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Original Research Article

HIV pre-exposure prophylaxis adherence among adolescent girls and young women in Muhoroni, Kisumu County, Kenya

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ABSTRACT

Background: This study assessed adherence patterns to oral pre-exposure prophylaxis (PrEP) and associated factors among adolescent girls and young women (AGYW) initiating PrEP in Muhoroni, Kisumu County, Kenya.
Methods: A retrospective longitudinal cohort study using routinely collected PrEP data from two high-volume public health facilities in Muhoroni Sub-County, including AGYW aged 15–24 years who initiated oral PrEP in January 2022 and followed for 24 months. Adherence was defined as continuous use without missed monthly visits, with appropriate discontinuation considered adherent. Descriptive statistics summarized characteristics and adherence patterns, while associations were assessed using modified Poisson regression with generalized estimating equations (GEE) accounting for within-individual correlation.
Results: PrEP adherence was high, with 82.2% (263/320) of participants' adherent. In bivariate analysis, adherence was significantly associated with marital status (p=0.003), education level (p=0.046), population type (p=0.021), injection drug use (p=0.042), shared syringe use (p=0.032), and STI status (p=0.021), but not with age or school attendance (p>0.05). In unadjusted analyses, higher education was associated with increased adherence (secondary: PR=1.22, 95% CI: 1.00–1.50; tertiary: PR=1.31, 95% CI: 1.07–1.61). In adjusted models, tertiary education remained significantly associated with adherence (aPR=1.30, 95% CI: 1.05–1.60). Shared syringe use was associated with higher adherence (aPR=1.40, 95% CI: 1.00–1.96). Other factors were not statistically significant after adjustment.
Conclusions: PrEP adherence among AGYW was high. Education was a key determinant; however, behavioral factors highlight the need for targeted, context-specific interventions

Keywords: HIV infection, Oral pre-exposure prophylaxis, Adolescent girls and young women

INTRODUCTION

Adolescent girls and young women (AGYW) in sub-Saharan Africa (SSA) continue to bear a disproportionate burden of HIV infection. Among adolescents aged 15–19 years, approximately six in seven new infections occur among girls, and young women aged 15–24 are about twice as likely to be living with HIV as their male counterparts.[1] In eastern and southern Africa, HIV incidence among young women in this age group is three to four times higher than among their male counterparts, highlighting persistent gender- and age-related vulnerabilities to HIV acquisition.[2] These disparities are driven by a combination of biological susceptibility, gender norms, social inequities, and age-specific risk behaviors that increase exposure to HIV among young women.[1]

In Kenya, by 2025 AGYW continued to experience a disproportionate burden of HIV, accounting for approximately 78% of new infections among young people aged 15–24.[3] Although overall HIV incidence has declined in recent years, - from about 0.35% in 2010 to approximately 0.19% in 2023 (roughly 350 to 190 new infections per 100,000 population) - AGYW remain nearly five times more likely to acquire HIV compared to their

male counterparts. Young people aged 15–24 contribute to over 40% of all new HIV infections nationally, underscoring the continued vulnerability of this age group.[2] With a national HIV prevalence of about 5.9%, some regions report substantially higher rates, with prevalence among young women reaching up to 10% in high-burden areas.

Notably, about 59% of new HIV infections among adolescents aged 10–19 was concentrated in just ten out of 47 counties, including Kisumu County.[3] Counties in the Nyanza region, particularly Kisumu, (17.5%) Homa Bay (19.6%), Siaya (15.3%), and Migori (13.0%), bear a disproportionate share of infections, reflecting persistently high HIV prevalence and structural vulnerabilities among adolescents and young women. Persistent structural challenges, including early pregnancy and limited access to prevention and treatment services, continue to increase HIV risk among AGYW, highlighting the need for targeted interventions and sustained investment in these regions.[3]

While national HIV prevalence among adults aged 15–64 years in Kenya is estimated at about 3.0–3.3%, counties in the Lake Victoria region continue to report disproportionately high rates of infection.[4] Kisumu County bears a substantially higher HIV burden (17.5%) than the national average (3-3.3%), making it a critical priority area for HIV prevention and control efforts. It is among the counties contributing to nearly 60% of all new HIV infections nationally, alongside neighboring high-burden counties such as Homa Bay County, Migori County, Siaya County, and Busia County.

