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HIV knowledge and its influence on prevention practices among females aged 15-24 years in Kisumu East Sub-County, Kenya

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Abstract

Introduction: *globally, approximately 39 million people live with HIV/AIDS, with females accounting for 54%. In Kenya's Kisumu County, HIV prevalence is 3.5 times the national average and disproportionately affects females. By 2022, it ranked 4th nationally for new infections among 15-24-year-olds, with HIV-related mortality over 20% higher in females. Comprehensive HIV knowledge remains low, especially in Kisumu's rural and informal areas. The objective was to assess HIV knowledge and its influence on prevention practices among females aged 15-24 in Kisumu East Sub-County.* ***Methods:*** *a cross-sectional mixed-methods study was conducted among 404 females aged 15-24 using multistage cluster sampling. Quantitative data were analyzed in R (v4.3.1) using descriptive statistics, chi-square tests, and logistic regression. For qualitative data, 15 in-depth interviews were purposively sampled and thematically analyzed using the Health Belief Model.* ***Results:*** *the mean HIV knowledge score was 10.75/16 (SD = 2.97); participants were classified into low (≤8; 15.1%), moderate (9-12; 52.5%), and high (≥13; 32.4%) knowledge groups based on their scores. Higher knowledge was significantly associated with awareness of own (OR = 3.87, CI: 2.15-6.97) and partner's HIV status (OR = 6.82, CI: 3.78-12.31), and knowledge of PrEP/PEP ($p < 0.01$). However, high knowledge was linked to lower odds of abstinence (OR = 0.28, $p = 0.001$) and consistent condom use (OR = 0.32, $p = 0.03$). Peer pressure, cited by 63%, was the most perceived barrier.* ***Conclusion:*** *HIV knowledge alone is insufficient. Prevention must integrate peer-led education, behavioral support, and youth-friendly services to bridge the knowledge-behavior gap.*

Introduction

HIV/AIDS remains a major public health challenge in Africa, ranking among the top five causes of mortality on the continent [1]. Since the epidemic began, over 85.6 million people worldwide have been infected, and approximately 40.4 million have died from HIV-related illnesses. Currently, approximately 39 million people live with HIV/AIDS globally, with women and girls representing 54% of this population [2]. Sub-Saharan Africa, home to just 12% of the global population, bears 71% of the world´s HIV burden [3]. In East and Southern Africa, ten countries account for nearly 80% of Africa´s HIV cases, with Kenya contributing 6% [4].

In Kenya, HIV prevention knowledge among 15-24-year-olds is 54% for females and 55% for males [5]. Across 30 sub-Saharan African countries (2010-2019), average comprehensive HIV knowledge among females aged 15-24 was 41.6%, with younger adolescents (15-19) having less knowledge than those aged 20-24 [6]. Rwanda had the highest knowledge at 74.3% and Congo had the lowest at 15% [6]. Gender disparities favoring males persist across low- and middle-income countries, like India, Malaysia, Uganda, China, Iraq, and Turkey [6]. Studies in Kenya, Uganda, the Bahamas, and India indicate that females aged 15-24 are prone to myths about HIV transmission [7]. In Malaysia, over 50% of secondary school girls were unaware of transmission through breastfeeding, and 63% believed in spread through tears, urine, saliva, mosquito bites, and sharing food [8].

Adolescence is a key stage where high-risk behaviors begin with limited awareness of health consequences [9]. In Asia and the Pacific, the median age for initiating sex work is 17-19 years [10]. In one study of 15-19-year-olds in the Pacific, the prevalence of sexually transmitted infections like chlamydia exceeded 35% in females, yet only 33% of them could name another STI besides HIV [11]. Similarly, HIV-related deaths among adolescents increased between 2005 and 2015 due to delayed diagnosis of HIV and inadequate treatment of related complications [12].

