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RESEARCH ARTICLE

REVISED Risky sexual behaviours and utilization of HIV testing services among the adolescent girls and young women aged between 15-24 years in Kibra Sub County, Nairobi County, Kenya

[version 2; peer review: 2 approved]

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Abstract

Background

HIV remains a significant global health challenge, disproportionately affecting adolescent girls and young women (AGYW). HIV testing is crucial in controlling transmission and reducing its prevalence. Understanding risky sexual behaviours among AGYW is pivotal in aligning prevention interventions. Despite global prevention efforts, testing gaps persist among AGYW, linked to risky sexual behaviour (RSB). This study explores the association between these behaviours and HIV testing utilization among AGYW (aged 15–24) in Kibra Sub County, Nairobi.

Methods

A cross-sectional study sampled 379 AGYW from three wards in Kibra Sub County in Nairobi County. To be an eligible participant, one must have been a resident for at least one year before the time of the study and aged between 15–24 years, employing standardized structured interviewer-administered questionnaires and statistical analyses. Results were analysed using Chi-square tests and a manual stepwise procedure was used to enter variables with p-values <0.1 in the bivariate model analysis into the multivariate logistic regression

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model at 95% Confidence Interval. Data was collected between June to July 2023.

Results

Majority (80.7%) of the respondents were single, married (18.2%) or separated (1.1%). Almost two-thirds (64.6%) were educated to secondary school level, while tertiary and primary levels accounted for 23.5% and 11.6% respectively. Overall, HIV testing prevalence was 60.7% (n=230). Those aged 20–24 were 71.3% (n=164), with secondary education were 63.5% (n=146) and married 28.7% (66) were more likely to undergo testing. Respondents who failed to use condoms in their last sexual encounter demonstrated a higher probability of testing for HIV (OR 3.96,955 CI:2.12,7.58, p<0.001). those who experienced gender-based violence were had a higher likelihood of testing (OR: 4.65, 95% CI: 1.93,13.87, p-0.002)

Participants engaging in risky behaviours such as lack of condom had higher odds of testing for HIV (AOR: 4.27, 95% CI: 2.25, 8.30, p-<0.001) relative to those who used protection.

Conclusions

This study establishes a clear link between risky sexual behaviours and HIV testing among AGYW Utilization of HIV testing among this population is still low. Efforts to enhance testing rates are vital. Interventions should align with acceptable methods, focusing on this high-risk group to ensure effective HIV care and prevention. The Ministry of Health should consider integration of HIV services in various service delivery points, upscale the uptake of HIV-self testing for both oral and blood blood based and support social protective measures for AGYW to ensure effective HIV care and prevention.

Plain language summary

Localized insights into testing disparities: This study provides localized insights into HIV testing disparities within specific communities, shedding light on differences in testing rates among various wards. Understanding these community-specific variations is essential for tailoring targeted interventions and healthcare resources effectively.

Comprehensive analysis of sociodemographic factors: Unlike some previous studies, this research comprehensively examines a range of sociodemographic factors, including education, employment status, income, and marital status, to identify nuanced influences on HIV testing among Adolescent Girls and Young Women (AGYW). By analysing these multifaceted factors, this study enriches the understanding of the complex interplay between sociodemographic variables and HIV testing behaviour in this vulnerable population.

Behavioural contextualization of HIV testing: This study goes beyond

numerical analysis by delving into the behavioural context surrounding HIV testing among AGYW. By exploring risky sexual behaviours in detail, such as transactional sex, alcohol-induced encounters, and STI diagnoses, this research offers a nuanced understanding of the psychosocial factors influencing HIV testing decisions. These insights are pivotal for developing targeted behavioural interventions that address the specific challenges faced by AGYW, thus contributing significantly to the design of more effective public health strategies.

Keywords
HIV Testing, Adolescent Girls, Young Women, Risky Sexual Behaviours, HIV Prevention

This article is included in the European & Developing Countries Clinical Trials Partnership (EDCTP) gateway.

This article is included in the Health Sciences gateway.

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REVISED **Amendments from Version 1**

Abstract

Methods: added a manual stepwise procedure was used to enter variables with p-values <0.1 in the bivariate model analysis into the multivariate logistic regression model at 95% Confidence Interval.

Results: paraphrased to read; Majority (80.7%) of the respondents were single, married (18.2%) or separated (1.1%). Almost two-thirds (64.6%) were educated to secondary school level, while tertiary and primary levels accounted for 23.5% and 11.6% respectively. Respondents who failed to use condoms in their last sexual encounter demonstrated a higher probability of testing for HIV (OR 3.96,955 CI:2.12,7.58, p<0.001). those who experienced gender-based violence were had a higher likelihood of testing (OR: 4.65, 95% CI: 1.93,13.87, p-0.002).