In 2024, Kisumu County recorded a 14.5% increase in new HIV infections, highlighting a concerning upward trend despite national progress in HIV control.[5] This high and rising burden is particularly evident among young people, who account for a substantial proportion of new infections nationally, with adolescent girls and young women remaining the most affected.[3] The persistently high prevalence in Kisumu is influenced by a combination of structural and contextual factors, including high community viral load, population mobility within the Lake Victoria basin, and socioeconomic vulnerabilities that increase HIV risk among adolescents and young adults.[6] These factors collectively underscore the importance of focusing research and targeted interventions in Kisumu County, where the HIV epidemic remains both concentrated and dynamic.

Oral HIV pre-exposure prophylaxis (PrEP), based on tenofovir disoproxil fumarate and emtricitabine (TDF/FTC), is a highly effective biomedical intervention for HIV prevention when taken consistently as prescribed. Evidence from systematic reviews and clinical trials shows that tenofovir-based PrEP substantially reduces the risk of HIV acquisition, with effectiveness strongly associated with high adherence levels.[7] Kenya incorporated PrEP into national HIV prevention guidelines in 2016, scaling up delivery through public health facilities and community-based platforms, with adolescent girls and young women (AGYW) identified as a priority population.[8] Adherence to PrEP is critical for achieving maximal protective efficacy, as prevention effectiveness is highly dependent on consistent medication use.[8] Missed doses or discontinuation significantly reduce individual-level protection and compromise the broader population-level impact of PrEP programs.

Understanding adherence patterns at the sub-national level is particularly important because PrEP use among AGYW is often characterized by cycles of initiation, discontinuation, and re-initiation that correspond to changes in perceived HIV risk and life circumstances. Studies from sub-Saharan Africa show that many AGYW use PrEP during “seasons of risk,” with continuation influenced by transitions such as entering or leaving relationships, school attendance, employment changes, pregnancy, and mobility, all of which shape both HIV vulnerability and motivation to continue PrEP.[9,10]

As a result, adherence cannot be viewed as a static behavior but rather as a dynamic process shaped by evolving personal and social contexts. Without a clear understanding of how these factors interact at the local level, PrEP programs may struggle to provide responsive and youth-friendly services that support sustained use during periods of heightened risk.

Additionally, national data is typically aggregated, which can often mask local and contextual variations. This underscores the importance and relevance of the current study.

In Muhoroni Sub-County, located within Kisumu County, these contextual influences may be further shaped by local socioeconomic conditions, healthcare access, and community norms that influence health-seeking behavior among young women. Kisumu County remains one of the high HIV burden regions in Kenya, underscoring the importance of understanding prevention behaviors such as PrEP adherence at more localized levels.[4]

Identifying patterns of PrEP adherence and the factors associated with continuation or discontinuation among AGYW in this setting provides important insights into gaps in service delivery and opportunities for strengthening PrEP programs.

Such evidence is essential for informing context-specific strategies to support adherence, including tailored counseling approaches, differentiated service delivery models, and community-based interventions designed to address stigma and improve access.

Ultimately, generating locally relevant evidence will contribute to improving the effectiveness of PrEP programs among AGYW in high-burden settings and support ongoing efforts to reduce new HIV infections in Kisumu County.

METHODS

Study setting and design

This study was conducted in Muhoroni Sub-County, one of seven sub-counties in Kisumu County, western Kenya. Kisumu County bears one of the highest HIV burdens nationally, with adolescent girls and young women (AGYW) disproportionately affected. Muhoroni Sub-County comprises five administrative wards; Muhoroni/Koru, Masogo/Nyangoma, Chemelil/Tamu, Miwani, and Ombeyi and has a predominantly agrarian economy. We employed a retrospective longitudinal cohort study design using routinely collected HIV PrEP program data. The study followed AGYW who initiated oral HIV PrEP between 01 and 31 January 2022, observing their PrEP adherence and HIV outcomes over a 24-month period (through January 2024). This design allowed assessment of adherence over time and identification of individual, interpersonal, and programmatic factors associated with sustained PrEP use under routine service delivery conditions.