Studies in Africa have shown that comprehensive HIV knowledge increases with age, urban

residence, higher education, economic status, and media access [13]. In Ethiopia, 40.9% of urban females had comprehensive knowledge versus 18.2% in rural areas [13]. In Kenya, youth with higher knowledge had higher risk perception [14]. Education beyond primary school was consistently linked to better awareness [15]. This, in turn, predicts higher HIV testing, risk perception, and safer sex negotiation [16]. By contrast, limited understanding correlates with stigmatizing attitudes, early sexual debut, inconsistent condom use, and risky partner tolerance [17,18].

Despite school education, many young people consistently engage in unsafe sex, highlighting a disconnect between awareness and behavior [7]. This supports the Information-Motivation-Behavioral Skills (IMB) model on which this study is grounded, which states that HIV prevention requires accurate knowledge, motivation, and behavioral skills [19]. Motivation is key to adopting safe behavior. The IMB model reliably predicts actions like condom use, HIV testing, and uptake of biomedical prevention measures like PEP/PrEP.

In Homa Bay County, higher HIV knowledge reduced risky behaviors, while negative attitudes increased the likelihood of unsafe sex fourfold [20]. Misconceptions about HIV being only sexually transmitted lead to overreliance on abstinence and neglect of other preventive strategies [21]. This limited understanding also affects biomedical prevention; in Kisumu County, confusion between PrEP and emergency contraception, coupled with stigma, has hindered uptake [22]. However, the SEARCH trial demonstrated that targeted, community-based education significantly improved biomedical uptake from 0.5% to 28%, highlighting the impact of tailored HIV literacy efforts [23].

In Kenya, those aged 15-24 accounted for 12% of the 1.8 million people living with HIV in 2018, emphasizing their vulnerability [24]. Despite a general decline in new infections over time, the 2022 World AIDS Day report noted an increase from 32,025 to 34,540 between 2020 and 2021, with 70% of new cases among females aged 15+ and 80% occurring in the 15-24 age group [24]. Kisumu County ranked fourth at 16771 new infections [24]. The county has a female HIV prevalence of 17.4%, compared to 15% in males, well above the national average of 4.9% [25]. Youth under 25 years make up 64% of Kisumu´s population [26].

In Kisumu County, key HIV risk factors for girls and women include early sexual debut, with only 19% using condoms at first sex [27]. Entry into sex work is at age 22, HIV prevalence in sex workers is 31% and condom use with regular clients is below 40% [28]. Despite 98% of 15-24-year-olds knowing about condoms, 40% do not know how to use them correctly [29]. Misunderstanding of PrEP/PEP and mistrust in health systems hinder prevention uptake [22]. The UN´s 2001 target aimed for 95% of youth (15-24) to have comprehensive HIV knowledge by 2010 [30]. In 2022, Kisumu County reported 73.5% knowledge among females aged 15-24, ranking fourth nationally [30]. Young people under 29 years remain a key challenge to ending new HIV infections by 2030 [31]. This study assesses HIV/AIDS knowledge and its influence on prevention practices in this vulnerable group.

Methods

Study site: the study was conducted in Kisumu East Sub-County, Kisumu County, Kenya, which spans 2,576.5 km^2, bordered by these counties: Nandi and Kericho (east), Homa Bay (south), Siaya (west), and Vihiga (northwest) [32]. According to the 2019 Kenya Population and Housing Census, Kisumu County had 1,155,574 people - 556,942 males, 594,609 females, and 23 intersex individuals, with a population density of approximately 550 people per km^2 [33]. Kisumu East Sub-County, the largest among Kisumu's seven sub-counties, covers 141 km^2 with an estimated population of 220,997 inhabitants, of whom 51% are female. It is divided into five wards and ten village units [34]. Informal settlements

within Kisumu East, including Nyalenda A and Manyatta B, experience a HIV prevalence as high as 18.4% and poverty rates of approximately 63%, contributing to a heightened vulnerability to HIV infection and posing challenges for prevention [35].

Kisumu County has a high HIV prevalence at 17.4% in females and 15% in males-well above the national average of 4.9%, ranking third nationally [24,25]. It recorded the fourth highest number of new HIV infections among youth aged 15-24, disproportionately affecting females [24]. National data show that HIV prevention knowledge in this age group is just over 50%, with disparities by age, gender, and location [5,6]. Kisumu East Sub-County was purposively selected for its high prevalence, demographic diversity, and vulnerable urban and peri-urban populations, to explore HIV knowledge and prevention.