Conclusion; added; utilization of HIV testing services among this population is generraly low. Focus on thus high risk group to ensure effective HIV care and prevention. The ministry of health should strengthen integration integration of HIV testing services in various service delivery points, upscale the uptake of HIV self-testing for both oral and blood based and support social protection measures a for AGYW

Body

Introduction

Paragraph three the word who do not practice transactional sex replaced do not do it for money

Removed the age of respondents

Paragraph four the years of the studies included

Paragraph five, risky sexual behavious included, UNAIDS targets of 95-95-95 and SDGs 3.3

Exclusion: removed absent from selected households

Sample size determination formula added

Sampling technique more details added to include the step by step procedure of selection of respondents

Data analysis; power of the study included

Ethical clearance numbers added

Table 2 on univariate analysis replaced to reflect percentages and number

Multivariable analysis; adjusted, to include comparisons and associations on risky sexual behaviours and HIV testing

Discussion: included testing in the informal settlements,

Conclusion: this has been changed as indicated in the abstract section

Any further responses from the reviewers can be found at the end of the article

Introduction

HIV continues to be a major public health issue with over 38 million people acquiring HIV globally and about 3.4 million adolescent girls and young adults aged between 15–24 years living with HIV[1]. HIV testing is the first step in HIV prevention of new transmissions and AIDS-related deaths, initiation on ART and improvement of quality of life among the Adolescent Girls and Young Women (AGYW)[2]. Testing services have become increasingly available in Kenya with over 7,000 government health facilities offering the service for free and private health facilities with minimal charges[3]. However, AGYW continue to be a uniquely vulnerable population that is exposed to risks that affect their health and well-being including risky sexual behaviours that expose them to HIV[4]. The prevalence of HIV among AGYW in Kenya is two to three times that of adolescent boys and young men (ABYM)[5]. Young people (15–24 years) contribute 41% of all new HIV diagnoses in the 15+ population in the country, with 70% of those new diagnoses in females[3]. Further, UNAIDS estimates that every week, approximately 6200 AGYW aged between 15–24 years of age get newly transmitted with HIV in Kenya[6].

HIV transmission among the AGYW in Sub-Saharan Africa and other African Countries is mainly through the unprotected heterosexual route fuelled by risky sexual behaviours such as early sexual debut, low condom use, substance use, having multiple sexual partners, transactional sex, among others[5]. In Nigeria for example, poverty, being orphan, dropping out of school, early child marriages and sexual violence among other inequalities are attributed to risks of unprotected sex among the AGYW[7].

A study done in Zimbabwe found out that AGYW who engage on sex for monetary gains are less likely to utilize HIV testing services compared to those who do not practice transactional sex, those who have multiple sexual partners are likely to test compared to those with only one and similarly, those who use condoms are less likely to test compared to those who don't use[8]. A similar study in Ethiopia among the AGYW, found that those who had multiple sexual partners, those who ever had been pregnant, started sexual intercourse early and had history of sexually transmitted infections were more likely to utilize HIV testing services due to the increased risk of HIV transmission[9]. Additionally, studies across different parts of the globe have positively associated risky sexual behaviours such as early sexual debut, stigma, attitudes with predisposing AGYW to HIV and utilization of HIV testing services[10–12].

Kenya has continually endeavoured to halt and reverse the spread of HIV transmission with remarkable achievements towards HIV prevention, and continues to implement various interventions geared towards achieving the UNAIDS 95-95-95 targets by 2030[3]. However, despite the efforts testing gaps exist for AGYW at 44%[13]. As of 2016, HIV testing among AGYW in Ethiopia is 27%[9]. Similar population-based survey in Malawi, Zambia and Zimbabwe showed that 46% of AGYW were aware of their HIV status[14]. Several other studies based on demographic health surveys between 2013 – 2016 in different countries have shown low HIV testing rates among AGYW such as Nigeria 12% (2013), Uganda 26.5% (2016) and Rwanda 40% (2014–15)[15]. A household study conducted in Viwandani and Korogocho slums in Nairobi 2018 showed that AGYW are less aware of their HIV status compared to those above 25 years[16].

Numerous investigations have focused on HIV among AGYW; however, a literature search failed to identify studies examining the nexus between risky sexual behaviours and the

utilization of HIV testing services within this high-priority demographic. Consequently, this research aims to elucidate the prevalence of HIV testing and scrutinize the interplay among sociodemographic characteristics, risky sexual behaviours such as early sexual debut, condom use, substance use, having multiple sexual partners, transactional sex, among others, and the utilization of HIV testing services among AGYW aged 15–24 in Kibra Sub County, Nairobi County, Kenya. The outcomes of this study stand poised to offer valuable insights for refining extant prevention strategies concerning differentiated HIV testing services. Moreover, the findings are anticipated to play a pivotal role in the formulation of targeted behavioural interventions tailored to address the specific challenges confronted by AGYW. Consequently, the study holds the potential to make significant contributions to the development of more efficacious public health strategies geared towards attainment of the UNAIDS 95-95-95 strategy to end HIV epidemic by 2023 and contribute to attainment of the SDG3 target 3.3 which aims to fight communicable diseases.

Methods

Design

A community-based cross-sectional analytical study design, using quantitative techniques, was employed.

