12.4)	376(87.6)		
Ever been tested for HIV test					
Yes	357	36(10.1)	321(89.9)	6.6837	**0.01**
No	96	19(19.8)	77(80.2)		
What do you think can hinder limit you from using PPrEP?					
None or not sure	190	14(7.4)	176(92.6)	28.7003	**<0.001**
Stigma, Religion, Community perception/cultural beliefs	120	31(25.8)	89(74.2)		
Accessibility: resources, or fear of confidentiality	143	10(7.0)	133(93.0)		
Who do you think are at high risk of HIV infection in your university?					
Boys	89	11(12.4)	78(87.6)	0.0049	0.944
Girls	364	44(12.1)	320(87.9)		
Ever heard about HIV pre-exposure prophylaxi s (PrEP)					
Yes	397	37(9.3)	360(90.7)	23.9649	**<0.001**

Variables	N	Whether ready to take PrEP once identified eligible		X_2 Value	p value
		No	Yes		
No	56	18(32.1)	38(67.9)		
If ever heard PrEP, how long have been aware?					
One years or less	149	16(10.7)	133(89.3)	0.5678	0.451
2 to 3 years	248	21(8.5)	227(91.5)		
Whether ready for daily pill as PrEP once eligible					
Yes	301	13(4.3)	288(95.7)	51.4571	**<0.001**
No	152	42(27.6)	110(72.4)		
If ever heard of PrEP, What method of PrEP have you heard of?					
Pill once a day	270	9(3.3)	261(96.7)	92.4358	**<0.001**
Injectable	90	8(8.9)	82(91.1)		
None/Not sure	93	38(40.9)	55(59.1)		
Ever used PrEP					
Yes	5	0(0.0)	5(100)	0.6987	0.403
No	448	55(12.3)	393(87.7)		
Whether currently on PrEP					
Yes	4	0(0.0)	4(100)	0.5577	0.455
No	449	55(12.3)	394(87.8)		

UR: University of Rwanda, UR/CMHS: University of Rwanda college of medicine and health sciences, EAUR: East African University Rwanda (EAUR)/ Nyagatare Campus.

All variables statistically associated with PrEP acceptability among female university students in Table 4, only 4 variables uniquely predicted PrEP acceptability among university students encompassing ever heard about PrEP, what can hinder or limit them from using PrEP, whether would recommend a friend/colleague to take HIV PrEP, and method of PrEP ever heard about. This study shows that higher likelihood of PrEP acceptability was observed among female university students who had never heard about PrEP [aOR: 13.8 with 95% C.I: 1.0-185.4], whether would recommend someone for PrEP [aOR: 15.3 with 95% C.I: 3.5-66.3], and Absence of PrEP usage hindrances as compared to being hindered by stigma, religion, community perception, or cultural beliefs. Moreover, being sure of an administration mode for a PrEP method ever heard about. As compared to female students who were e unaware or unsure of PrEP methods, being aware of daily taken oral PrEP was associated with 15.8 [aOR:15.8 with 95% C.I: 2.5-99.6] folds of PrEP use acceptability while awareness of injectable PrEP was associated with 20.4 [aOR:20.4 with 95% C.I: 3.3-124.8] folds of PrEP acceptability. Table 5 shows further information on Logistic regression analysis of factors associated with PrEP acceptability among students.

Table 5: Logistic regression analysis of factors associated with PrEP acceptability among students

Variables	COR*	95% C.I: Lower	Upper	*p value*	aOR**	95% C.I: Lower	Upper	*p value*
Ever heard about HIV pre-exposure prophylaxis (PrEP)								
Yes	4.6	2.4	8.9	**<0.01**	Ref			
No	Ref				13.8	1.0	185.4	**0.047**
Which method of PrEP are you aware of								
Pill	4.3	1.6	11.9	**0.01**	Ref			
None	0.8	0.3	2.2	0.68	1.1	0.2	6.7	0.881
others-Injectable/vaginal ring	Ref				0.2	0.01	2.6	0.216
Where did you about PrEP?								
At School	Ref				Ref			
Radio or Television	1.3	0.7	2.8	0.43	0.9	0.2	3.7	0.923
Health facility or others	0.3	0.1	0.5	**<0.01**	0.4	0.1	2.9	0.375
PrEP is one way of HIV prevention								
Yes	7.9	4.2	14.7	**<0.01**	Ref			
No/Not sure	Ref				0.4	0.1	1.5	0.177
PrEP is the administration of ARVs to stop HIV infection								
Yes	7.9	4.3	14.5	**<0.01**	Ref			
No/Not sure					1.7	0.4	8.3	0.498
Only people who are at high risk of HIV are eligible								
Yes	2.4	1.2	4.6	0.01	Ref			
No/Not sure					0.9	0.3	3.2	0.886
Before PrEP initiation, HCPs assess good renal function								
Yes					Ref			
No/Not sure	4.9	2.7	9.2	**<0.01**	0.4	0.1	1.9	0.263
In Rwanda, PrEP drugs can be accessed from a health facility								
Yes	7.5	3.9	14.7	**<0.01**	Ref			
No/Not sure	Ref				0.2	0	1.6	0.117
Risks to HIV								
Ever had sex in a lifetime								
Yes					Ref			
No	2.2	1.2	3.9	0.01	0.4	0.1	1.6	0.192

