



Assessment of Oral Pre-exposure Prophylaxis Eligibility and Use among Persons at Substantial Risk of HIV Acquisition, Uganda, 2017-2021

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Summary

Background: In 2017, Oral pre-exposure prophylaxis (PrEP) was rolled out by the Uganda Ministry of Health (MOH) for high-risk populations at substantial risk of HIV infection (HRPs). In this strategy, HIV-negative individuals are screened for oral PrEP eligibility. Eligible high-risk individuals are offered pre-PrEP counselling, and those who accept are initiated, with subsequent follow-up visits for refills. However, no study has evaluated eligibility and uptake of oral PrEP since its roll-out. We assessed for oral PrEP eligibility, use, and associated factors among HRPs, Uganda, 2017-2021.

Methods: HRPs demographics, oral PrEP eligibility, oral PrEP initiation and refill dates were retrieved from PrEP tracker system for July 2017-May 2021. We conducted descriptive analysis of all HRPs screened for oral PrEP eligibility and oral PrEP use Modified Poisson regression was applied to identify factors associated with oral PrEP eligibility and use.

Results: Overall, 7,727 HRPs were screened for oral PrEP eligibility. Out of these, 3,156 (41%) were identified oral PrEP-eligible for whom 1,900 (60%) were female and 1,392 (44%) were sex workers. Among HRPs identified as oral PrEP-eligible, 2,409 (76%) were initiated on oral PrEP. Of these, 1,513 (63%) were female, 2,136 (89%) were from Central Region, and 1,188 (49%) were sex workers. Being a male (vs. female) HRPs was associated with increased oral PrEP eligibility (IRR=1.2, 95% CI: 1.02-1.41; $p=0.03$). HRPs in discordant relationship (vs. sex workers) were strongly associated with increased oral PrEP eligibility (IRR=3.6, 95% CI: 2.65-4.85; $p<0.0001$). Being married or cohabiting (vs. single) was associated with increased oral PrEP use (IRR=1.3, 95% CI: 1.01-1.6; $p=0.04$). Older HRPs aged 50 years and above had a reduced rate of oral PrEP eligibility (RR=0.4, 95%CI: 0.26-0.56; $P<0.0001$) and oral PrEP use (RR=0.3, 95%CI: 0.17-0.67; $P=0.002$).

Conclusion: Despite low rate of oral PrEP eligibility among people at substantial risk of HIV infection, oral PrEP use was high. Married or cohabiting HRPs had an increased rate of oral PrEP use, suggesting a role for partner support. Intensified efforts may be needed to promote partner support to ensure oral PrEP use among HRPs.



Introduction

Oral Pre-exposure Prophylaxis (PrEP) is the use of ARV drugs by HIV-uninfected persons to prevent HIV infection and has been shown to reduce HIV transmission in both clinical trials and community-based studies (1-4). Oral PrEP using tenofovir (TDF) and emtricitabine (FTC) as a once-daily pill is highly effective against HIV infection (5); however, the degree of effectiveness depends mainly on uptake and continuity (6). The World Health Organization (WHO) recommends the use of oral PrEP for HIV-negative persons at high risk of infection (7), including key populations (KPs) such as female sex workers (FSW), fisherfolk (FF), serodiscordant couples (SDC), men who have sex with men (MSM), and adolescent girls and young women (AGYW) (7-9).

In Kampala, HIV prevalence among MSM was estimated at 13.7% and 31.3% among FSW in 2012 (10). Other studies estimated HIV prevalence among people who inject drugs (PWID) at 34% (11). The higher prevalence of HIV infection among these populations was due to high-risk sexual behaviors (12, 13). In 2017, the Uganda Ministry of Health (MOH) rolled out oral pre-exposure prophylaxis (PrEP) for high-risk populations (5). In this strategy, HIV-negative individuals were screened for oral PrEP eligibility and eligible HRP were offered pre-PrEP counselling and those who accept were initiated on oral PrEP (14, 15).

Although correct and consistent use of oral PrEP is effective in preventing HIV infection for high-risk population groups at substantial risk of HIV infection, important questions remain about oral PrEP use among people at substantial risk of HIV acquisition in Uganda. We assessed oral PrEP eligibility, oral PrEP use, and associated factors among high-risk populations at substantial risk of HIV infection in Uganda, 2017-2021.

