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HIV risk factors and risk perception among adolescent girls and young women: results from a population-based survey in western Kenya, 2018

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Abstract

Background: In Sub-Saharan Africa, HIV prevalence in adolescent girls and young women (AGYW) is two- to three-fold higher than in adolescent boys and young men. Understanding AGYW's perception of HIV risk is essential for HIV prevention efforts.

Methods: We analyzed data from a HIV bio-behavioral survey conducted in western Kenya in 2018. Data from AGYW aged 15–24 years who had a documented HIV status were included. We calculated weighted prevalences and evaluated factors associated with outcomes of interest (HIV infection and high risk perception) using generalized linear models to calculate prevalence ratios.

Results: A total of 3,828 AGYW were included; 63% were aged 15–19 years. HIV prevalence was 4.5% and 14.5% of sexually active AGYW had high risk perception. Over 70% of participants had accessed HIV testing and counseling (HTC) in the past 12 months. Factors associated with both HIV infection and high risk perception included: having an HIV-positive partner or partner with unknown status, and having a sexually transmitted infection (STI) in the past 12 months. Having an older (by ≥ 10 years) partner was associated with HIV infection, but not high risk perception. Less than 30% of sexually active AGYW with three or more HIV risk factors had high perception of HIV risk.

Conclusion: Gaps in perceived HIV risk persist among AGYW in Kenya. High access to HIV testing and prevention services in this population highlights platforms through which AGYW may be reached with improved risk counseling, and to increase uptake of HIV prevention strategies.

Keywords

HIV; risk factors; HIV prevention; HIV prevalence; adolescent girls; young women; risk perception; Kenya

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INTRODUCTION

In 2018, an estimated 2.2 million adolescent girls and young women (AGYW) aged 15–24 years were living with HIV globally, and 300,000 were newly infected [1]. The vast majority (87%) of all AGYW living with HIV, and new HIV infections in this population, were in Sub-Saharan Africa[2], where girls and young women are twice as likely to be living with HIV, and three times as likely to be newly infected with HIV compared to adolescent boys and young men (ABYM) of the same age [3,4]. The primary mode of HIV transmission among AGYW in sub-Saharan Africa is unprotected heterosexual sex [5]. Several social determinants and individual-level risk factors have been identified as drivers of high heterosexual HIV transmission among AGYW in this region, including gender inequality and poverty [6]; sexual and gender-based violence [7–9],;having multiple sexual partners; engaging in transactional sex or exchanging sex for gifts [10,11]; limited knowledge and use of HIV prevention interventions, including condoms [12–15]; using mind-altering substances; having sexually transmitted infections (STIs) [14]; dropping out of school[16] and orphanhood [17].

HIV risk perception is an essential component in the HIV prevention cascade, as the perception of higher risk for HIV can increase uptake of prevention services [18]. Studies among AGYW in Uganda [19], Lesotho [20], and Malawi [13] have shown that although HIV risk perception increases with the number of HIV risk factors, a substantial proportion of AGYW with multiple risk factors for HIV have low-risk perception [13,21,22]. In Malawi, studies have further shown that AGYW who perceive themselves to be at low risk of HIV acquisition minimally seek, or use, protective measures[23,24].

Similar to other countries in Sub-Saharan Africa, HIV prevalence among AGYW in Kenya is two-fold higher than among ABYM (2.6% vs. 1.3%) [25,25,] A longitudinal HIV serological study conducted in 2011–2016 in western Kenya—the region with the highest HIV prevalence in the country—found the incidence of HIV infection among AGYW 15–24 years was nearly 3-fold higher than among boys and men of the same age (8.9 vs. 3.2 per 1,000 py, respectively) [28]. In addition to robust programs for HIV “test-and-start” and voluntary medical male circumcision in the region [29,30], targeted efforts to reduce new HIV infections among AGYW in western Kenya have included the implementation and scale-up of Determined, Resilient, Empowered, AIDS-free, Safe (DREAMS) program beginning in 2015. The DREAMS program is designed to reduce HIV infections among the most vulnerable AGYW populations [31,32] through a combination of clinical, social, and community-based prevention strategies. Little is known about the prevalence of risk factors for HIV and HIV risk perception among AGYW in this region—information that could potentially be used to improve existing prevention strategies, inform new interventions, and better target programs for epidemic control in this vulnerable population. We used data from a cross-sectional HIV seroprevalence and behavioral risk survey conducted in Siaya County to estimate the prevalence of HIV infection and risk perception, and their associated factors, among AGYW aged 15–24 years in western Kenya.

METHODS

Study Setting and Population

The study area falls within a health and demographic surveillance system (HDSS) covering approximately 260,000 Siaya County residents across three primarily rural, contiguous administrative areas: Gem, Karemo, and Asembo. HIV prevalence among adults 15–49 years in Siaya is 15.3%, three-fold higher than the national estimate of 4.9% [33]. The Siaya HDSS is described in detail elsewhere[34] Siaya county, including areas within the HDSS, has been the focus of a multi-country evaluation of the DREAMS program [32,35], and a cluster randomized control trial for interventions aimed to improve sexual and reproductive health among adolescent girls and young women [16,36].