Variables	COR*	95% C.I: Lower	Upper	*p value*	aOR**	95% C.I: Lower	Upper	*p value*
If ever had sex, age at first sex								
Never done sex					Ref			
17 years below4-17	3.6	1.3	10.3	0.02	1.4	0.2	9.4	0.697
18 years and above 18	2.6	1.3	5.2	0.01	Omitted			
Ever been tested for HIV test								
Yes	2.2	1.2	4.0	0.01	Ref			
No	Ref				1	0.2	4.2	0.948
What do you think can hinder limit you from using PPrEP?								
Stigma, Religion, Community perception/cultural beliefs	4.4	2.2	8.6	**<0.01**	Ref			
Accessibility: resources, or fear of confidentiality	4.6	2.2	9.9	**<0.01**	1.5	0.3	6.3	0.604
None or not sure	Ref				4.5	1	19.5	**0.046**
Whether would recommend a friend/colleague to take HIV PrEP								
Yes	20.1	10.4	39.0	**<0.01**	15.3	3.5	66.3	**<0.01**
No	Ref				Ref			
Whether ready for daily pill as PrEP once eligible								
Yes	8.5	4.4	16.4	**<0.01**	Ref			
No	Ref				0.2	0	1.1	0.064
If ever heard PrEP, Method of PrEP heard of								
Pill once a day	Ref				15.8	2.5	99.6	**0.003**
Injectable	2.8	1.1	7.6	0.04	20.4	3.3	124.8	**0.001**
None or not sure	0.1	0.1	0.3	**<0.01**	Ref			

***COR: Crude odd ratios, **AOR: Adjusted odd ratios (Predicted probabilities are of being in membership of accepting PrEP**

4. Discussion

This study was found that about 87.9% female university students aged 18 to 24 years accept to use PrEP once a healthcare provider advises them to do so for HIV prevention and several factors were found to be associated with the acceptability including lack of prior knowledge about PrEP among others.

First of all, this study found that majority of female university students in Rwanda (87.5%) had ever heard about HIV pre-exposure prophylaxis. This prevalence is far higher than those reported in other studies like 52% in the USA(Okeke et al., 2021), 49% in South Africa in 2021(Shamu et al., 2021), and 20.8% in Thailand (Thongsutt et al., 2022). Differences can be

attributed to variations in study methodology and effort in community awareness in regards to HIV prevention services like pre-exposure prophylaxis. This study's finding that 87.5% of female university students in Rwanda had heard about HIV pre-exposure prophylaxis (PrEP) is a proxy that HIV prevention campaigns and educational efforts have been relatively successful in reaching young women in academic settings. Thus, these students are expected to make positive informed choice because awareness is a critical first step in the pathway to adoption of preventive measures like PrEP. However, awareness alone does not necessarily translate to use, indicating a need for follow-up actions to bridge the gap between knowledge and behavior.

Secondly, the finding that 87.9% of female university students in Rwanda accept starting PrEP, if deemed eligible, is an encouraging indicator of the acceptability of PrEP among adolescents and young women in academic settings. This level of willingness aligns with studies conducted in other settings, where awareness and perceived benefits of PrEP often correlate with high levels of acceptability. Similar to the higher awareness level reported among female students in Rwanda than in other countries, acceptability, once identified eligible for PrEP was higher among Rwandan university students. Lower rates of acceptability were observed among university students in other countries like 58% in the USA(Okeke et al., 2021), 47% in Sweden (Nguyen & Mayerhofer, 2022), 50% in South Africa (Shamu et al., 2021), and 39.8% in Thailand (Thongsutt et al., 2022). It's worth noting that a Swedish study reported that a multi-month PrEP injection was the most preferred biomedical method of HIV prevention(Nguyen & Mayerhofer, 2022). This is mainly due to felt pill burden and lack of privacy associated with oral PrEP.