Methods

Study setting, design, sample size consideration, and exclusion criteria

We conducted a secondary data analysis using the PrEP tracker dataset as of July 2017 to May 2021. Oral PrEP data from all health facilities in the US-CDC supported regions offering oral PrEP among high-risk populations at substantial risk of HIV infection during the study period were abstracted and included in the study. The PrEP tracker is a database created



to capture all oral PrEP use data in the country these include Key populations- and other priority Populations at substantial risk of HIV acquisition like AGWY, Pregnant and Breast-feeding mothers. The database provides insights in the client’s baseline and follow-up data including: numbers of oral PrEP users, demographic characteristics, oral PrEP eligibility screening data, dates of follow-up, oral PrEP eligibility, initiation dates, HIV screening, reasons for declining oral PrEP and enrolment dates. Oral PrEP data are routinely generated at health facility level using clients’ registers and then uploaded into the tracker (web-based reporting). The PrEP tracking system is designed to collect monthly and quarterly data that are nationally representative of oral PrEP use across health facilities offering oral PrEP services to people at substantial risk of HIV. Oral PrEP was rolled out in 142 sites in June 2017 and we included all participants data from the start of the program up to May, 2021. We excluded all participants with missing information on oral PrEP eligibility and oral PrEP use during the study period.

Study variables, data abstraction, and analysis

We abstracted HRPs demographic data, including (sex, age, marital status, region of origin), key populations classification category (sex workers, clients of sex workers, men who have sex with men, people who inject drugs, transgender people), and priority populations category (migrant workers, fish folks, uni-formed men, discordant couples, adolescent girls and young women, truckers, people in prison and displaced persons)), HRPs oral PrEP eligibility, initiation and refill dates.

We conducted descriptive analysis of HRPs demographic characteristics using frequencies and percentages. HRPs at substantial risk of HIV infection were categorized as: “eligible or not eligible” and “oral PrEP users or non- oral PrEP users.” “oral PrEP eligibility” was the percentage of HRPs meeting oral PrEP use criteria of the total screened at baseline for the study period (July, 2017-May, 2021). “oral PrEP use”-the percentage of HRPs initiated on oral PrEP at baseline of the total HRPs identified eligible. “oral PrEP non-use”- the proportion of HRPs who declined using oral PrEP of all those identified as oral PrEP-eligible.



To identify factors associated with oral PrEP eligibility and oral PrEP use among HRPs at baseline, modified Poisson regression was applied to estimate incident rate ratios (IRRs) and 95% confidence intervals of oral PrEP eligibility and use by HRPs baseline characteristics. All factors at bivariate analysis were included in the multivariate model and statistical significance was set at $P \leq 0.05$. All data analysis was done using Stata version 14.0.

Ethical considerations

We used KPs PrEP surveillance data with no identifying information. We obtained oral PrEP data with permission from Makerere University School of Public Health Monitoring and Evaluation Technical Support Program (METs) who are currently custodians of HRPs oral PrEP data together with Ministry of Health (MOH). In addition, the Office of the Associate Director for Science, U.S. Centers for Disease Control and Prevention, determined this project as a non-human subject's research that is in response to a public health problem with the primary intent of public health practice (epidemic disease control).

Result

Social-demographic characteristics of high-risk populations screened for oral PrEP eligibility and oral PrEP use at baseline in Uganda, 2017-2020

A total of 7,727 high risk populations (HRPs) were screened for oral PrEP eligibility at baseline. Of these, 3,156 (41%) were identified eligible for oral PrEP use. The majority 1,900 (60%) were female with a median age of 25 years (range: 10, 75 years). A high proportion of oral PrEP-eligible HRPs were from central region 2,821 (89%), and 1,392 (44%) were sex workers (Table 1).

Among HRPs identified eligible for oral PrEP, 2,409 (76%) were initiated on oral PrEP at baseline. Out of those, 1,513; (63%) were female, most HRPs 1,127 (47%) were single, the majority 2,136 (89%) were from central region and 1,188 (49%) were sex workers (Table 1).