Study design: this cross-sectional study used both qualitative and quantitative methods, guided by the Information-Motivation-Behavioral Skills (IMB) model, which informed the design of data collection tools and qualitative analysis.

Study population: the study population consisted of females aged 15-24 years.

Inclusion criteria: participants were females aged 15-24 years, residing in Kisumu East Sub-County, able to communicate in Kiswahili, English, or Dholuo, physically available for the duration of the interview, and willing to provide informed consent (ages 18-24) or assent with guardian consent (ages 15-17).

Exclusion criteria: those who were not physically available for the interview or unable to provide consent or assent due to cognitive or developmental impairments.

Sample size determination: according to the 2019 census, Kisumu East Sub-County had approximately 14,112 females, 15 -24 years [33]. The Yamane [36] was used to calculate the sample size as follows:

$$n = \frac{N}{1 + N(e)^2}$$

Where, n = required sample size; N = population under study, and e = precision level.

n=14112/1+14112 x (0.05)^2=388.97

The final sample size was 429, calculated by rounding the initial estimate of 388.97 to 390 and adding 10% for potential nonresponse. The total sample of 429 was divided equally among the five wards (86 participants per ward) for logistical ease and to ensure geographic representation, though this did not reflect population proportionality.

Sampling techniques: Kisumu County was purposively selected due to its high HIV prevalence -3.5 times the national average-and ranking fourth in new infections among females,15-24 years of age [26]. Kisumu East Sub-County was chosen for its demographic diversity and inclusion of high-risk informal settlements such as Nyalenda A and Manyatta B [35]. The study included all five wards and ten village units in Kisumu East Sub-County, with respondents evenly distributed for logistical efficiency and to capture diverse perspectives from rural, urban, and informal settlements. A two-stage cluster sampling was used, whereby market areas were purposively selected, followed by random sampling of community units. Community Health Volunteers helped list households, forming a sampling frame of those with at least one eligible female aged 15-24 years.

Quantitative data was collected from 404 females aged 15-24 years old. For qualitative data, 25 respondents, aged 15-24, were purposively selected to achieve thematic saturation, informed by qualitative research standards, prior studies, and feasibility. Selection was separate from the survey sample to minimize respondent fatigue. Additionally, five key informants comprising nurses, clinicians, and HIV testing and counselling (HTC) officers who were selected from the Gender-Based Violence Response Centre (GBVRC),

Voluntary Counselling and Testing (VCT), and Comprehensive Care Centre (CCC) of health facilities, which were providing HIV preventive services [37]. The mixed-method design enabled triangulation and contextual depth.

Data collection instruments: quantitative data were collected using structured questionnaires, adapted from the DHS HIV module and KAP survey templates to fit the local context [26,30]. Qualitative interview guides were developed by the research team based on the IMB model. These tools were reviewed by experts to ensure accuracy and designed to capture sociodemographic data, HIV knowledge, sexual behavior, and barriers to prevention.

Qualitative data were collected through in-depth and key informant interview guides administered face-to-face by trained research assistants. Interviews were audio-recorded with participant consent. The in-depth interviews explored several key areas aligned with the Information-Motivation-Behavioral Skills (IMB) model to understand HIV prevention knowledge and behaviors. Questions focused on participants´ sources of HIV information, understanding of transmission and prevention, attitudes and motivations towards testing and safer sex practices, perceived social norms, and challenges to prevention. For example, participants were asked: "*Can you describe what you know about how HIV is transmitted and prevented?*" "*What motivates or discourages you from using condoms or seeking HIV testing?*" "*How do people in your community view HIV and those who are living with it?*" Key informant interviews with healthcare providers and counselors explored common misconceptions, barriers to PrEP/PEP access, community attitudes towards HIV, and recommendations for improving HIV education and prevention uptake. Sample questions included: "*What are the main challenges you observe among females 15-24 years in accessing HIV prevention services?*" "*How do myths and stigma affect HIV prevention efforts in this community?*" "*What strategies have been effective in increasing HIV knowledge and testing among youth?*" Interview guides were semi-structured, enabling probing and follow-up questions to gain deeper, contextual insights into participants' HIV-related knowledge, motivation, and behaviors.