Study Design and Procedures

In 2010, the Kenya Medical Research Institute (KEMRI) initiated home-based HIV testing and longitudinal behavioral surveillance approximately every two years (4 total rounds between 2010–2018) among a simple random sample of 6,809 compounds in the Gem area of the HDSS. A compound consists of physically co-located households in which immediate and extended family members reside. After the initial survey in 2010, subsequent HIV bio-behavioral survey (HBBS) rounds included compounds within the Gem HDSS to which an HBBS participant had moved. Consenting or assenting individuals aged 13 years and older, who were either HDSS residents (continuously resided in the HDSS for four calendar months) or who spent the night preceding the survey in a study compound, were eligible to participate. In 2018, HBBS was expanded to include a simple random sample of 5,930 additional compounds in the Gem HDSS to increase the representation of AGYW 13–24 years of age. The 2018 HBBS was conducted during January–December and included a total of 18,074 compounds, including 3,995 initially selected in 2010, 8,149 to which an HBBS participant had subsequently moved, and 5,930 for targeted AGYW enrollment. All interviews and HIV testing and counseling (HTC) services were conducted in-person, privately in the home using a pre-coded structured questionnaire. Participants were asked about their demographics, sexual behaviors, HIV testing history, perception of HIV risk, and access to HIV prevention, and care and treatment services. After completion of the survey, participants who did not have documentation of a previous positive HIV test (e.g. HIV clinic or outreach program card, antiretroviral prescription) were offered rapid HIV testing. Testing was done according to the Kenyan Ministry of Health testing guidelines[37], incuding a screening test using Determine (Alere, Orlando, FL, USA), which if positive, was followed by a confirmatory test using First Response (Premier Medical Corporation, Nadi Daman, India). Clients with a positive confirmatory test were referred to a health facility for retesting per the national guidelines. HIV testing and counseling was done by trained counselors. Participants newly identified as HIV-positive, or known HIV-positive but not receiving care, were linked to care at their preferred health clinic. Data were entered into the CommCare mobile app in the field using tablets and auto-synchronized to a secure cloud-based study server with end-to-end encryption.

Analytic Methods

This analysis included adolescent girls and young women 15–24 years of age who participated in the 2018 HBBS. This age group was chosen to align with previous national surveys and routinely collected HIV program data in Kenya[26,27]. Outcomes of interest were HIV status and perception of risk for HIV acquisition. HIV status was dichotomized coded as “negative” for participants with a negative HIV test result, and “positive” for participants who had a positive test result, or documentation of known HIV positive status. Participants who reported having a previous positive or negative HIV test without documentation, or a previous indeterminate result, and declined testing, were classified as “unknown” and excluded from the analysis.

Participants were asked about their perceived chance of acquiring HIV, with possible responses: “no risk at all”,“small”, “moderate”, “great”, “already have HIV” or “don’t know”. For the analysis, responses were classified into either “high risk” for those who responded “great” or “moderate”; “low risk” for those who responded “no risk at all” or “small risk”. Analysis of HIV risk perception was restricted to participants who had ever had sex, and who tested HIV-negative or newly diagnosed HIV-positive at the time of the survey. Exposure variables included socio-demographic characteristics (age, education level attained, marital status, socioeconomic status, migration status, orphanhood); sexual behaviors (age of sexual debut, condom use, forced sex, intimate partner violence, transactional sex, number and age of sexual partner(s), partner circumcision status); risk perception; reproductive health history; and use of HIV prevention services (i.e. HTC, DREAMS).

Frequencies and percentages were calculated to describe participant characteristics. We calculated weighted prevalence estimates and assessed factors associated with HIV infection and high HIV risk perception using unadjusted and adjusted prevalence ratios. Individual-level weights were applied based on the inverse product of the probability of a compound being selected out of all the compounds in the study area, and the number of people interviewed per compound out of the total people residing in the same compound at the time of the visit. Weighted prevalence estimates of HIV infection, and high and low perception of HIV risk were calculated overall and for each of the covariates assessed. Generalized Linear Models were fitted to estimate unadjusted and adjusted (aPR) prevalence ratios and associated 95% confidence intervals (CI) using backward stepwise elimination. Variables associated with each outcome in bivariable analysis ($p<0.20$) were included in the variable selection for the multivariable model. Finally, prevalence of HIV-infection and high- and low-risk perception by the number of factors were estimated among sexually active AGYW. These factors were independently associated with HIV infection in the multivariate model. All analyses were performed using Stata statistical software (release 16, College Station, TX).

Ethical considerations

The study was reviewed and approved by Kenya Medical Research Institute Scientific and Ethics Review Unit (#1801). This study was also reviewed and approved by the United States Centres for Disease Control and Prevention (CDC) Institutional Review Board

(#3308). Eligible adults aged 18 years and above and emancipated minors (persons below 18 years of age who are either pregnant, a parent, married, or heading a household) provided written informed consent before participation in the survey and HTC. Minors aged 13–17 years provided assent after parental consent was granted.