Table 1: Socio-demographic characteristics of high-risk populations screened for oral PrEP eligibility and oral PrEP use at baseline, Uganda, 2017-2021

Characteristics	PrEP eligibility at baseline						PrEP use at baseline					
	N1	Yes		No		p-value	N2	Yes		Declined		p-value
		n ₁ (col%)	n ₁ (col%)	n ₁ (col%)	n ₁ (col%)			n ₂ (col%)	n ₂ (col%)	n ₂ (col%)	n ₂ (col%)	
Overall	7,727	3,156		4,571			3,156	2,409		747		
Sex												
Female	4,145	1,900 (46)		2,245 (54)		0.006	1,900	1,513 (79)		387 (21)		0.02
Male	3,582	1,256 (35)		2,326 (65)			1,256	896 (71)		360 (29)		
Age (years)												
10-19	940	387 (41)		553 (59)		<0.0001	387	281 (73)		106 (27)		<0.0001
20-29	4,061	1,726 (42)		2,335 (58)			1,726	1,332 (77)		394 (23)		
30-39	1,932	781 (40)		1,151 (60)			781	602 (77)		179 (23)		
40-49	604	221 (37)		383 (63)			221	175 (79)		46 (21)		
50 +	190	41 (21)		149 (79)			41	19 (47)		22 (53)		
Marital status												
Single	3,741	1,525 (41)		2,216 (59)		<0.0001	1,525	1,127 (74)		398 (26)		0.003
Married/cohabiting	3,023	1,078 (36)		1,945 (64)			1,078	813 (75)		265 (25)		
Divorced/separated	963	553 (57)		410 (43)			553	469 (85)		84 (15)		
Region												
Central	6,670	2,821 (42)		3,849 (58)			2,821	2,136 (76)		685 (24)		
Western	902	325 (36)		577 (64)			325	266 (82)		59 (18)		
Eastern	155	10 (6)		145 (94)			10	7 (70)		3 (30)		
Classification												
Sex worker	2,741	1,392 (51)		1,349 (49)		<0.0001	1,392	1,188 (85)		204 (15)		
Clients of sex workers	809	278 (34)		531 (66)			278	180 (65)		98 (35)		
Fisher Folks	819	304 (37)		515 (63)			304	267 (88)		37 (12)		
Migrant workers	313	94 (30)		219 (70)			94	37 (39)		57 (61)		
Uni-formed men	196	16 (8)		180 (92)			16	8 (50)		8 (50)		
Discordant couples	289	216 (75)		73 (25)			216	176 (81)		40 (19)		
*AGYW	435	191 (44)		244 (56)			191	124 (65)		67 (35)		
**MSM	385	229 (59)		156 (41)			229	181 (79)		48 (21)		
Truckers	194	64 (33)		130 (67)			64	29 (45)		35 (55)		
***Others	1,546	372 (24)		1,174 (76)			372	219 (59)		153 (41)		



§N1. Overall total of those screened for PrEP eligibility

§§N2. The proportion of those identified eligible for PrEP use at baseline

**AGYW=Adolescent girls and young women*

***MSM=Men who have sex with men*

****Others include= people who inject drugs, people in prison, transgender, None, non-injecting drug users, and displaced persons*

Factors associated with oral PrEP eligibility among high risk populations screened at baseline, Uganda, 2017-2021

Male HRPs were strongly associated with increased oral PrEP eligibility compared with their female counter parts (IRR=1.2, 95% CI: 1.02-1.41; P=0.03) (Table 2). Being divorced or separated compared with being single was associated with increased oral PrEP eligibility (IRR=2.0, 95% CI: 1.67-2.29; P=<0.0001). HRPs from Eastern verses central region were associated with 30% reduced rate of oral PrEP eligibility (P=<0.0001). HRPs in discordant relationships were strongly associated with increased PrEP eligibility compared with sex workers (IRR=3.6, 95% CI: 2.65-4.85; P=<0.0001) (Table 2).