Measurement of the study variables: the independent variable was HIV prevention knowledge, measured by 16 6 true/false/don´t know questions. Correct answers scored 1 point, while incorrect or unsure responses scored 0. Total scores classified participants into high (≥13), moderate (8-12), or low (≤7) knowledge levels. The dependent variable was HIV prevention practices, assessed through responses on the ABC approach, HIV counseling and testing, STI screening and treatment, partner reduction, and use of PEP and PrEP, all considered correct preventive behaviors.

Procedure for data collection

Pretesting: pretesting was conducted in Kisumu West using a purposive sample of 22 females aged 15-24 years, representing 5% of the intended study sample. Five percent was selected as a commonly recommended proportion in survey pretesting to identify ambiguities, assess timing, and test logistical procedures without exhausting resources. The questionnaire was reviewed for completion time and clarity, with adjustments made to improve response accuracy before the main study began. Content validity was ensured through expert review of tools by HIV prevention specialists. Reliability was strengthened through pretesting, interviewer training, and use of standardized administration protocols.

Data collection: the study began with informed consent/assent, requiring signatures from both minors and their guardians. Research assistants conducted face-to-face interviews lasting 30-45 minutes, maintaining anonymity via study IDs. Qualitative data was gathered through audio-recorded in-depth interviews and key informant guides, then transcribed verbatim.

Analysis and presentation of data: after data collection, research assistants ensured completeness and maintained confidentiality using anonymized IDs. Data was stored in password-protected folders with restricted access. Qualitative data were thematically analyzed using a deductive approach based on the IMB model, coding for information, motivation, and behavioral skills. Audio recordings were transcribed, coded, and reviewed until thematic saturation was reached. Quantitative data were analyzed using descriptive and inferential statistics in R (v4.3.1). Socio-demographics, knowledge scores, risk behaviors, and prevention strategies were summarized with frequencies, percentages, means (SD), or medians (IQR) as appropriate. Chi-square tests assessed associations between knowledge levels and demographics. Binary logistic regression identified predictors of high HIV knowledge and its links to prevention practices like condom use and HIV testing. Adjusted odds ratios (AORs) with 95% confidence intervals were reported. Results were displayed using bar graphs, histograms, and tables.

Informed consent and ethical clearance: approval was obtained from AMIU Graduate School and AMREF ESRC, with research clearance from NACOSTI (NACOSTI/P/24/33903). Additional approvals came from the Kisumu County Government (GN 133 VOL.XVI/239), Ministry of Education (CDE/KISUMU/GA/3/24/VOL.VI 22), and Ministry of Interior and National Administration (CC/KC/RES/1/3/VOL.6/06). Consent was obtained from adults; minors gave assent with guardian approval.

Results

As Table 1 shows, the study had 404 respondents, average age 18 (SD=2.86), mostly unmarried (87.4%), with 72% having secondary education. Most lived with both parents (70.4%) and were economically dependent on them (82.7%). HIV prevention knowledge was assessed with 16 true/false/don´t know questions. The mean HIV awareness score was 10.75 (SD± 2.97) with 32.4% classified as high knowledge (score of ≥13), 52.5% moderate (8- 12), and 15.1% (≤7). Table 2 presents the proportion of correct responses per question. Key gaps included 49% unaware that condoms prevent HIV, 36% unaware that healthy-looking people can have HIV, mosquito bites (21%), and sharing utensils (13%) transmitting HIV. Older and more educated respondents scored higher. Main information sources were school (32%), mass media (25%), and family (18%), with those citing family scoring highest.