Study population and sampling

The study population comprised AGYW aged 15–24 years who initiated oral PrEP in January 2022 at two purposively selected high-volume public health facilities: Muhoroni Sub-County Hospital and Masogo Sub-County Hospital. These facilities were selected due to high PrEP client volumes and comprehensive service delivery. All eligible AGYW initiating PrEP during the inclusion period were included (census of eligible clients). AGYW who transferred out immediately after initiation were excluded. All available eligible records were analyzed, consistent with secondary use of routine program data.

For analysis, AGYW were stratified along three dimensions: age group (15–19 years and 20–24 years), programmatic risk classification (general population versus priority/key populations as recorded in facility registers), and behavioral risk profile based on documented PrEP eligibility risk factors, including STI history, injection drug use, and other sexual risk indicators. These strata were used for subgroup comparisons and were incorporated into the regression modelling to examine differences in adherence patterns across groups.

Data collection

Data for this study were obtained from routine clinical records, including Ministry of Health PrEP registers, client clinical files, and electronic medical records (EMR). A structured data abstraction tool, specifically developed for this study, was used to systematically extract relevant information. Extracted data encompassed socio-demographic characteristics, details of PrEP initiation and clinical eligibility, follow-up visits and adherence indicators, HIV testing outcomes including seroconversion, and any documented reasons for non-adherence or PrEP discontinuation. Data abstraction was performed by trained research staff, with regular quality assurance checks conducted to ensure completeness, consistency, and accuracy of the extracted records. To protect participant confidentiality, no personal identifiers were collected, and all datasets were anonymized prior to analysis.

Variables and measurements

Outcome variable

The primary outcome was longitudinal PrEP adherence over the 24-month follow-up period, assessed using a prevention-effective adherence approach that accounts for repeated PrEP use over time. AGYW were classified as adherent if they maintained continuous PrEP coverage during documented follow-up, attended scheduled monthly refill visits without gaps in recorded coverage, or had documented clinician-guided discontinuation due to reduced HIV risk. In contrast, participants were classified as non-adherent if they missed scheduled monthly follow-up visits without documented discontinuation or experienced interruptions in PrEP coverage that were not clinically justified. To account for the cyclical nature of PrEP use, adherence was analyzed using a person-month structure rather than a single binary measure. Secondary outcomes included the number of follow-up visits completed, documented reasons for PrEP discontinuation, and HIV seroconversion during the follow-up period.

Covariates

The independent variables included socio-demographic, clinical, programmatic, and behavioral factors. Socio-demographic factors comprised age, marital status, education level, school attendance, and family planning use. Clinical factors included baseline HIV status, creatinine clearance, and comorbidities where available. Programmatic factors included population type (general versus priority populations), PrEP eligibility category, and facility of care. Behavioral risk factors included STI history, multiple sexual partners, transactional sex, alcohol use during sex, condom use, injection drug use, syringe sharing, and partner HIV status. These variables were selected based on prior evidence of their association with PrEP adherence.

Data analysis

Descriptive statistics summarized participant characteristics and adherence outcomes using frequencies, proportions, means, and medians as appropriate. Adherence was reported as the proportion of person-months covered and the proportion of AGYW classified as adherent over the follow-up period. Bivariate associations between adherence and covariates were assessed using chi-square tests (or Fisher's exact test where appropriate) for categorical variables. To account for repeated measurements over time (monthly PrEP cycles within

individuals), modified Poisson regression with generalized estimating equations (GEE) was used to estimate population-averaged adjusted prevalence ratios (aPRs) with robust standard errors.

This approach accounted for within-individual correlation due to repeated PrEP use cycles across the 24-month follow-up period. Multivariable models included variables with $p<0.20$ at bivariate analysis and those of epidemiological relevance (age, education, and risk profile). Statistical significance was set at $p<0.05$. Results are presented as crude and adjusted prevalence ratios with 95% confidence intervals.