Table 2: Factors associated with Oral PrEP eligibility among high-risk populations at substantial risk of HIV infection screened at baseline, Uganda, 2017-2021

Characteristics	Oral PrEP eligibility at baseline					Unadjusted		Adjusted	
	N ₁	Yes n ₁ (col%)	No n ₁ (col%)	†IRR (95% CI)	p-value	IRR (95% CI)	p-value		
Overall	7,727	3,156	4,571						
Sex									
Female	4,145	1,900 (46)	2,245 (54)	1.00 (Ref)		1.00 (Ref)			
Male	3,582	1,256 (35)	2,326 (65)	0.6 (0.58-0.69)	<0.0001	1.2 (1.02-1.41)	0.03		
Age (Years)									
10-19	940	387 (41)	553 (59)	0.9 (0.82-1.09)	0.45	1.1 (0.89-1.23)	0.5		
20-29	4,061	1,726 (42)	2,335 (58)	1.00 (Ref)		1.00 (Ref)			
30-39	1,932	781 (40)	1,151 (60)	0.9 (0.82-1.02)	0.13	0.9 (0.81-1.04)	0.2		
40-49	604	221 (37)	383 (63)	0.8 (0.65-0.93)	0.006	0.8 (0.66-0.98)	0.03		
50 +	190	41 (21)	149 (79)	0.4 (0.26-0.53)	<0.0001	0.4 (0.26-0.56)	<0.0001		
Marital status									
Single	3,741	1,525 (41)	2,216 (59)	1.00 (Ref)		1.00 (Ref)			
Married/cohabiting	3,023	1,078 (36)	1,945 (64)	0.8 (0.73-0.89)	<0.0001	0.9 (0.84-1.06)	0.35		
Divorced/separated	963	553 (58)	410 (42)	2.0 (1.69-2.26)	<0.0001	2.0 (1.67-2.29)	<0.0001		



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Region									
Central	6,670	2,821	(89)	3,849	(84)	1.00 (Ref)		1.00 (Ref)	
Western	902	325	(10)	577	(13)	0.1 (0.04-0.18)	<0.0001	0.1 (0.07-0.25)	<0.0001
Eastern	155	10	(0)	145	(3)	0.7 (0.67-0.89)	<0.0001	0.7 (0.61-0.82)	<0.0001
Key population classification									
Sex worker	2,741	1,392	(44)	1,349	(30)	1.00 (Ref)		1.00 (Ref)	
Clients of sex workers	809	278	(9)	531	(12)	0.5 (0.43-0.59)	<0.0001	0.5 (0.41-0.63)	<0.0001
Fisher Folks	819	304	(10)	515	(11)	0.6 (0.49-0.67)	<0.0001	0.6 (0.47-0.71)	<0.0001
Migrant workers	313	94	(3)	219	(5)	0.4 (0.32-0.54)	<0.0001	0.4 (0.33-0.59)	<0.0001
Uni-formed men	196	16	(1)	180	(4)	0.1 (0.05-0.14)	<0.0001	0.1 (0.05-0.15)	<0.0001
Discordant couples	289	216	(7)	73	(2)	2.9 (2.18-3.78)	<0.0001	3.6 (2.65-4.85)	<0.0001
*AGYW	435	191	(6)	244	(5)	0.8 (0.62-0.93)	<0.0001	0.8 (0.65-0.99)	0.05
**MSM	385	229	(7)	156	(3)	1.4 (1.15-1.77)	<0.0001	1.3 (0.97-1.66)	0.08
Truckers	194	64	(2)	130	(3)	0.5 (0.35-0.65)	<0.0001	0.5 (0.35-0.70)	<0.0001
***Others	1,546	372	(12)	1,174	(26)	0.3 (0.27-0.35)	<0.0001	0.3 (0.28-0.39)	<0.0001

*AGYW=Adolescent girls and young women

**MSM=Men who have sex with men

***Others= people who inject drugs, people in prison, transgender, None, non-injecting drug users, and displaced persons

†IRR=Incidence rate ratio

Factors associated with oral PrEP use among eligible high-risk populations at substantial risk of HIV infection at baseline in Uganda, 2017-2021

Male HRP were strongly associated with increased oral PrEP use compared with female HRP (IRR=1.7, 95% CI: 1.27-2.36; P=0.001) (Table 3). HRP at substantial risk of HIV infection aged 50 years and older were associated with 70% reduced rate of using oral PrEP at baseline compared with younger HRP aged 20-29 years (p=0.002). Being married or cohabiting was significantly associated with increased oral PrEP use compared with being single (IRR=1.3, 95% CI: 1.01-1.58; P=0.04). Divorced or separated HRP were strongly associated with increased oral PrEP use (IRR=1.7, 95% CI: 1.24-2.22; p=0.001). HRP from Eastern verses central region were strongly associated with increased oral PrEP use (IRR=1.8, 95% CI: 1.33-2.56; P=<0.0001) (Table 3).