HIV prevention practices included abstinence, reduction of sexual partners, consistent condom use, and knowledge of HIV, as summarized in Table 3. Among 404 respondents, 188 were sexually active with an average sexual debut age of 17, over half before 18, with a few reported sexual debuts as early as 10 years. About 61% used a condom at first sex, but consistent use dropped to 23%. Older respondents (aged 20-24) were more likely to know their own (70%) and partner´s (55%) HIV status. On average, respondents had 2 sexual partners, with some up to 6. Older respondents had more partners with risky behavior, including transactional sex, reported in 41% of sexually active respondents. Using bivariate binary logistic regression, as Table 4 shows. Respondents with moderate knowledge were 51% less likely to abstain from sex (aOR = 0.49; 95% CI: 0.25-0.96), while those with high knowledge were 72% less likely to abstain (aOR = 0.28; 95% CI: 0.14-0.55), compared to those with low knowledge. Knowledge did not affect the age at sexual debut (p = 0.88) but was linked with higher condom use at first sex and greater awareness of biomedical prevention. Youth with high knowledge were four times more likely to know their HIV status (aOR = 3.87; 95% CI: 2.07-7.22) and seven times more likely to know their partner´s status (aOR = 6.82; 95% CI: 2.26-20.59).

Among those sexually active in the past year, high knowledge was associated with reduced high-risk sexual behavior (aOR = 0.47; 95% CI: 0.18-1.27), but not with consistent condom use (aOR = 0.32; 95% CI: 0.12-0.85) or monogamy (p = 0.65). This indicates a gap between knowledge and consistent

behavior, influenced by social and relational factors. Qualitative findings from in-depth interviews revealed barriers that prevent knowledgeable youth from engaging in preventive behavior. When asked, "Have you ever been in a situation where your knowledge conflicts with HIV preventive action?" respondents shared real-life examples. A 19-year-old said, "Yes, I know that sharing sharp objects is not good, but I share needles for making clothes." A 17-year-old noted, "Yes, I was drunk, and we had unprotected sex." A 21-year-old explained, "*There was no money to buy condoms, so we had sex without protection, and I got pregnant.*" These accounts show that even with knowledge, factors like poverty, alcohol use, and resource limitations create barriers to safe practices.

Section three of the questionnaire assessed HIV risk perception and prevention challenges. Overall, 36% of respondents felt at risk of HIV, with older youth (40% aged 20-24) perceiving more risk than younger ones (30% under 18), mostly due to self-identified risky behaviors. The main challenges identified were peer pressure (63%), lack of knowledge (42%), financial dependence (19%), low bargaining power (13%), partner violence (7%), and substance use (7%). These findings were reinforced through key informant interviews. A counselor at Gita Sub-County Hospital noted, "*Their friends have mentioned that there is a mobile app which can tell whether you are HIV negative or positive. You answer some questions, and it gives you the results.*" A nurse at Chiga Dispensary added, "*If correct information can be circulated on social media platforms like TikTok, it can reach many of these young people," and "Having peer educators that teach different groups during school holidays will give them access to people that they can ask questions freely.*"

Discussion

This study found high levels of HIV knowledge among young people, with 85% of respondents scoring in the moderate to high range. These findings are consistent with the 2022 Kenya Demographic and Health Survey (KDHS), which reported a 73.5% knowledge rate among females aged 15-24 in Kisumu County [30]. Despite the high knowledge levels, myths were evident, mirroring findings on myths and misconceptions which were reported in female secondary students in Kenya, Uganda, the Bahamas, India, and Malaysia [8]. The study revealed a positive correlation between HIV knowledge and age, education level, and access to media, aligning with studies from Ethiopia, Malawi, and Indonesia [13,14]. However, unlike these studies, which showed that knowledge increased with marital status, no association was found between marital status and knowledge, indicating a context-specific deviation.

Schools (32%) and mass media (25%) were the primary sources of HIV information, reflecting similar patterns observed in Nigeria, Cameroon, Ghana, and Kenya [38,39]. Although family was less frequently cited, younger respondents (15-19 years) relying on family had higher knowledge scores, highlighting the protective role of parental communication in adolescent sexual health [40]. These findings highlight the need for age-appropriate, multimodal interventions that evolve with adolescents´ growing influence from peers and social media.