Ethical considerations

Ethical approval was obtained from the Baraton University Ethics Review Committee (UAEB/SER/25/06/2024.A research permit was granted by the National Commission for Science, Technology and Innovation (NACOSTI/P/24/38437). Administrative permission was obtained from participating health facilities. As the study relied exclusively on routinely collected clinical data, a waiver of individual informed consent was granted. All data were anonymized prior to analysis. The study adhered to the Kenya Data Protection Act (2019) and upheld principles of confidentiality, minimal risk, and responsible data use.

RESULTS

General characteristics of participants

A total of 320 AGYW initiated on PrEP were included in the analysis. Slightly more than half of the participants were aged 20–24 years (52.2%) and the majority had never been married (78.4%). Most participants had attained secondary education (60.0%) and over two-thirds of the AGYW (68.4%) were attending school at the time of PrEP initiation. With respect to family planning, 70.0% of participants reported using modern contraceptive methods, 7.5% reported natural family planning, and 22.5% reported no family planning use.

The majority of participants were drawn from the general population (85.0%), while 15.0% were classified as belonging to at-risk populations. Baseline renal function assessment showed that 46.9% of participants had normal creatinine clearance (≥90 ml/min). Multiple PrEP eligibility criteria were reported. Commonly reported risk factors included a history of sexually transmitted infection (30.6%), sex under the influence of alcohol (29.7%), recurrent family planning use (29.4%), multiple sexual partners (28.4%), being in a sero-discordant relationship and attempting conception (28.4%), and injection drug use (27.8%).

Transactional sex (26.6%), inconsistent or no condom use (27.8%), sexual or intimate partner violence (23.4%), having an HIV-positive sexual partner (25.3%), and shared syringe use (25.3%) were also reported (Table 1).

Table 1: General characteristics of AGYW initiated on PrEP.

Variable	Levels	All (n=320)
Age group (in years)	15-19	153 (47.8)
	20-24	167 (52.2)
Marital status	Never married	251 (78.4)
	Ever married	69 (21.6)
Education level	Tertiary	61 (19.1)
	Secondary	192 (60.0)
	Primary	67 (20.9)
School attendance	At school	219 (68.4)
	Not at school	101 (31.6)
Family planning use	Modern contraceptives	224 (70.0)
	Natural family planning	24 (7.5)
	No usage	72 (22.5)
Population type	General population	272 (85.0)
	At-risk population	48 (15.0)
Baseline creatinine clearance (ml/min)	Normal renal function (≥90	150 (46.9)
	Reduced renal function (≤89)	170 (53.1)
PrEP eligibility (multiple choices allowed)	Sexual/intimate partner violence	75 (23.4)
	People who inject drugs	89 (27.8)
	Multiple sex partners	91 (28.4)
	Transactional sex	85 (26.6)
	STI infection	98 (30.6)
	Sex under alcohol use	95 (29.7)
	Inconsistent/no condom use	89 (27.8)
	Sexual partner HIV positive	81 (25.3)
	Recurrent use of FP	94 (29.4)
	Sero-discordant couple tying to conceive	91 (28.4)
	Shared drug use syringe	81 (25.3)

PrEP adherence assessment

During the follow-up period, 247 participants (77.2%) continued taking PrEP as recommended by 2024, while 73 participants (22.8%) discontinued PrEP at various points for different reasons. Among those who discontinued (n=73), the largest proportion (32 participants; 43.8%) stopped PrEP after the first follow-up visit (Figure 1).

To ensure accurate classification of adherence, we further examined the reasons for PrEP discontinuation, recognizing that some participants may no longer have required PrEP and therefore should not be classified as non-adherent. Of the 73 participants who discontinued, 16 (21.9%) stopped PrEP due to a substantial reduction in HIV risk, including changes in risky behaviour (n=12) and a partner achieving an undetectable viral load (n=4). Additional reasons for discontinuation are presented in Figure 1.