Study site and population

Kibra is one of the 17 sub counties in Nairobi County, it is located southwest of Nairobi County approximately 5 kilometres from CBD and projected to have a population of 206,064 persons, 21.5% of this population constitutes the AYPs aged between 15–24 years. Majority of the residents are in informal settlements[17]. The sample size of 379 adolescent girls and young women (AGYW) aged 15–24 was calculated using the Cochran formula[18]. Employing a multistage sampling technique, three out of five Wards were randomly selected. Then random walk sampling method was used, starting from common meeting points (markets, hospitals, or schools) in selected wards. A local guide assisted in choosing a random route, with data collection continuing until the minimum sample size was reached. In households with multiple AGYW, random selection using yes/no indicators determined the participant. To be eligible participant must have been a resident for at least one year before time of study, consent/assent to participate and aged between 15–24 years.

Dependent variable

The dependent variable of this study was utilization of HIV testing services among AGYW aged between 15–24 years in Kibra Sub County, which was measured by asking the question to the respondents whether have ever been tested for HIV and the outcome was binary (Yes/No).

Independent variables

Independent variables for this study were grouped into two categories i.e. (sociodemographic characteristics and risky sexual behaviours) where Socio-demographic factors included (age, education level, employment status, average monthly income, marital status and religion). Risky sexual behaviours (ever had sex, age at first sexual debut, ever tested for HIV, had sex for cash, having multiple sexual partners, condom use in sexual encounters and if ever experienced gender-based violence).

Inclusion criteria

The study included AGYW aged between 15–24 years who are residents of Kibra Sub County for at least one year.

Exclusion criteria

The study excluded eligible AGYW 15–24 years not willing to consent or assent or whose parent or guardian declined to give consent from the selected households during data collection

Sample size determination

Sample size was calculated using Cochran formula (1977) since the estimated population of AGYW in Kibra is above 10,000

$$n_0 = \frac{Z^2 pq}{e^2}$$

Where;

$\mathbf{n_0}$ - is the sample size;

$\mathbf{Z^2}$ = Is the standard normal deviate for alpha at 95% confidence level (1.96);

E = is the desired level of precision (0.05);

P = 56% proportion of AGYW ever tested for HIV and know their status in Kenya (Kenya Demographic Health Survey (KDHS 2022);

Q = is 1-p. (0.44);

The value for Z is found in statistical tables which contain the area under the normal curve. i.e. Z = 1.96 for 95 % level of confidence

$$no = \frac{1.96^2 x0.56x0.44}{0.05\text{x}0.05} \qquad = 378.6 \sim (379)$$

Sampling technique

The study used a four multistage sampling technique

Where;

1. Using random numbers, 3 wards from the 5 were selected (Sarang'ombe, Laini saba and Lindi)

2. According to 2019 Census, the population of AGYW in sarang'ombe waurd was 5,741, laini saba 2,870 and lindi 3,565. This population was projected to grow at arte of 2.2% per year which means that the population at the time of study was (sarang'mbe 6,263, laini saba 3,131 and lindi 3,889) giving a total population for the three wards to be 13,283.

3. Proportions were used to allocate sample for each ward i.e sarang'ombe ward 47% of 379 (179), laini saba 24% of 379 (89) and lindi 29% of 379 (111)

4. The study utilized the random walk sampling method whereby in each of the selected wards, a common meeting place, either a market, hospital, hospital or school was chosen a sthe staring point. With the help of a local guide, one route from the selected meeting point was chosen at random and the data collected proceeded along that route until the minum sample size was reached. The first household along the route was skipped and the next household was assessed for presence of the population of interest. The data collector continued to skip one household in this manner until the minimum sample size was achieved. For household with more than one AGYW, use of random numbers written yes and no was used so that the one that picks yes was interviewed. Household without AGYW were skipped.

Pre testing of data collection tools

Research assistants were trained on the data collection tools then pretesting of the data collection questionnaire was done in 30 households where 30 interviewer administered questionnaires were administered to AGYW in Mathare Sub County. Mathare Sub County was chosen because the population there has similar characteristics like the one found in Kibra Sub County, this enabled the researcher to make any necessary adjustments on the study questionnaire depending on how well the respondents understood and gave responses.

Data collection

Standardized structured quantitative interviewer-administered questionnaires were used, covering sociodemographic details, risky sexual behaviours, and HIV testing service utilization. Sociodemographic factors (age, sex, education level, marital status, average monthly income, religion) and indicators of risky sexual behaviours were assessed. Risky behaviours included sexual activity, age at first encounter, condom use, pregnancy prevention methods, transactional sex, multiple sexual partners, sex under the influence, and STI diagnosis in the past 12 months. HIV testing history was also assessed. The questionnaire was adapted with modification from 15,19. Before the actual data collection, the questionnaire was pre-tested to see if participants are able to comprehend the questions, test the time taken. This was done in the indicated sub county which has similar characteristics with the study area. Data were collected between June and July 2023.