RESULTS

A total of 5,177 AGYW were enumerated in the sampled compounds by the HDSS during the biannual census round preceding the survey. Overall, 4,447 (86%) of the enumerated AGYW were contacted during the HBBS of whom 4,441 (99%) were enrolled and 4,288 were eligible for HIV testing. Testing uptake was 86%; reasons for not testing are shown in Figure 1. HIV status was determined for 3,828 (86%) of those enrolled. A greater proportion of eligible AGYW who consented to testing were 15–19 years of age (36.4 %vs. 27.7% [p-value 0.001]); single (50.4% vs. 43% [p-value 0.016]); and had transactional sex in the past 12 months (38.8% vs. 30.4% [p-value 0.001]. Overall, 21 (0.5%) participants were newly diagnosed HIV-positive during the survey and 153 (4.0%) had a known HIV-positive status. Overall prevalence of HIV infection was 4.5% (174).

Participant characteristics

A total of 3,828 participants with known HIV status (i.e. known HIV-positive or tested during the survey) were included in the analysis. The majority, 63.0% (n=2,395), were aged 15–19 years; the median age was 18 [interquartile ranges (IQR) 16–21] years. Overall, 45.6% (1,742) of AGYW had completed a primary level of education or below; 26.5% (1,008) had ever been married; 2.9% (105) had newly (in past 4 months) in-migrated to the HDSS, and 11.4% (414) had returned to the HDSS after out-migrating. Nearly one quarter were orphaned, either paternally or maternally (18.6%), or both (5.1%). Overall, 95.9% (n=3670) had ever had an HIV test. Among the participants who reported having a previous negative test, 36.0% (n=1292) had been tested less than 3 months ago, 35.9% (n=1301) in the past 3 to 12 months, 13.5% (n=374) more than 12 months ago, and 14.6% (n=524) could not recall the date of the previous test. Nearly three quarters (71.9%) of AGYW had accessed HTC in the past 12 months, and approximately one-half, 52.3% (n=1,610), had accessed a DREAMS program service in the past 12 months (Supplemental table 1).

A minority,13.0% (244), of sexually active AGYW had a high/moderate perceived risk of acquiring HIV infection. Over half, 53.0% (2056), of AGYW had ever had sex. Sexually active participants reported the following behavioral risks: 15.0% (311) had their sexual debut at <15 years of age, and 44.5% (876) did not use a condom at their first sexual intercourse. A substantial proportion of AGYW had either been forced to have sex, 8.5% (161); or experienced partner violence, 13.4% (261); and, a small proportion, 1.9% (34), reported having an STI diagnosis in the past 12 months. In the past 12 months, the minority of sexually active participants, 8.3% (156), had multiple sexual partners; 10.2% (201) had a casual sexual partner; 13.2% (221) had an older (by ≥10 years) sexual partner, and 5.1% (80) had sex with a known HIV-positive partner . The majority, 70.7% (1241), reported that their primary male sexual partner was circumcised and 39.6% (697) reported having been given money/gifts/favors for sex in the past 12 months. The majority of participants, 73.0%

(1,465), had ever been pregnant, and 61.0% (1121) had used contraception in the past 12 months. Overall prevalence of HIV infection was 4.5% (174).

Factors associated with HIV infection among sexually active AGYW

Sociodemographic and behavioral risk factors associated with HIV infection among the 2,056 sexually active participants in the bivariable analysis are shown in Table 1 and Supplemental table 2. In the multivariable analysis, being aged 20–24 years (aPR 2.04, 95% CI 1.33–3.12); having been diagnosed with an STI (aPR 3.01, 95% CI 1.74–5.19); having an older sexual partner (aPR 1.45, 95% CI 1.02–2.08); and, having an HIV-positive partner in the past 12 months (aPR 9.09, 95% CI 6.18–13.37), or not knowing a partner's HIV status (aPR 1.70, 95% CI 1.11–2.61), were significantly associated with HIV infection. Having secondary education ongoing/incomplete (aPR 0.57, 95% CI 0.37–0.86) or complete secondary/tertiary education (aPR 0.39, 95% CI 0.22–0.67) was associated with lower HIV prevalence (Table 1). There was no difference in HIV prevalence among AGYW who had, versus had not, participated in DREAMS program in the past 12 months (weighted prevalence 5.8% [95% CI 4.1 – 8.2] vs. 6.1% (4.3 – 8.4), respectively) (Supplemental table 2).