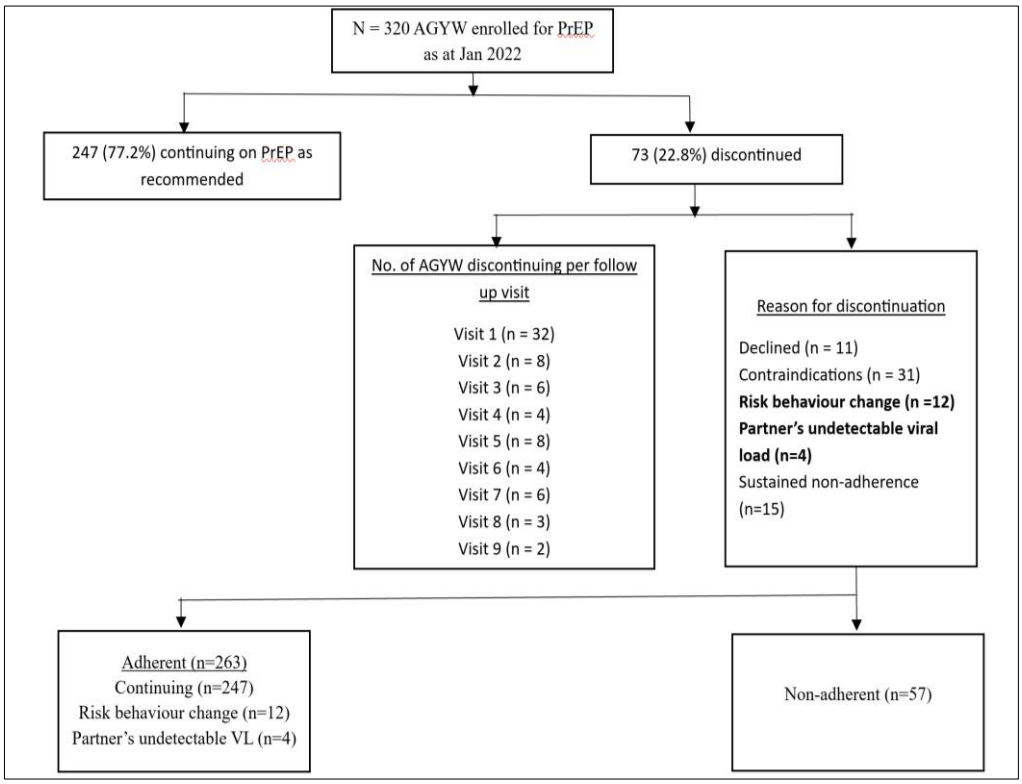

Figure 1: PrEP adherence among AGYW.

Given that these 16 participants discontinued PrEP following a meaningful reduction in HIV risk, they were reclassified as adherent. After reclassification, the final analysis considered 263 participants adherent (82.2%) while 57 participants (17.8%) were non-adherent (Figure 1).

Association between PrEP adherence and sociodemographic and clinical factors

Overall, 263 participants (82.2%) were adherent to PrEP, while 57 (17.8%) were non-adherent. Associations between PrEP adherence and selected sociodemographic and clinical characteristics were examined using Pearson's chi-square test or Fisher's exact test where appropriate. PrEP adherence did not differ significantly by age group, with similar adherence among participants aged 15–19 years (82.4%) and 20–24 years (82.0%; p=0.941). School attendance was also not associated with adherence, with comparable proportions among those not in school (83.2%) and those currently attending school (81.7%; p=0.755).

Marital status was significantly associated with PrEP adherence (p=0.003). Participants who had never been married had higher adherence (82.9%) compared with those who had ever been married (80.8%). Education level was also significantly associated with adherence (p=0.046), with adherence increasing across educational categories: 76.1% among those with primary education, 81.3% among those with secondary education, and 91.8% among those with tertiary education.

No statistically significant association was observed between adherence and family planning use (p=0.500) or baseline renal function (p=0.917). However, population type was significantly associated with adherence (p=0.021), with higher adherence observed among participants from the general population (82.7%) compared with those classified as at-risk populations (79.2%).