Despite high awareness, HIV prevention practices were inconsistent, exposing a disconnect between knowledge and behavior. These findings suggest that while knowledge may increase risk perception and awareness, it does not guarantee behavioral change due to intervening psychosocial and environmental factors. According to the IMB model, information alone is insufficient without motivation (e.g., perceived susceptibility, self-efficacy) and behavioral skills (e.g., condom negotiation, refusal skills). Therefore, knowledge needs to be reinforced through enabling environments, peer support, and practical interventions. Although 53.5% reported abstinence, 53.2% of the sexually active group had their debut before age 18, some under coercion [41]. Seventy percent of those who did

not know their HIV status were below 18 years of age. 30% of respondents reported multiple partners, averaging 2.3, consistent with KDHS 2022 data for females aged 20-24 [30]. While 60.6% used condoms with the initial sex, consistent use declined particularly in older respondents, those with regular partners, and in high-risk sexual behavior, a trend noted in the KDHS 2022 and South African studies [30,42].

High-risk behaviors such as transactional sex, coercion, and multiple partners were reported by 41%, reflecting similar challenges in Kampala [43]. Despite 57% awareness of PrEP/PEP, uptake was very low (2%), mirroring trends in Brazil, Ghana, and Thailand [44-46]. These findings suggest that structural and psychosocial barriers-such as stigma, limited access, and gender power dynamics-limit the translation of knowledge into protective behavior. This highlights that behavior change requires not just knowledge, but also enabling environments, practical skills, and psychosocial support.

Surprisingly, respondents with higher HIV knowledge were less likely to abstain from sex. Those with moderate knowledge were 51% less likely, and those with high knowledge 72% less likely to abstain compared to low-knowledge peers (OR=0.49 and 0.28) as Table 4 shows. This contrasts with earlier Kenyan studies but aligns with recent findings suggesting knowledge promotes safer sex rather than abstinence alone [47,48]. This calls for a reevaluation of abstinence-only programs in favor of comprehensive sexual education. No link was found between knowledge and age at sexual debut [49].

While condom use at sexual debut increased with knowledge, consistent use declined among high-knowledge respondents (OR=0.32), suggesting that knowledge alone does not ensure sustained behavior change [39]. Trust in partners, relationship dynamics, and economic vulnerabilities may contribute to this inconsistency. Knowledge was positively associated with awareness of HIV status and biomedical prevention (PrEP/PEP), but actual use remained low, reflecting a gap between awareness and action, consistent with the IMB model [39,48].

High knowledge was linked to reduced high-risk behaviors (OR=0.47), but risky practices persisted across knowledge levels, underscoring the need for behavioral skills reinforcement. No association was found between knowledge and partner fidelity, indicating that sociocultural norms and gender dynamics may outweigh individual awareness in influencing fidelity behaviors [39]. These findings show that while knowledge improves awareness and testing, motivation and behavioral skills are essential to bridge the gap to safer behavior. Peer pressure, cited by 63%, supported by both quantitative and qualitative data, emerged as the most common barrier, consistent with findings from other studies [50]. Many in-depth interview participants described instances where friends discouraged the use of condoms or biomedical interventions, contributing to risky behaviors despite adequate knowledge. For example, one respondent noted, "*My friends say condoms are not good so people should not use them,*" while another shared, "*My friends discouraged the use of PEP because of side effects.*" This illustrates how social beliefs can override individual knowledge, reinforcing the need for peer-focused education, social norm-shifting strategies, and youth-friendly, stigma-free health services.

This study´s cross-sectional design limits causal inference, highlighting the need for longitudinal research. Recall and social desirability bias were minimized through anonymous interviews and the use of pretested tools. Purposive sampling and community collaboration improved representativeness to allow access to certain subgroups. Findings were specific to Kisumu East Sub-County, affecting generalizability, but they were interpreted in the local context. Language or topic sensitivity was addressed via translation, pretesting, and trained bilingual data collectors.