HIV prevalence and the number of risk factors for HIV

Overall, 16.7% (343) of sexually active AGYW had no other known risk factors, 38.2% (786) had 1 risk factor, and 29.5% (607) had 2 risk factors, 12.8% (264) had 3 risk factors, and 2.7% (56) had 4+ risk factors associated with HIV infection in the multivariable analysis. HIV prevalence increased with the number of risk factors; sexually active AGYW who reported having 0, 1, 2, 3, and 4+ factors had an HIV prevalence of 0.9% (95% CI 0.2–2.5), 3.3% (95% CI 2.2–4.8), 9.1% (95% CI 6.9–11.6), 17.4%(95% CI 13.0–22.5) and 35.7% (95% CI 23.4–49.6), respectively (Figure 2).

HIV risk perception among sexually active AGYW

The majority (74%) of the 1658 sexually active AGYW who, at the time of the survey, did not have a known HIV-positive status, reported having low HIV risk perception; 13% (241) reported high-risk perception; and, 14% (267) did not know their perceived level of risk. Factors associated with high HIV risk perception in the bivariable analysis are shown in Table 1 and Supplemental table 3. In multivariable analysis, high perception of HIV risk was associated with not using a condom at first sex (aPR 1.61, 95% CI; 1.26–2.05), having been diagnosed with an STI (aPR 2.44, 95% CI; 1.30–4.58), having had anal sex (aPR 2.35, 95% CI; 1.33–4.14), having had multiple sexual partners (aPR 1.79, 95% CI; 1.31–2.47), an HIV-positive partner (aPR 4.38, 95% CI; 2.96–6.47), or a partner with unknown HIV status (aPR 1.73, 95% CI; 1.33–2.25) (Table 1).

Risk perception and risk factors for HIV infection

Of the sexually active AGYW who did not have a previous HIV diagnosis, and who reported knowing their perceived risk for HIV, 12.6% (209) had no risk factors for HIV infection, 32.7% (542) had 1 risk factor, 28.2% (468) had 2 risk factors, 19.9 % (330) had 3 risk factors and 6.6% (109) had 4+ risk factors associated with HIV in the multivariable analysis.

HIV risk perception increased with the number of HIV-infection risk factors; prevalence of high risk perception among sexually active AGYW who reported having 0, 1, 2, 3, and 4+ factors was 7.7% (95% CI 4.4–12.1), 9.2% (95% CI 6.9–12.0), 14.5% (95% CI 11.5–18.1), 22.1% (95% CI 17.8–27.8) and 31.2% (95% CI 22.7–40.8), respectively. Prevalence of low risk perception among sexually active AGYW who reported having 3 and 4+ factors was 77.9% (95% CI 73.0–82.2) and 68.8% (95% CI 59.2–77.3), respectively (Figure 3). Of the 267 sexually active AGYW who reported not knowing their perceived level of risk, 6.4% (17) had 0 risk factors for HIV infection, 24.7% (66) had 1 risk factor, 30.7% (82) had 2 risk factors, 26.2% (70) had 3 risk factors and 11.9% (32) had 4+ risk factors. Of the 21 AGYW newly diagnosed with HIV infection, 57.1% (12) had 3 or more risk factors for HIV infection; however, only 12.0% (3) reported having a high perceived risk of HIV infection; and 12.0% (3) didn't know their perceived risk for HIV.

DISCUSSION

Our study found that the majority of sexually active AGYW in western Kenya with multiple (≥3) HIV risk factors had a low perception of HIV risk. Furthermore, our study uniquely demonstrated that risky sexual behaviors, and gaps in perceived HIV risk, persist in this population despite high reported access to HIV prevention services (HTC and DREAMS) in the past 12 months.

The overall prevalence (known and newly diagnosed) of HIV among AGYW 15–24 years was 4.5%, considerably higher than national estimates among AGYW 15–19 years (1.2%) and 20–24 (3.2%)[33]. Social and behavioral factors significantly associated with HIV infection in the study population are consistent with others in the literature, including being aged 20–24 years [38–40], having been diagnosed with an STI in the past 12 months [10,41], having an older (by ≥10 years) sexual partner [42,43], or having a sexual partner who was HIV-positive [13,20] or had unknown HIV status [44]. As expected, the prevalence of HIV increased considerably from 0.5% among AGYW who reported having no risk factors to 35.7% among those with 4 or more factors. This finding is consistent with studies conducted among AGYW attending health facilities in Uganda, Lesotho, and Malawi [13,19,20], and point to a need to deliver more effective HIV prevention services to AGYW with multiple (2 or more) risk factors for HIV.

After controlling for other factors, having multiple sexual partners, and having been given money/gifts/favors for sex, in the past 12 months, although associated with HIV infection in other studies in SSA [13,45–47], were not significantly associated with HIV infection in this population. These findings may have resulted from misreporting of transactional sex, and/or indicate that AGYW engaging in these behaviors could be doing so with boys and young men of similar age, who have a substantially lower prevalence of HIV [40]. In this study, 26% of AGYW who had an older male partner (≥10 years) had engaged in transactional sex versus 39% of those whose partner was <10 years older; among the latter, 48% of participants whose partner was the same age, reported having transactional sex. The association between higher (any secondary or tertiary) levels of education and lower HIV prevalence is consistent with other studies and may be explained by access to HIV prevention programs in schools, greater empowerment and knowledge around sexual

and reproductive health[48,49], less opportunity to engage in risky sexual behavior among school attendees, and greater attrition from school among AGYW infected with HIV [50]. Other studies have shown that access to interventions provided in the DREAMS program, including social protections [51,52], use of cash transfers [53,54], school-based sex education HIV intervention programs [55,56], and the provision of safe spaces [57–59] decreases the risk of HIV among AGYW. In this study there was no difference in HIV prevalence between participants who had, versus those who had not accessed at least one DREAMS service in the past 12 months; however, we were not able to assess specific service(s) received by participants, or HIV status at the time service was accessed [32].