Among PrEP eligibility and behavioral risk factors, adherence differed significantly by injection drug use status. Participants who reported injecting drugs had lower adherence (76.4%) compared with those who did not inject drugs (84.4%; p=0.042). A significant association was also observed between adherence and shared syringe use, with higher adherence among participants reporting syringe sharing (88.9%) compared with those who did not report sharing syringes (79.9%; p=0.032). Additionally, adherence differed by STI status (p=0.021), although adherence proportions were similar between participants with and without a reported STI.

No significant associations were found between PrEP adherence and sexual or intimate partner violence, multiple sexual partners, transactional sex, sex under the influence of alcohol, inconsistent or no condom use, having an HIV-positive sexual partner, recurrent PrEP use, or being in a sero-discordant couple attempting conception (all p>0.05) as shown in Table 2.

Factors associated with PrEP adherence among AGYW at the unadjusted and adjusted analyses

Table 3 presents the results of the unadjusted and adjusted modified Poisson regression analyses assessing factors associated with PrEP adherence among adolescent girls and young women. In the unadjusted analysis, education level was associated with PrEP adherence. Participants with secondary education (PR=1.22, 95% CI: 1.00–1.50) and those with tertiary education (PR=1.31, 95% CI: 1.07–1.61) were more likely to be adherent to PrEP compared to those with primary education. Marital status was not significantly associated with PrEP adherence, with ever-married participants showing similar likelihood of adherence compared to those who were never married (PR=1.01, 95% CI: 0.93–1.10). Similarly, population type was not associated with PrEP adherence, with participants from the general population showing comparable adherence to those from at-risk populations (PR=0.93, 95% CI: 0.81–1.07).

With respect to clinical and behavioral factors, people who inject drugs showed no statistically significant association with PrEP adherence in the unadjusted analysis (PR=1.08, 95% CI: 0.97–1.20). Participants reporting STI infection (PR=1.08, 95% CI: 0.99–1.19) and those reporting shared drug-use syringe (PR=1.37, 95% CI: 0.97–1.93) tended to have a higher likelihood of PrEP adherence, although these associations did not reach conventional levels of statistical significance.

In the adjusted analysis, tertiary education remained independently associated with higher PrEP adherence compared to primary education (aPR=1.30, 95% CI: 1.05–1.60). A borderline association was observed for participants with secondary education (aPR=1.22, 95% CI: 0.99–1.50). Participants who reported shared drug-use syringe were more likely to be adherent to PrEP after adjustment (aPR=1.40, 95% CI: 1.00–1.96).

Borderline positive associations were also observed for people who inject drugs (aPR=1.09, 95% CI: 0.97–1.22) and participants reporting STI infection (aPR=1.09, 95% CI: 0.99–1.19), although these did not reach statistical significance (Table 3).

Table 2: PrEP adherence by sociodemographic and clinical factors (n= 320).

Variable	Level	Adherence status		P value
		Adherent (n=263)	Non adherent (n=57)	
Age group (in years)	15-19	126 (82.4)	27 (17.6)	0.941
	20-24	137 (82.0)	30 (18.0)	
Marital status	Never married	208 (82.9)	43 (17.1)	0.003
	Ever married	55(80.8)	14 (19.2)	
Education level	Primary	51 (76.1)	16 (23.9)	0.046
	Secondary	156 (81.3)	36 (18.8)	
	Tertiary	56 (91.8)	5 (8.2)	
School attendance	Not at school	84 (83.2)	17 (16.8)	0.755
	At school	179 (81.7)	40 (18.3)	
Family planning use	No usage	64 (88.9)	8 (11.1)	0.500
	Natural family planning	22 (91.7)	2 (8.3)	
	Modern contraceptives	177 (79.0)	47 (21.0)	
Population type	At risk population	38 (79.2)	10 (20.8)	0.021
	General population	225 (82.7)	47 (17.3)	
Baseline creatinine clearance (ml/min)	Reduced renal function (≤89)	139 (81.8)	31 (18.2)	0.917
	Normal renal function (≥90	124 (82.7)	26 (17.3)	
PrEP eligibility				
Sexual/intimate partner violence	No	205 (83.7)	40 (16.3)	0.209
	Yes	58 (77.3)	17 (22.7)	
People who inject drugs	No	195 (84.4)	36 (15.6)	0.042
	Yes	68 (76.4)	21 (23.6)	
Multiple sex partners	No	187 (81.7)	42 (18.3)	0.695
	Yes	76 (83.5)	15 (16.5)	
Transactional sex	No	193 (82.1)	42 (17.9)	0.963
	Yes	70 (82.4)	15 (17.6)	
STI infection	No	182 (82.0)	40 (18.0)	0.021
	Yes	81 (82.7)	17 (17.3)	
Sex under alcohol use	No	185 (82.2)	40 (17.8)	0.980
	Yes	78 (82.1)	17 (17.9)	