Data analysis

Completed questionnaires were cross-checked for accuracy and completeness, then analysed using SPSS version 25. Descriptive statistics on sociodemographic characteristics such as age, sex, education level, marital status, average monthly income, religion, and risky sexual behaviours included sexual activity, age at first encounter, condom use, pregnancy prevention methods, transactional sex, multiple sexual partners, sex under the influence, and STI diagnosis in the past 12 months. Inferential statistics were employed. Regression analyses were performed to assess the association between the explanatory variables and each variable. Variables with a univariable p-value < 0.1 were included in multivariate logistic regression. Adjusted odds ratios, 95% confidence intervals, and p-values were reported, with significance set at $p < 0.05$.

Ethical considerations

Ethical clearance was obtained from Jomo Kenyatta University of Agriculture and Technology Research Committee (JKU/ISERC/02316/0832). Research permits were secured from the National Commission for Science Technology and Innovations (NACOSTI/P/23/24723), and Nairobi County Ethical and Research Committee (NCCG/HWN/REC/357). Informed consent and assent were obtained from participants, ensuring full disclosure of study purpose, risks, and benefits. Strict confidentiality measures, including identity code usage and password protection, were implemented. Access to data was restricted, and anonymity was maintained during data sharing.

Results

Sociodemographic characteristics

The majority of the AGYW respondents (80.7%) were single, with the rest either married (18.2%) or separated (1.1%). Almost two-thirds (64.6%) were educated to secondary school level, while tertiary and primary levels accounted for 23.5% and 11.6% respectively (Table 1)[20].

Table 1. To determine risky sexual behaviors associated with HIV testing among AGYW aged between 15–24 years in Kibra Sub County.

	Ever tested for HIV?		
Variable			
Ever had sex?	**Yes (N=230)**	**No (N=149)**	**Overall (N=379)**
No	13 (5.7%)	98 (65.8%)	111 (29.3%)
Yes	217 (94.3%)	51 (34.2%)	268 (70.7%)
Age at first sexual intercourse (in years)	**Yes (N=217)**	**No (N=51)**	**Overall (N=268)**
Mean (SD)	17.9 (1.86)	17.3 (1.97)	17.8 (1.89)
Median [Min, Max]	18.0 [14.0, 24.0]	18.0 [13.0, 21.0]	18.0 [13.0, 24.0]

	Ever tested for HIV?		
Variable			
Cash in return for sex?	**Yes (N=217)**	**No (N=51)**	**Overall (N=268)**
No	175 (80.6%)	45 (88.2%)	220 (82.1%)
Yes	42 (19.4%)	6 (11.8%)	48 (17.9%)
Have more than 1 lifetime sexual partners?	**Yes (N=217)**	**No (N=51)**	**Overall (N=268)**
No	174 (80.2%)	42 (82.4%)	216 (80.6%)
Yes	43 (19.8%)	9 (17.6%)	52 (19.4%)
If yes to question 21 above, how many?	**Yes (N=43)**	**No (N=9)**	**Overall (N=52)**
Mean (SD)	2.67 (1.11)	2.33 (0.500)	2.62 (1.03)
Median [Min, Max]	2.00 [2.00, 7.00]	2.00 [2.00, 3.00]	2.00 [2.00, 7.00]
Had more than 1 sexual partners during the past 3 months?	**Yes (N=217)**	**No (N=51)**	**Overall (N=268)**
No	185 (85.3%)	44 (86.3%)	229 (85.4%)
Yes	32 (14.7%)	7 (13.7%)	39 (14.6%)
If yes to question 23 above, how many?	**Yes (N=32)**	**No (N=7)**	**Overall (N=39)**
Mean (SD)	2.37 (0.718)	2.29 (0.488)	2.35 (0.676)
Median [Min, Max]	2.00 [2.00, 5.00]	2.00 [2.00, 3.00]	2.00 [2.00, 5.00]
Missing	2 (6.3%)	0 (0%)	2 (5.1%)
Did you use condom in your last sexual intercourse?	**Yes (N=217)**	**No (N=51)**	**Overall (N=268)**
No	156 (71.9%)	20 (39.2%)	176 (65.7%)
Yes	61 (28.1%)	31 (60.8%)	92 (34.3%)
Did you use any method for prevention of pregnancy during your last sexual intercourse?	**Yes (N=217)**	**No (N=51)**	**Overall (N=268)**
No	109 (50.2%)	20 (39.2%)	129 (48.1%)
Yes	108 (49.8%)	31 (60.8%)	139 (51.9%)
Had sexual intercourse under the influence of alcohol?	**Yes (N=217)**	**No (N=51)**	**Overall (N=268)**
No	178 (82.0%)	47 (92.2%)	225 (84.0%)
Yes	39 (18.0%)	4 (7.8%)	43 (16.0%)
Ever experienced gender-based violence?	**Yes (N=217)**	**No (N=51)**	**Overall (N=268)**
No	185 (85.3%)	47 (92.2%)	232 (86.6%)
Yes	32 (14.7%)	4 (7.8%)	36 (13.4%)
Had any STI in the last 12 months?	**Yes (N=217)**	**No (N=51)**	**Overall (N=268)**
No	185 (85.3%)	44 (86.3%)	229 (85.4%)
Yes	32 (14.7%)	7 (13.7%)	39 (14.6%)