Overall, just 12.7% of sexually active AGYW in this population had a high HIV risk perception. Factors independently associated with higher risk perception in this population are consistent with other published reports, including not using a condom at first sex [22,60]; having ever had anal sex [61]; and having either an STI diagnosis [62], multiple sexual partners [42,63], and HIV positive-partner, or partner with unknown HIV status [13,20,64] in the past 12 months. Notably, however, less than 30% of those diagnosed with an STI in the past 12 months, and approximately one-half of those who reported having an HIV-positive sexual partner in the past 12 months reported having a high perceived risk of HIV. Additionally, although HIV prevalence in men 25–34 years in Kenya is considerably (4–5 fold) higher than in ABYM [33], and having an older (≥10 years) partner was significantly associated with HIV infection in this and other studies [13,42,43], having an older sexual partner was not associated with higher perceived risk of HIV among this population of AGYW. This finding suggests that asking AGYW who access HIV prevention services about the relative age of sexual partners in the past 12 months could improve identification of, and prevention counseling (including PrEP) provided to, AGYW with older male partners.

Similar to other studies [19,20,24] we found that, although high HIV risk perception increased from 7.7% among sexually active AGYW with no reported risk factors to 35.7% among those reporting 4 or more factors associated with HIV infection, critical gaps in perception of HIV risk remain in this population. A large proportion of AGYW with 3 or more HIV risk factors had either a low perception of risk (61%) or didn't know their perceived risk for HIV (19%). Additionally, over 75% of the 21 AGYW newly diagnosed with HIV during the survey—a sub-population clearly at high risk for HIV infection— reported having either a low perception of HIV risk or not knowing their perceived risk. The observed mismatch between reported behaviors and perception of risk for HIV infection among sexually active AGYW is concerning because individuals with a lower perception of risk have been shown to be less likely to seek or use preventive measures, including HIV pre-exposure prophylaxis [65] while continuing to engage in behaviors that can put them at risk for HIV infection [22,23,66]. Our study demonstrates that it is possible to identify AGYW who, despite having low risk perception, are at high risk of HIV infection, thereby opening the door for more effective counseling and interventions.

LIMITATIONS

The study has several limitations. First, assessment of behavioral risks for HIV, access to HIV testing, and prevention services relied on self-reporting, which can be unreliable

[67–69]. To minimize reporting bias and ensure confidentiality, all interviews and HCT were conducted by trained staff in a private space. Participants who consented to testing may have differed from those who declined on prevalence of HIV and associated factors; however, the few statistically significant differences observed were modest. Secondly, owing to the small number of newly diagnosed HIV-positive participants we were unable to assess risk factors for new HIV diagnoses. Thirdly, owing to cross-sectional study design we cannot establish temporality or infer causality between the factors assessed in the analysis and HIV infection; however, the trend in increasing HIV prevalence with a number of reported risk factors suggests the factors identified may, nevertheless, be important drivers of HIV infection in this population. Fourthly, we were not able to assess the extent or quality of HIV testing and prevention counseling or DREAMS services received. Finally, as the survey was conducted in a mostly rural area of Siaya County, the findings may not be generalizable to urban settings and other regions of Kenya.