Continued.

Variable	Level	Adherence status		P value
		Adherent (n=263)	Non adherent (n=57)	
Inconsistent/no condom use	No	188 (81.7)	42 (18.3)	0.769
	Yes	74 (83.1)	15 (16.9)	
Sexual partner HIV positive	No	195 (81.6)	44 (18.4)	0.631
	Yes	68 (84.0)	13 (16.0)	
Recurrent use of PrEP	No	183 (81.0)	43 (19.0)	0.379
	Yes	80 (85.1)	14 (14.9)	
Sero-discordant couple tying to conceive	No	188 (82.1)	41 (17.9)	0.946
	Yes	75 (82.4)	16 (17.6)	
Shared drug use syringe	No	191 (79.9)	48 (20.1)	0.032
	Yes	72 (88.9)	9 (11.1)	

Differences in adherence across categories were assessed using Pearson's chi-square test or Fisher's exact test, as appropriate. Statistical significance was set at $p<0.05$

Table 3: Unadjusted and adjusted analysis of factors associated with PrEP adherence.

Variable	Level	Modified Poisson regression analysis	
		Unadjusted analysis	Adjusted analysis
		PR (95% CI)	aPR (95% CI)
Education level	Primary	1.00 (ref)	1.00 (ref)
	Secondary	1.22 (1.00–1.50)	1.22 (0.99–1.50)
	Tertiary	1.31 (1.07–1.61)	1.30 (1.05–1.60)
Marital status	Never married	1.00 (ref)	-
	Ever married	1.01 (0.93–1.10)	-
Population type	At risk population	1.00 (ref)	-
	General population	0.93 (0.81–1.07)	-
People who inject drugs	No	1.00 (ref)	1.00 (ref)
	Yes	1.08 (0.97–1.20)	1.09 (0.97–1.22)
STI infection	No	1.00 (ref)	1.00 (ref)
	Yes	1.08 (0.99–1.19)	1.09 (0.99–1.19)
Shared drug use syringe	No	1.00 (ref)	1.00 (ref)
	Yes	1.37 (0.97–1.93)	1.40 (1.00–1.96)

DISCUSSION

This study examined patterns of oral PrEP adherence and associated factors among AGYW initiating PrEP in Muhoroni Sub-County, Kisumu County, Kenya, using routinely collected program data over a 24-month period. Overall adherence was relatively high, with more than four in five participants classified as adherent after accounting for appropriate discontinuation due to reduced HIV risk. Discontinuation occurred most frequently early in follow-up, particularly after the first visit. Higher educational attainment and shared syringe use were independently associated with adherence, while several demographic and behavioral factors, including age, school attendance, and family planning use, were not significantly associated with adherence. These findings highlight that PrEP adherence among AGYW is dynamic and influenced by both structural and behavioral factors, underscoring the importance of context-specific adherence support strategies in high-burden settings such as Kisumu County.