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Table 3: Factors associated with oral PrEP use among eligible high-risk populations at substantial risk of HIV infection at baseline, Uganda, 2017-2021

Characteristics	Oral PrEP use at baseline					Unadjusted		Adjusted	
	N ₂	Yes		No		IRR (95% CI)	p-value	IRR (95% CI)	p-value
		n ₂ (col%)	n ₂ (col%)	n ₂ (col%)	n ₂ (col%)				
Overall	3,156	2,409		747					
Sex									
Female	1,900	1,513 (63)	387 (52)			1.00 (Ref)		1.00 (Ref)	
Male	1,256	896 (37)	360 (48)			0.6 (0.54-0.75)	<0.0001	1.7 (1.27-2.36)	0.001
Age (Years)									
10-19	387	281 (12)	106 (14)			0.8 (0.61-1.01)	0.06	0.8 (0.64-1.09)	0.19
20-29	1,726	1,332 (55)	394 (53)			1.00 (Ref)		1.00 (Ref)	
30-39	781	602 (25)	179 (24)			1.0 (0.81-1.21)	0.95	0.9 (0.77-1.22)	0.80
40-49	221	175 (7)	46 (6)			1.1 (0.79-1.59)	0.5	1.2 (0.81-1.75)	0.37
50 +	41	19 (1)	22 (3)			0.3 (0.14-0.48)	<0.0001	0.3 (0.17-0.67)	0.002
Marital status									
Single	1,525	1,127 (47)	398 (53)			1.00 (Ref)		1.00 (Ref)	
Married/cohabiting	1,078	813 (34)	265 (36)			1.1 (0.91-1.29)	0.38	1.3 (1.01-1.58)	0.04
Divorced/separated	553	469 (19)	84 (11)			2.0 (1.52-2.55)	<0.0001	1.7 (1.24-2.22)	0.001
Region									
Central	2,821	2,136 (89)	685 (92)			1.00 (Ref)		1.00 (Ref)	
Western	325	266 (11)	59 (8)			0.7 (0.19-2.90)	0.67	0.9 (0.23-4.16)	0.9
Eastern	10	7 (0)	3 (0)			1.4 (1.08-1.94)	0.01	1.8 (1.33-2.56)	<0.0001
Key population classification									
Sex worker	1,392	1,188 (49)	204 (27)			1.00 (Ref)		1.00 (Ref)	
Clients of sex workers	278	180 (7)	98 (13)			0.3 (0.24-0.42)	<0.0001	0.2 (0.11-0.25)	<0.0001
Fisher Folks	304	267 (11)	37 (5)			1.2 (0.85-1.80)	0.26	0.8 (0.54-1.33)	0.47
Migrant workers	94	37 (2)	57 (8)			0.1 (0.07-0.17)	<0.0001	0.1 (0.04-0.12)	<0.0001
Uni-formed men	16	8 (0)	8 (1)			0.2 (0.06-0.46)	<0.0001	0.1 (0.04-0.31)	<0.0001
Discordant couples	216	176 (7)	40 (5)			0.8 (0.52-1.09)	0.14	0.6 (0.37-0.89)	0.01
*AGYW	191	124 (5)	67 (9)			0.3 (0.23-0.44)	<0.0001	0.4 (0.26-0.52)	<0.0001
**MSM	229	181 (8)	48 (6)			0.6 (0.46-0.92)	0.02	0.4 (0.28-0.71)	0.001
Truckers	64	29 (1)	35 (5)			0.1 (0.09-0.24)	<0.0001	0.1 (0.04-0.15)	<0.0001
***Others	372	219 (9)	153 (21)			0.2 (0.19-0.32)	<0.0001	0.2 (0.14-0.26)	<0.0001