CONCLUSIONS

This study highlights persistent behavioral risks and actionable gaps in perceived HIV risk among AGYW in western Kenya. The expansive reach of HTC services and access to the DREAMS program demonstrated by this study highlight key service delivery platforms through which AGYW are accessing HIV prevention services in western Kenya. Our findings further underscore the need to improve counseling around HIV prevention and HIV risk among AGYW who access these services. Further, the findings presented provide a baseline for measuring HIV program impact on the prevalence of risky behaviors and associated perception of risk for HIV infection in this vulnerable population.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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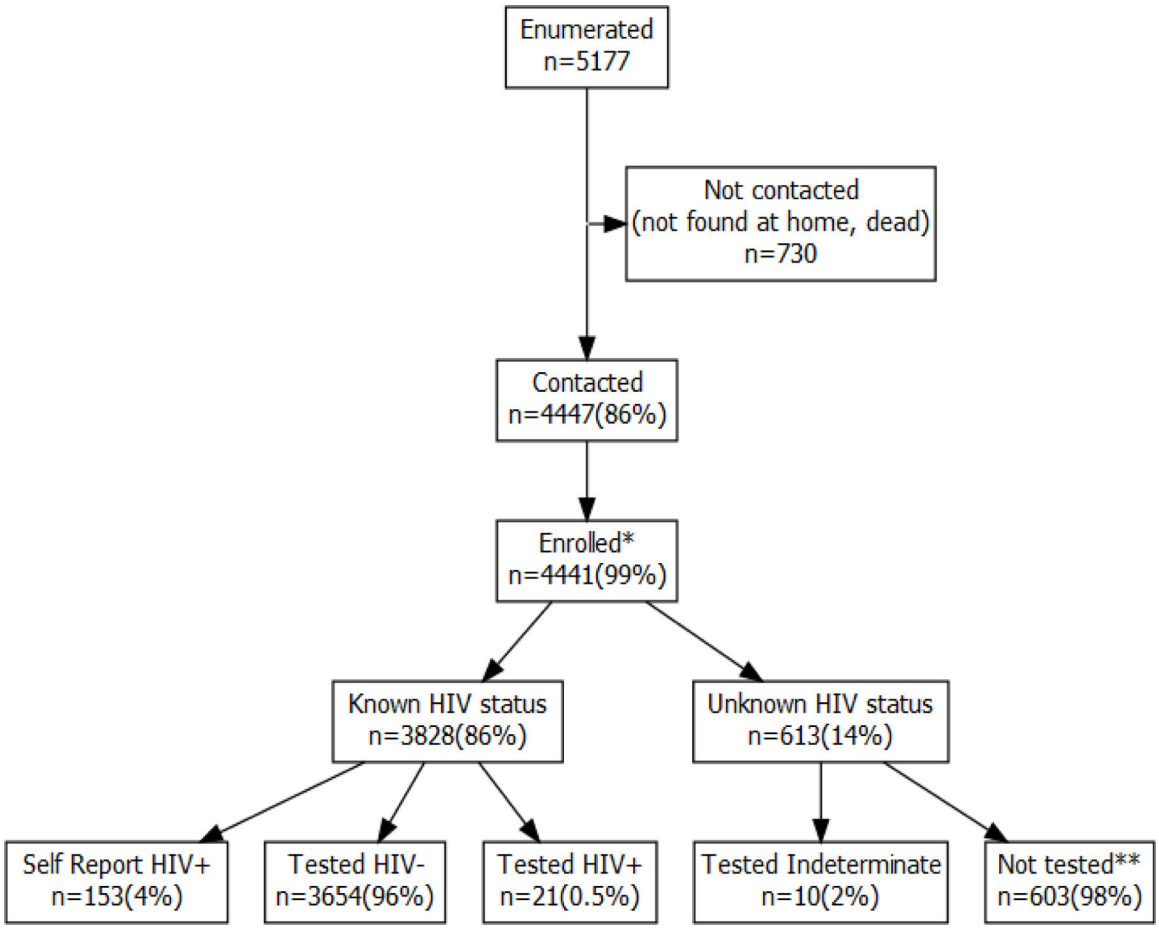
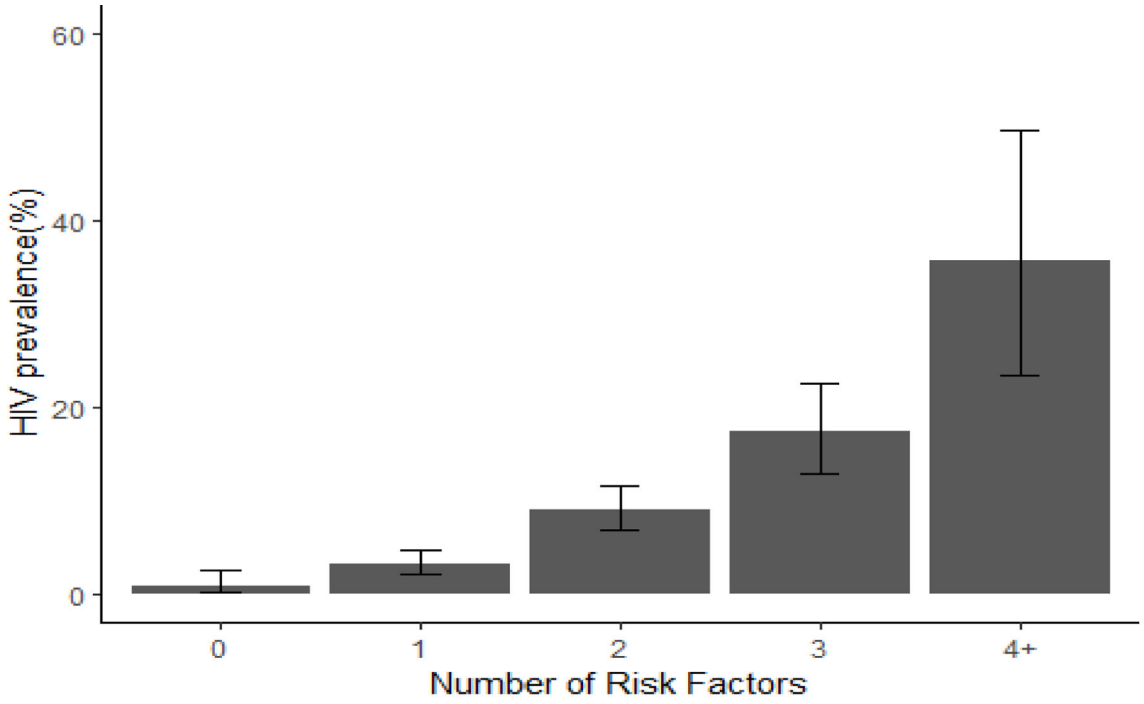


Figure 1.