Testing services utilization

Regarding HIV testing, participants from Sarangombe had the highest testing rate 47.4% (179), followed by Lindi 28.7% (111) and Laini Saba 23.9% (89). 60.7% (230) of the AGYW had tested for HIV, with a majority 71.3% (164) being in the 20–24 age group and 28.7% (66) being among participants aged 15–19. Education played a role in utilization of HIV testing services as 63.5% (146) of those with secondary education and 23.3% (56) with tertiary education having been tested, compared to only 12.2% (28) with primary education. Employment status influenced testing, with most unemployed participants, 79.6% (183), having tested for HIV, while business, and employed individuals had lower and similar testing rates at 10.4% (24), and 10.0% (23) respectively. Participants earning less than 10,000 monthly had a testing rate of 64.8% (149), contrasting sharply with the 1.3% (3) testing rate among those earning between 20,000 and 30,000. Marital status showed differences, as 69.6% (160) of single participants were tested compared to 28.7% (66) married participants. In terms of religion, 84.8% (195) of Christians and 15.2% (35) of Muslims underwent HIV testing, the overall testing prevalence was 60.7%, as seen in Table 1.

Bivariate analysis

Adolescent girls and young women aged 20–24 years exhibited a substantial likelihood of testing (OR: 4.50, 95% CI: 2.91, 7.04, $p < 0.001$), while not employed participants were markedly less likely to get tested (OR: 0.23, 95% CI: 0.04, 0.50, $p < 0.004$). Married individuals exhibited a significantly higher likelihood of HIV testing (OR: 20.1, 95% CI: 7.26, 83.32, $p < 0.001$). No significant association was found between religion and utilization of HIV testing services. For AGYW who had ever engaged in sexual activity, the likelihood of testing was notably elevated (OR: 32.08, 95% CI: 17.22, 64.20, $p < 0.001$). Furthermore, individuals not using condoms in their last sexual encounter demonstrated a higher probability of HIV testing (OR: 3.96, 95% CI: 2.12, 7.58, $p < 0.001$). Experiencing gender-based violence significantly increased the likelihood of testing (OR: 4.65, 95% CI: 1.93, 13.87, $p = 0.002$), and participants reporting recent STI contraction were also more inclined to undergo HIV testing (OR: 2.85, 95% CI: 1.33, 6.81, $p = 0.011$), as detailed in Table 2.

Multivariable analysis

AGYW aged 20–24 years had higher odds of testing for HIV (AOR: 2.40, 95% CI: 1.44, 4.02, $p = 0.001$). Relative to those aged between 15–19 years. Additionally, married AGYW exhibited a significantly higher odds of testing for HIV (AOR 10.50, 95% CI: 3.63, 44.58, $p = 0.000$) compared to single and seperated. AGYW aged 15–24 years, those who failed to use condoms in their last sexual encounter were more likely to opt for HIV testing (AOR: 4.27, 95% CI: 2.25, 8.30, $p < 0.001$) relative to those who use condoms in their last sexual encounter. These findings highlight the substantial impact of age, marital status, and condom usage on HIV testing behaviours within this demographic group (Table 3).

Table 2. Univariable logistic regression model assessing sociodemographic and risky sexual behaviour factors associated with utilization of HIV testing services.

Variable	Category	n	% HIV tested	Crude OR	95% CI	P-value
Ward	Laini Saba	89	23.9	Ref		
	Lindi	111	28.7	0.91	0.51, 1.60	0.737
	Sarangombe	179	47.4	0.96	0.57, 1.62	0.886
Age (ungrouped)				1.61	1.44, 1.82	**<0.001***
Age (grouped)	15-19 years	162	28.7	Ref		
	20-24 years	217	71.3	4.5	2.91, 7.04	**<0.001***
Education level	No formal education	1	0	Ref		
	Primary	44	12.2	-	-	0.979
	Secondary	245	63.5	-	-	0.979
	Tertiary	89	24.3	-	-	0.979
Employment status	Business	27	10.4	Ref		
	Not employed	34	10.0	0.23	0.04, 0.50	**0.004365***
	Employed	318	79.6	0.26	0.05, 0.96	0.060
Average monthly income	No income	127	22.6	0.23	0.01, 1.86	0.210
	<10,000	218	64.8	0.72	0.04, 5.74	0.778
	10,000 - 20,000	30	11.3	2.17	0.09, 22.71	0.544
	20,000 - 30,000	4	1.3	Ref		