The relatively high adherence observed in this study contrasts with findings from several PrEP demonstration projects in sub-Saharan Africa that have reported substantial early discontinuation among AGYW. For example, studies have shown that PrEP continuation often declines sharply within the first few months after initiation, reflecting changing perceptions of HIV risk and barriers to sustained use.[9,10] The early drop-off observed in Muhoroni Sub-County is consistent with this broader evidence and reinforces the concept of "seasons of risk," whereby AGYW initiate and discontinue PrEP in response to changing life circumstances and perceived HIV vulnerability. Reclassification of participants who discontinued due to reduced risk likely provided a more accurate estimate of meaningful adherence, as PrEP guidelines emphasize use during periods of elevated HIV risk rather than continuous lifelong use.[11] This finding supports the importance of differentiating between programmatic loss to follow-up and intentional, appropriate discontinuation.

Educational attainment emerged as an important predictor of adherence, with participants who had tertiary education more likely to remain adherent compared to those with primary education. This finding aligns with previous research indicating that education may enhance health literacy, risk perception, and the ability to navigate health

services, all of which can support sustained PrEP use.[8,12] Higher education levels may also be associated with greater autonomy and decision-making power, which have been linked to improved uptake and continuation of HIV prevention interventions among AGYW. In contrast, marital status and population type were not independently associated with adherence after adjustment, suggesting that individual-level factors such as knowledge and empowerment may play a more influential role than relationship status alone in this setting.

Interestingly, shared syringe use was positively associated with adherence after adjustment, a finding that differs from some studies where higher-risk behaviors have been associated with poorer adherence. One possible explanation is that AGYW who perceive themselves to be at particularly high risk may be more motivated to maintain consistent PrEP use. Similar patterns have been observed in studies where individuals with higher perceived HIV risk demonstrated stronger adherence to prevention interventions.[13] However, the borderline associations observed for injection drug use and STI history suggest that the relationship between behavioral risk and adherence may be complex and influenced by unmeasured factors such as stigma, service accessibility, and social support.

Several factors commonly associated with PrEP adherence in other studies including age, school attendance, and contraceptive use, were not significantly associated with adherence in this study. Previous research has suggested that younger adolescents and those attending school may face additional barriers to adherence, such as stigma, limited autonomy, or competing academic demands.[14,15] The absence of significant associations in this study may reflect relatively homogeneous access to PrEP services at the selected facilities or the effectiveness of adherence counseling provided through routine care. Alternatively, it may indicate that contextual and structural factors play a larger role than individual demographic characteristics in shaping adherence patterns in Muhoroni Sub-County.

Strengths

This study has several strengths. The use of routinely collected program data allowed for the inclusion of a real-world cohort of AGYW receiving PrEP under routine service delivery conditions, enhancing the generalizability of the findings to similar programmatic settings. The longitudinal design enabled assessment of adherence over an extended period, providing insights into patterns of continuation and discontinuation that would not be captured in cross-sectional studies. Additionally, the reclassification of participants who discontinued PrEP due to reduced HIV risk provided a programmatically relevant measure of adherence.

Limitations

The study also has limitations. The reliance on routine clinical records may have resulted in incomplete or inaccurately recorded data, particularly for behavioral risk factors. Adherence was measured based on clinic attendance and continuation rather than objective measures such as drug levels, which may overestimate true adherence. The study was also limited to two facilities in Muhoroni Sub-County, which may limit generalizability to other settings within Kisumu County or beyond. Finally, unmeasured factors such as stigma, partner support, and service quality may have influenced adherence but were not captured in the available data.

CONCLUSION

In conclusion, this study found relatively high levels of PrEP adherence among AGYW in Muhoroni Sub-County after accounting for appropriate discontinuation during periods of reduced HIV risk. Adherence was positively associated with higher education and certain risk-related behaviors, while many demographic factors were not significantly associated with continuation. These findings highlight the importance of understanding PrEP adherence as a dynamic process shaped by evolving risk and contextual factors. PrEP programs in Kisumu County should strengthen early adherence support, particularly during the first months following initiation, and consider differentiated service delivery approaches tailored to AGYW with lower educational attainment. Future research should incorporate qualitative methods and objective adherence measures to better understand barriers and facilitators of sustained PrEP use among AGYW in high-burden settings.

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