Conclusion

In Kisumu County, youth had moderate to high HIV knowledge, especially those in school or living with both parents, but this didn´t always lead to safer behaviors. Knowledge was linked to HIV status and PrEP/PEP awareness, not consistent condom use. Younger, out-of-school, and unsupported youth had lower knowledge and a higher risk. Younger respondents (15-17years), out-of-school, and those not living with parents had lower knowledge and riskier behaviors, highlighting disparities within this group. This study shows that HIV knowledge alone is insufficient to drive behavior change, as structural and social barriers like peer pressure, financial dependence, and low autonomy undermine the application of knowledge. To address this gap, actionable recommendations include integrating HIV education into the school life-skills curriculum and training teachers in youth-friendly delivery. Family-based education can be scaled through parenting workshops, school-based caregiver sessions, and community outreach via maternal and child health clinics. Peer-led school clubs and social media campaigns should complement formal education by reinforcing behavior change messages. Policy implications point to the need for coordinated action between the health, education, and social sectors to deliver youth-friendly services, provide economic support, and improve school retention. Future research should explore how social dynamics and structural conditions mediate the relationship between knowledge and behavior, and test interventions that combine education with behavioral support and empowerment strategies.

What is known about this topic

- *Kisumu County has a high HIV prevalence, and HIV disproportionately affects the female gender;*
- *HIV cases are rising in the 15-24-year age group;*
- *High HIV knowledge levels are expected to translate to HIV prevention practices.*

What this study adds

- *Females (15-24 years) in Kisumu County generally have moderate to high HIV knowledge, mainly due to school education and family support, but younger adolescents and those out of school show lower knowledge and higher risk behaviors;*
- *Despite good HIV knowledge, prevention behaviors like consistent condom use and avoiding risky sex are inconsistent, highlighting a gap between knowledge and practice influenced by peer pressure, financial dependence, and gender power dynamics;*
- *Comprehensive interventions are needed that combine accurate HIV information with motivation and behavioral skills training, tailored to the socio-demographic realities of females 15-24 years in Kisumu.*

Competing interests

The authors declare no competing interests.

Authors' contributions

Tabitha Adhiambo Odero conceptualized the research idea, led the data collection, analysis, and interpretation of data, drafted the article, and submitted the version to be published. Collins James Owek and Tom Marwa Machera substantially contributed towards the study design, data analysis, and interpretation of data, and revision of the manuscript. All the authors have read and agreed to the final manuscript.

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Tables

Table 1: socio-demographic characteristics of female (15-24 years) participants in Kisumu East Sub-County (n=404), to contextualize patterns in HIV knowledge and prevention behavior

Table 2: HIV transmission and prevention scores among females (15-24 years) in Kisumu East Sub-County, to assess knowledge levels and inform targeted HIV prevention efforts

Table 3: HIV prevention practices among 404 females (15-24 years) in Kisumu East Sub-County, highlighting the protective behaviors that they engage in to inform targeted public health interventions

Table 4: HIV knowledge levels among females (15-24 years) in Kisumu East Sub-County and its influence on the choice of preventive behavior, illustrating the relationship between awareness and the adoption of preventative strategies

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Table 1: socio-demographic characteristics of female (15-24 years) participants in Kisumu East Sub-County (n=404), to contextualize patterns in HIV knowledge and prevention behavior		
Variable	**Values**	**Frequency; N=404, n (%)**
Age	Under 18 (15-17 years)	208 (51.5)
	Above 18 (18-24 years)	196 (48.5)
Marital status	Not married	353 (87.4)
	Married	48 (11.9)
	Separated	3 (0.7)
Level of education	Secondary education	291 (72.0)
	Primary education	55 (13.6)
	Tertiary education	50 (12.4)
	No education	8 (2.0)
Family structure	Both parents	284 (70.4)
	Single parents	87 (21.5)
	Extended family	30 (7.4)
	Other	3 (0.7)
Economic status	Dependent on parents	334 (82.7)
	Financially independent	35 (8.6)
	Dependent on spouse	20 (5.0)
	Dependent on a sponsor	10 (2.5)
	Other sources	5 (1.2)