Variable	Category	n	% HIV tested	Crude OR	95% CI	P-value
Marital status	Single	306	69.6	Ref		
	Married	69	28.7	20.1	7.26, 83.32	**<0.001***
	Separated	4	1.7	-	-	0.983
Religion	Christian	321	84.8	1.02	0.56, 1.79	0.954
	Muslim	58	15.2	Ref		
Ever had sex	No	111	5.7	Ref		
	Yes	268	94.3	32.08	17.22, 64.20	**<0.001***
Age at first sex (in years)				1.18	1.00, 1.40	0.053
Cash in return for sex	No	220	80.6	Ref		
	Yes	48	19.4	1.8	0.77, 4.95	0.208
1+ lifetime sex partners	No	216	80.2	Ref		
	Yes	52	19.8	1.15	0.54, 2.69	0.725
Used condom last sex	No	176	71.9	3.96	2.12, 7.58	**<0.001***
	Yes	92	28.1	Ref		
Contraceptive last sex	No	129	50.2	1.49	0.81, 2.78	0.204
	Yes	139	49.8	Ref		
Sex under alcohol influence	No	225	82.0	Ref		
	Yes	43	18.0	2.63	0.996, 9.08	0.079
Experienced GBV	No	232	85.3	Ref		
	Yes	36	14.7	4.65	1.93, 13.87	**0.002***
STI last 12 months	No	229	85.3	Ref		
	Yes	39	14.7	2.85	1.33, 6.81	**0.011***

Table 3. Multivariable logistic regression model assessing sociodemographic and risky sexual behaviour factors associated with utilization of HIV testing services.

	Variable	Adjusted OR	95% CI	P-value
Age (grouped)	15–19 yrs.	Ref		
	20–24 yrs.	2.4	1.44, 4.02	**<0.001***
Employment status	Business	Ref		
	Not employed	0.81	0.16, 3.15	0.780
	Employed	0.52	0.10, 2.25	0.398
Average monthly income	No income	0.42	0.02, 5.12	0.518
	<10,000	0.64	0.03, 7.18	0.734
	10,000 - 20,000	1.22	0.05, 15.76	0.883
	20,000 - 30,000	Ref		

	Variable	Adjusted OR	95% CI	P-value
Marital status	Single	Ref		
	Married	10.5	3.63, 44.58	**<0.001***
	Separated	-	-	0.984
Used condom last sex	No	4.27	2.25, 8.30	**<0.001***
	Yes	Ref		
Sex under alcohol influence	No	Ref		
	Yes	2.99	1.04, 11.02	0.064
Experienced GBV	No	Ref		
	Yes	1.8	0.58, 6.88	0.341
STI last 12 months	No	Ref		
	Yes	0.66	0.25, 1.89	0.411

Discussion

The study findings indicated that adolescent girls and young women between the age of 20–24 years had testing rate of 71.3% or were 4.5 times likely to test for HIV. The findings concur with studies conducted in different countries which attributed age among other sociodemographic factors to have a significant association with utilization of HIV testing services among the adolescent girls and young women as those aged 20 and above were more likely to utilize HIV testing services compared to those aged between 15–19 years in most Sub-Saharan Africa[1,21]. Better testing rates for AGYW between 20–24 years may imply that these are young women who have completed secondary education and have a higher chance of getting or accessing information on HIV awareness, better understating on the importance of HIV testing which may drive them to make evidence-based decision thus increasing their chances of being tested. Additionally, this group is more likely to have sexual partners older than them due to material benefits to meet other basic needs that they may not be getting from their parents or guardians, further, they may not be first-time testers but had been tested for HIV even before the study[16]. On the contrast, there is probability that AGYW younger than 20 years of age have shorter sexual experience and hence less informed on sexual matters compared to older one thus disparity in HIV testing.

Participants who had attained secondary and tertiary education had better testing rates at 63.5% and 23.5% respectively an indication that the more the AGYW are educated, the more likely they are to test for HIV compared to less educated, this is also true since the only participant who did not have formal education had not tested for HIV. Other studies indicate that people who are educated up to secondary education level and above are more likely to utilize HIV testing services compared to those with primary or no education[22,23]. With majority having attained secondary education, it points to better overall achievement in school enrolment, greater empowerment, and knowledge on sexual and reproductive health among the residents and a pointer to association between education level and utilization of HIV testing.

The study findings indicate that the testing prevalence for the participants in Kibra which is an informal settlement was 60.7%, the finding are not consistent with a study in Viwandani and Korogocho slums in Nairobi which showed that AGYW are less aware of their HIV status compared to those above 25 years[16]. Improvement in testing rates among this group may be attributed to the concerted efforts by the Ministry of Health in implementing various interventions like campaigns promoting HIV testing, increased availability of HIV testing centres and youth friendly HIV testing services in the informal settlements all geared towards ending HIV pandemic and achieving UNAIDS target to end HIV pandemic by 2030.

Majority of the participants who were married had tested for HIV which may be attributed to the program of prevention of perinatal transmission which requires that all pregnant and expectant mothers attending antennal clinics should be initiated on provider HIV testing services for them to understand the potential of reducing the chances of transmitting HIV to their unborn child hence are more likely to be tested for HIV. Studies in sub-Saharan Africa have shown that most indicated that married people were more likely to utilize HIV testing services compared to those not married or in any union as more countries adopt policies to encourage HIV testing[8,24,25]. This implies the importance of prevention of mother to child transmission (PMTCT) program in sensitizing expectant mothers on the advantages of undergoing HIV testing during pregnancy, labour, and delivery and postnatally, the importance of training health care workers and care givers on optimizing the interventions of HIV prevention including awareness on HIV and differentiated prevention services like PrEP that focuses on AGYW.