Additionally, though the majority of the students would accept to use PrEP once identified eligible for PrEP, significantly higher likelihoods of acceptability were observed among students who had never heard about PrEP before [aOR: 13.8 with 95% C.I: 1.0-185.4]. This is interesting findings that may reflect a lack of evidence-based information among students ever heard about PrEP and preconceived notions which may make students who heard PrEP for the first time, more receptive to new information provided during the study. This may be attributed to the first impression effect of positive information about PrEP for the first time during the study which resulted in a favorable perception and thus, increasing willingness to use it.

However, contrary to this study, a Thailand study among university students in Southern Thailand found that participants aware of PrEP's existence were more likely to accept its use than those unaware(Thongsutt et al., 2022). Therefore, these findings emphasize the need for accurate, unbiased information dissemination and suggest that initial exposure to well-presented facts can significantly influence acceptance. Public health initiatives should consider these dynamics to enhance the effectiveness of PrEP education and uptake.

Furthermore, a higher tendency to accept PrEP was also observed among female students who Knew that PrEP can be taken as an injection [aOR:20.4 with 95% C.I: 3.3-124.8] or daily taken oral PrEP as pills [aOR:15.8 with 95% C.I: 2.5-99.6]. This underscores the importance of knowledge about PrEP modalities in influencing willingness to use HIV prevention methods. This

is because understanding that PrEP is available in different forms allows individuals to choose a method that aligns with their preferences and lifestyles, thereby increasing acceptability. This flexibility can address concerns related to daily adherence or medical procedures which may affect one's comfort and conveniences. Similar studies like a USA study also reported that understanding different PrEP modalities, including injectable and oral pills, was associated with increased willingness to consider PrEP as a viable HIV prevention strategy(Amico et al., 2019). Therefore, the significant association between knowledge of PrEP administration methods and higher acceptability highlights the critical role of comprehensive education in HIV prevention efforts. By informing individuals about the various PrEP options available, public health initiatives can enhance acceptability and uptake, contributing to more effective HIV prevention strategies.

Furthermore, lack of hindrances to using PrEP like fear of stigma, religion, confidentiality, community perception, cultural beliefs, or financial constraints [aOR:4.5 with 95% C.I: 1.0-19.5] were positively associated with PrEP acceptability. This is in line with other findings which found association with religious affiliations and community settings in the USA (Janosik, 2020) and belonging to a social group in South Africa (Shamu et al., 2021). These findings emphasize concerns about being judged or discriminated against for using PrEP, which may be associated with assumptions about one's sexual behavior. Consequently, injectable PrEP options may help address issues related to stigma, discrimination, and privacy.

Lastly, Female university students self-reporting that they would recommend it to others were more likely to accept use [aOR: 15.3 with 95% C.I: 3.5 -66.3]. This is an indication of interconnected relationship between personal acceptance and social endorsement of health interventions. The data implies that peer recommendations or perceptions may play a significant role in promoting acceptance.

5. Unique contribution to Theory, Practice and Policy

It is believed that the results from this study will inform the Ministry of Health on the prevalence of HIV PrEP acceptability among young women university students in Rwanda, the need to increase awareness of the availability and utilization of HIV PrEP services especially among people at high risk of HIV infection including young women University students. This study will also inform young women in selected Universities to be aware of the HIV PrEP services. Finally, the findings will enrich the available literature on PrEP and the factors associated with its utilization.

This study of the prevalence and factors associated with HIV PrEP acceptability among young women students in selected universities in Rwanda used a quantitative cross-sectional study with a concentration in higher learning institutions. Therefore, the findings will only be generalizable to university settings, not to general population of young women in Rwanda.

6. Conclusion

This study assessed the prevalence of awareness, acceptability and factors associated with the acceptability of HIV pre-exposure prophylaxis (PrEP) among female university students aged 18 to 24 years in 5 selected universities in Rwanda. The study findings revealed a high level of PrEP awareness (87.5%) and acceptability (87.9%) indicating that most young women are willing to use PrEP if recommended by healthcare providers. However, several factors were identified as predictors of PrEP acceptability, including lack of prior knowledge about PrEP, clarity on the mode of administration (e.g., injection or daily oral pills), and the absence of barriers to its use. These findings highlight the potential impact of rumors and misinformation about PrEP circulating within communities, emphasizing the need for targeted awareness campaigns by PrEP service providers. Additionally, the study underscores that the pill burden associated with oral PrEP is a significant drawback to its acceptability. Introducing injectable PrEP options could significantly solve pill burden issue and subsequently enhance PrEP uptake in Rwanda.

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