*AGYW=Adolescent girls and young women

**MSM=Men who have sex with men

***Others=people who inject drugs, people in prison, transgender, None, non-injecting drug users, and displaced persons

†IRR=Incidence rate ratio



Discussion

This study found high oral PrEP use among high-risk populations at substantial risk of HIV infection at baseline. Female HRPs were often eligible oral PrEP users at baseline. Old age was strongly associated with reduced rate of both oral PrEP eligibility and oral PrEP use. Married or cohabiting HRPs were strongly associated with increased oral PrEP use. These findings indicate willingness to use oral PrEP among high-risk populations at substantial risk of HIV infection.

High oral PrEP use at baseline has also been documented in previous studies that assessed oral PrEP acceptability among other key populations in East and Southern Africa (16). Oral PrEP use among HRPs is possibly because high-risk population groups perceived themselves to be at increased risk of HIV acquisition. A study among fishing communities in Uganda, reported a link between risk perception and acceptability to use oral PrEP (17). Because of the risky sexual behaviours among these population categories, this might explain the high oral PrEP use among them.

Female high-risk populations being more likely to be eligible oral PrEP users during this study, may be because most of our study participants were sex workers who possibly consider themselves to be at increased risk of HIV and other sexually transmitted infections due to involvement in sex work with multiple sex partners (18). Several of these observations were also reported in a study on HIV vulnerability among Sub-Saharan African migrants (19). In addition, since most of our study participants were married, another possible explanation for female being more likely to be eligible oral PrEP users could be that women had regular sexual partners of whom they never trusted and therefore considered using oral PrEP to protect themselves while sustaining their relationships. The importance of showing trust by having unprotected sex in relationships have widely been reported elsewhere (20, 21).

The connection between old age and oral PrEP use has been reported in other studies as an effect of high risky sexual behaviours among older people (22). In a cohort study conducted in Amsterdam, it was found that the rate of oral PrEP use was highest among men aged 40 years and older (15). However, in this study, HRPs aged 50 years and older were associated



with reduced rate of oral PrEP use at baseline. This could be attributed to the lower proportion of older HRP identified eligible for oral PrEP use in our study and could have possibly perceived themselves to be at lower risk of HIV infection. It has been documented that understanding the risk associated with high risky behaviour is the first step to oral PrEP use (23, 24).

Married or cohabiting HRPs were associated with oral PrEP eligibility and use at baseline. In many parts of Africa, the risk of HIV acquisition is known to be high among married or cohabiting couples especially where intimate partner violence exists (25). The risk of HIV infection among married couples is increased due to gender inequalities (26, 27). Gender inequalities, particularly in communities where men are allowed to have extra marital relationships (28) render women vulnerable to HIV infection from their husbands (29-31). As a result, women opt to use oral PrEP as a way of protecting themselves from contracting HIV from their partners. Another possible explanation is that women's sexuality is often controlled by their husbands or male partners (32) such that refusing sex becomes difficult, because marriage is believed to be more respectable than divorce, and therefore, oral PrEP becomes a means to keep the peace in a marriage.

Study strengths and limitations

Our study utilized a national oral PrEP dataset for high risk populations at substantial risk of HIV acquisition with differing oral PrEP use rate levels, thus giving us a nationwide outlook regarding oral PrEP eligibility and use. However, the study solely depended on secondary data and could not be used to analyse behaviour or attitude over a period of time. Secondly, we assessed for only oral PrEP eligibility and oral PrEP use rather than preference to continue using oral PrEP, for this reason, we could not account for any dropout rates. Further studies requiring primary data are needed to better understand willingness to continue PrEP and HRPs at substantial risk of HIV infection.

Conclusion

Despite low rate of oral PrEP eligibility among HRPs, this study found that oral PrEP use was high among this population category. Married or cohabiting persons had increased odds



of PrEP use in Uganda during 2017-2021, suggesting a role for partner support. Intensified efforts may be needed to promote partner support to ensure PrEP use among high-risk populations in the country.

Conflict of Interest

The authors declare that they had no competing interests.

Acknowledgments

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