The study demonstrated that AGYWs who had sexual intercourse without using condom, who had sexual intercourse under the influence of alcohol, who had contracted STI in the last 12 months and who had experienced gender-based violence were more likely to test for HIV. Similarly, studies in Zimbabwe and Ethiopia indicated that AGYW who engage in sex for monetary gains are less likely to utilize HIV testing services compared to those who don't do it for money, those who have multiple sexual partners are likely to test compared to those with only one, additionally, those who use condoms during sexual intercourse are less likely to test compared to those who don't use[8,9]. The findings of the study underscore the need for interventions targeting the young AGYWs to understand the risks involved in early sexual debut and other available protective measures to prevent HIV transmission such as Pre and Post exposure prophylaxis.

Study limitations

The study was cross sectional, no causal conclusions or inference on causality can be drawn from the assessed factors, although the sample included in the study was representative, Kibra is only one of seventeen (17) sub counties in Nairobi County, it's an informal settlement hence study findings may not be generalizable to other formal and urban settlements. The study relied on self-report on the variables assessed which may be influenced by social disparities, several other variables affecting utilization of HIV testing services such as individual level factors, hospital level factors, perceived vulnerabilities and risks, access to testing sites were not assessed hence should be included in future studies. However, the study provided pivotal insights necessary for developing targeted behavioural interventions that address the specific challenges faced by AGYW, thus contributing significantly to the design of more effective public health strategies.

Conclusion

Risky sexual behaviours among the AGYW in Kibra sub county was noted to be common and may mirror other findings on HIV burden among populations in informal settlements. This study established a clear link between sociodemographic characteristics and risky sexual behaviours. Utilization of HIV testing among AGYW is low., efforts to enhance testing rates are vital. Interventions should align with acceptable methods, focusing on this high risk population to ensure effective HIV care and prevention. The ministry of health should consider integration of HIV services in various service delivery points, upscale the uptake of HIV self-testing for both oral and blood based, social support and protective measures for AGYW as crucial in HIV response. Despite limitations, the study contributes to knowledge on the association between risky sexual behaviours and HIV testing in Kenya, more research should be conducted considering other factors such as individual level factors, hospital level factors, perceived vulnerabilities and risks, access to testing sites among other variables.

What is already known on this topic

1. **Disparities in HIV testing rates:** Existing research has shown disparities in HIV testing rates among different demographic groups, particularly among adolescent girls and young women (AGYW). These disparities are often influenced by factors such as age, education, and socioeconomic status.

2. **Impact of risky sexual behaviours:** Previous studies have established a link between risky sexual behaviours and HIV testing patterns. Risky behaviours, including sex without the use of prevention tools and multiple sexual partners, have been identified as significant factors influencing HIV testing behaviour among AGYW.

What this study adds

1. **Localized insights into testing disparities:** This study provides localized insights into HIV testing disparities within specific communities, shedding light on differences in testing rates among various wards. Understanding these community-specific variations is essential for tailoring targeted interventions and healthcare resources effectively.

2. **Comprehensive analysis of sociodemographic factors:** Unlike some previous studies, this research comprehensively examines a range of sociodemographic factors, including education, employment status, income, and marital status, to identify nuanced influences on HIV testing among AGYW. By analysing these multifaceted factors, this study enriches the understanding of the complex interplay between sociodemographic variables and HIV testing behaviour in this vulnerable population.

3. **Behavioural contextualization of HIV testing:** This study goes beyond numerical analysis by delving into the behavioural context surrounding HIV testing among AGYW. By exploring risky sexual behaviours in detail, such as transactional sex, alcohol-induced encounters, and STI diagnoses, this research offers a nuanced understanding of the psychosocial factors influencing HIV testing decisions. These insights are pivotal for developing targeted behavioural interventions that address the specific challenges faced by AGYW, thus contributing significantly to the design of more effective public health strategies.

Ethics and consent

Ethical clearance was obtained from Jomo Kenyatta University of Agriculture and Technology Research Committee (ref number. JKU/ISERC/02316/0832; 23 February 2023). Research permits were secured from the National Commission for Science Technology and Innovations (NACOSTI) and Nairobi County Ethical and Research Committee. Written informed consent was obtained from participants (or the guardians/parents of the participants under 18 years old, with assent being obtained from the participants) before they filled out the questionnaire, ensuring full disclosure of study purpose, risks, and benefits.

Data availability

Underlying data

Dryad: Risky sexual behaviours and utilization of HIV testing services among the adolescent girls and young women aged

between 15–24 years in Kibra Sub County, Nairobi County, Kenya. https://doi.org/10.5061/dryad.kh18932fs[20].

Data are available under the terms of the Creative Commons Zero "No rights reserved" data waiver (CC0 1.0 Public domain dedication).