Table 2: HIV transmission and prevention scores among females (15-24 years) in Kisumu East Sub-County, to assess knowledge levels and inform targeted HIV prevention efforts		
	Knowledge of HIV transmission and prevention	**N (%)**
1.	One sexual encounter is enough to get HIV (true)	262 (64.9)
2.	Having sex during your monthly period protects you against HIV (false)	333 (82.4)
3.	One can get HIV by sharing utensils with HIV positive people (false)	353 (87.4)
4.	Bathing immediately after sex reduces your chances of getting HIV (false)	325 (80.4)
5.	You can get HIV through many ways other than sex (true)	327 (80.9)
6.	Pulling out the penis before ejaculation reduces the chances of HIV (false)	208 (51.5)
7.	HIV can be transmitted by mosquito bites (false)	340 (84.1)
8.	It is not easy to know people with HIV by physical appearance (true)	265 (65.6)
9.	Emergency contraception pills (E-Pills) reduce your chances of HIV if taken within 72 hours (false)	206 (51.0)
10.	As soon as you get HIV, symptoms start showing (false)	312 (77.2)
11.	Lubricating condoms with Vaseline reduces the chances of condom tears during sex (false)	151 (37.4)
12.	A negative HIV test after exposure should be repeated after 3 months to ensure that one is negative (true)	225 (55.7)
13.	To prevent HIV transmission, oral and anal sex are safer options than vaginal sex (false)	234 (57.9)
14.	All children born to HIV positive mothers end up being HIV positive (false)	303 (75.0)
15.	ARVs cure HIV (false)	256 (63.4)
16.	Having sex with an HIV positive person using a condom reduces your chances of getting HIV (true)	250 (62.0)

Table 3: HIV prevention practices among 404 females (15-24 years) in Kisumu East Sub-County, highlighting the protective behaviors that they engage in to inform targeted public health interventions		
Prevention practices	**Yes; N (%)**	**No; N (%)**
Abstain	216 (53.5)	188 (46.5)
Early sexual debut < 18 years	100 (53.2)	88 (46.8)
Faithfulness to one partner	132 (70.2)	56 (29.8)
Use of condoms during the first sexual encounter	114 (60.6)	74 (39.4)
Use of condoms with every sexual encounter	43 (22.9)	145 (77.1)
Knowledge of PEP/PrEP	232 (57.4)	172 (42.6)
Knowledge of one's HIV status	234 (58.0)	170 (42.0)
Knowledge of the partner's HIV status	103 (54.8)	85 (45.2)
High risk practices (alcohol use, age-disparate relationships, sex for financial/material rewards)	77 (41.0)	111 (59.0)

Table 4: HIV knowledge levels among females (15-24 years) in Kisumu East Sub-County and its influence on the choice of preventive behavior, illustrating the relationship between awareness and the adoption of preventative strategies				
HIV prevention behavior	**Binary outcome (yes/no)**	**OR (moderate vs ref. low)**	**OR (high vs ref. low)**	**P-value**
Abstinence	Yes/no	0.45 (0.25-0.96)	0.28 (1.14-0.55)	< 0.001
Sexual debut	Early (<18yrs)/ Late (>18 yrs)	0.95(0.42-2.18)	0.90 (0.38-2.15)	0.88
Condom use at the first sexual encounter	Yes/no	1.30 (0.52-3.23)	1.65 (0.66-4.12)	0.32
Know partner's HIV status	Yes/no	2.58 (0.88-7.59)	6.82 (2.26-20.59)	<0.01
Know your own HIV status	Yes/no	2.07 (1.14-3.77)	3.87 (2.07-7.22)	< 0.001
PEP/PrEP knowledge	Yes/no	3.38 (1.79-6.39)	4.24 (2.23-8.05)	<0.001
Condom use in the last year	Every time/ not every time	0.35 (0.14-0.91)	0.32 (0.12-0.85)	<0.05
Faithfulness to one partner	One partner/ more than one partner	0.72 (0.21-2.41)	0.68 (0.20-2.34)	0.65
High-risk behavior	Yes/no	0.30 (0.10-0.88)	0.47 (0.18-1.27)	<0.05