AGYW (15 – 24 years) participation in the HIV bio-behavioral survey—Siaya County HDSS, January–December, 2018

¶Reasons for non-enrollment (n=736): 728 (99%) were not found at home at the time of survey, 6 (<1%) declined participation in the survey, and 2 (<1%) had died.

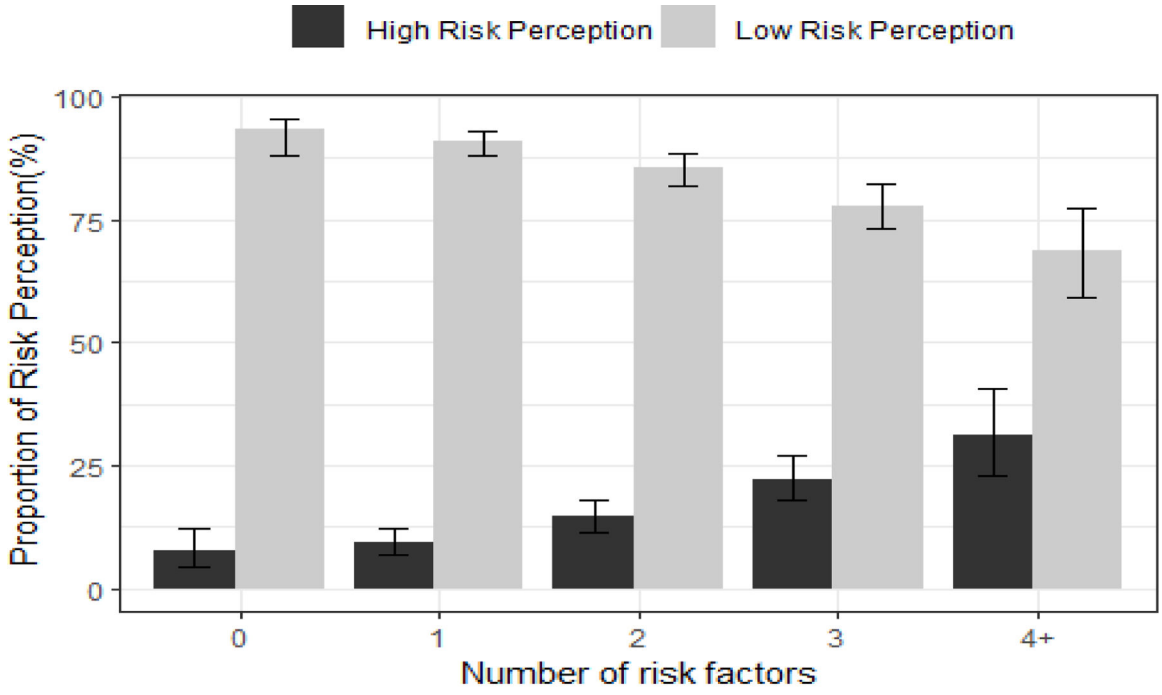
§Reasons for not receiving HIV testing among (n=603): 341 (57%) reported having been tested in the past 3 months, 37 (6%) declined testing, and 225 (37%) had no reason recorded.



	0	1	2	3	4+
Total	343(16.7%)	786(38.2%)	607(29.5%)	264(12.8%)	56(2.7%)
HIV Neg	99.1(97.5-99.8)	96.7(95.2-97.8)	90.9(88.4-93.1)	82.6(77.5-87.0)	64.3(50.4-76.6)
HIV Pos	0.9(0.2-2.5)	3.3(2.2-4.8)	9.1(6.9-11.6)	17.4(13.0-22.5)	35.7(23.4-49.6)

Figure 2.

HIV Prevalence by the number of risk factors for HIV infection among sexually active AGYW 15–24 years of age in the Siaya County HDSS, 2018 (n=2056)



	0	1	2	3	4+
Total	209(12.6%)	542(32.7%)	468(28.2%)	330(19.9%)	109(6.6%)
Low risk	92.3(87.9-95.6)	90.8(88.0-93.1)	85.5(81.9-88.5)	77.9(73.0-82.2)	68.8(59.2-77.3)
High risk	7.7(4.4-12.1)	9.2(6.9-12.0)	14.5(11.5-18.1)	22.1(17.8-27.0)	31.2(22.7-40.8)

Figure 3.

Prevalence of high and low HIV risk perception by the number of risk factors for HIV infection among AGYW 15–24 years of age (n=1,658)—Siaya County HDSS, 2018

Table 1.

Factors associated with HIV infection and high HIV risk perception among sexually active AGYW 15–24 years in the Siaya County HDSS, 2018

	HIV Infection (n=2,056)					High HIV risk perception (n=1,658)				
Variable/Factor	**Weighted HIV prevalence (95%CI)**	**unadjusted PR (95% CI)**	**p value**	**adjusted PR (95% CI)**	**p value**	**Weighted prevalence high HIV risk perception (95%CI)**	**unadjusted PR (95% CI)**	**p value**	**adjusted PR (95% CI)**	**p value**
Age group (years)										
15–19	3.8 (2.4 – 5.8)	1		1		14.1 (11.1 – 17.9)	1			
20–24	9.5 (7.7 – 11.7)	2.50 (1.67 – 3.73)	<0.001	2.04 (1.33 – 3.12)	0.001	16.6 (14.0 – 19.6)	1.31 (1.02 – 1.69)	0.035		
Highest education level attained										
None/Primary and below	11.0 (8.8 – 13.6)	1		1		18.2 (14.9 – 22.1)	1			
Secondary ongoing/ incomplete	4.1 (2.7 – 6.2)	0.43 (0.29 – 0.63)	<0.001	0.57 (0.37 – 0.86)	0.008	14.1 (10.8 – 18.2)	0.79 (0.60 – 1.04)	0.089		
Secondary complete/any tertiary	4.5 (2.5 – 7.8)	0.34 (0.20 – 0.57)	<0.001	0.39 (0.22 – 0.67)	0.001	12.8 (9.3 – 17.3)	0.87 (0.64 – 1.18)	0.369		
Condom use at first sex										
Yes	4.8 (3.5 – 6.4)	1				11.5 (9.3 – 14.2)	1		1	
No	10.8 (8.4 – 13.7)	2.28 (1.66 – 3.15)	<0.001			21.3 (17.7 – 25.5)	1.72 (1.36 – 2.17)	<0.001	1.61 (1.26 – 2.05)	<0.001
Diagnosed with STI in past 12 months										
No	7.0 (5.7 – 8.5)	1		1	.	15.4 (13.4 – 17.8)	1		1	
Yes	34.1 (17.1 – 56.6)	4.70 (2.82 – 7.84)	<0.001	3.01 (1.74 – 5.19)	<0.0001	28.4 (11.8 – 54.0)	2.89 (1.73 – 4.85)	<0.001	2.44 (1.30 – 4.58)	0.006
Ever had anal sex										
No	7.1 (5.9 – 8.6)	1				15.2 (13.2 – 17.5)	1		1	
Yes	23.7 (10.1 – 46.2)	2.34 (1.11 – 4.94)	0.026			52.4 (25.6 – 77.9)	2.81 (1.62 – 4.87)	<0.001	2.35 (1.33 – 4.14)	0.003
Multiple sexual partners in past 12 months										

	HIV Infection (n=2,056)					High HIV risk perception (n=1,658)				
Variable/Factor	**Weighted HIV prevalence (95%CI)**	**unadjusted PR (95% CI)**	**p value**	**adjusted PR (95% CI)**	**p value**	**Weighted prevalence high HIV risk perception (95%CI)**	**unadjusted PR (95% CI)**	**p value**	**adjusted PR (95% CI)**	**p value**
No	7.0 (5.7 – 8.6)	1				14.9 (12.8 – 17.4)	1		1	
Yes	12.0 (6.8 – 20.3)	1.39 (0.83 – 2.31)	0.208			28.7 (19.5 – 40.1)	2.12 (1.54 – 2.91)	<0.001	1.79 (1.31 – 2.47)	<0.001
Older (by ≥ 10 years) partner in past 12 months										
No	6.1 (4.7 – 7.9)	1		1	.	16.0 (13.6 – 18.7)	1			
Yes	17.0 (12.0 – 23.3)	3.08 (2.18 – 4.36)	<0.001	1.45 (1.02 – 2.08)	0.04	23.6 (16.5 – 32.6)	1.60 (1.17 – 2.19)	0.003		
HIV positive partner in past 12 months										
No	4.0 (2.9 – 5.4)	1		1	.	13.4 (11.1 – 16.2)	1		1	
Yes	55.5 (41.2 – 69.0)	13.68 (9.87 – 18.95)	<0.001	9.09 (6.18 – 13.37)	<0.0001	53.9 (31.0 – 75.3)	4.34 (2.94 – 6.42)	<0.001	4.38 (2.96 – 6.47)	<0.001
Unknown	8.4 (5.7 – 12.3)	1.95 (1.29 – 2.96)	0.002	1.70 (1.11 – 2.61)	0.014	25.2 (19.5 – 31.8)	1.95 (1.51 – 2.52)	<0.001	1.73 (1.33 – 2.25)	<0.001