Authors' contributions

OMM contributed by drafting the initial manuscript. KN meticulously reviewed the manuscript and provided valuable insights. AGM played a crucial role in conducting the statistical analysis. All authors were actively involved in the major revisions, ensuring the manuscript's accuracy and coherence.

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Version 2

Reviewer Report 22 February 2025

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✔ **Alfred Musekiwa**
University of Pretoria, Pretoria, Gauteng, South Africa

All my comments have been addressed. I have no further comments to make.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Biostatistics, HIV/AIDS among adolescent girls and young women in Sub-Saharan Africa

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Reviewer Report 06 February 2025

https://doi.org/10.21956/openreseurope.21104.r50554

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✔ **Elizabeth Kiilu**
University of Bradford, Bradford, UK

The article has addressed my comments satisfactorily.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Public Health and health systems management

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Version 1

Reviewer Report 13 January 2025

https://doi.org/10.21956/openreseurope.19028.r48451

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?

Elizabeth Kiilu
University of Bradford, Bradford, UK

Risky sexual behaviours and utilization of HIV testing services among the adolescent girls and young women aged between 15-24 years in Kibra Sub County, Nairobi County, Kenya

Abstract:
-The results in the abstract are not well presented with the respective Confidence intervals. All statistics must be fully presented.
- Was ethical approval obtained? Needs to be reflected in the methods section of the abstract.

Conclusions and recommendations should match what was presented as the main findings. You talk about age, secondary education and those married as being more likely to be tested in reference to which specific categories? i.e. what are the reference points of these findings so that it's clearer? Other findings highlighted are condom use, GBV and STIs...These findings need to be matched with your conclusions and recommendations.

You have provided several findings with only one conclusion on risky sexual behaviours. This is a positive finding as those who are engaging in risky sexual behaviours are actually more likely to seek HIV services. This is a good thing! It's exactly what needs reinstated among teenagers engaging in risky sexual behaviours. A more Profound finding is the low testing prevalence...what can be done about this?
What are the outcomes of those with low testing rates?
Are younger people having lower testing rates?
What can be done to help?
Are those with lower levels of education less likely to seek testing services and what can be done to improve this?
The results need to be presented in a clearer manner to show the implication of the said findings using the respective reference groups.

Essentially in the abstract, you present the main findings of the study (1-3) then conclude on these findings and give recommendations based on these main findings. You don't need to present all

the positive findings in the abstract.

Introduction:
This section is fairly well written with excellent justification of why AGYW alongside current epidemiological statistics. Some areas that could use some improvement in this section:
The paragraph below could use more elaboration for some of the indicators. For instance, age is a significant finding in your study...elaborate further how this may or may not be a factor in other studies and the implications of age... what about stigma? Explore this further as well as attitudes and implications of early sexual debut. These are all drivers or barriers for testing and could be explored in more detail.

“Additionally, studies across different parts of the globe have positively associated risky sexual behaviours such as age of respondents, early sexual debut, stigma, attitudes with predisposing AGYW to HIV and utilization of HIV testing services10–12

Methods:
-Cite the source of the demographics in the first paragraph.
-In the abstract you say that you used logistic regression, yet your Dependent variable in the methods is stated as binary outcome. So, did you use logistic regression, or you used binary regression?
-In the exclusion criteria you cannot exclude those who were not present at in the HH as they are actually not there anyway. Remove that statement.
-What was the power of the study?
-Include the ethical approval number from Jomo Kenyatta University of Agriculture and Technology Research Committee.

Results:
- Table 1 results (descriptive statistics) are clear.
- Table 2 results (not clear what the authors are testing.) Are these for test of association i.e Chi square test? If this is the case you have wrongly presented these results as you don't have OR in chi square tests. Additionally, some data is missing in the table i.e. level of education data is missing yet a p-value is indicated. If this table is not testing associations using Chi square test as indicated in your methods, you need to include your test of association table.
- If you are going to present crude ORs you should give a statement of caution that these do not take care of possible confounders, and the results should be interpreted as such.
- Multivariable analysis: when presenting your results, it's important to indicate the reference group (which shows what category of independent variables you are comparing to) for instance in the statement below:

AGYW aged 20–24 years were 2.40 times more likely to undergo HIV testing (AOR: 2.40, 95% CI: 1.44, 4.02, p = 0.001).
The above information does not mean much if you do not give the reader what you are making reference to. This could have been stated as follows:
AGYW aged 20–24 years were 2.40 times more likely to undergo HIV testing (AOR: 2.40, 95% CI: 1.44, 4.02, p = 0.001) relative to their younger counterparts aged 15-19 years (95%CI.....).
This should be reflected in all the results you present even in the discussion section.

Discussion:

-The first paragraph and subsequent ones giving results should indicate the reference category. I.e. The study findings indicated that adolescent girls and young women between the age of 20–24 years had testing rate of 71.3% or were 4.5 times likely to test for HIV compared to their younger counterparts/the younger adolescents aged 15-19 years. This has already been explained previously.
- In the below paragraph what was the testing rate at Korogocho/viwandani compared to KIbra? You only mention it was less...and what could be the possible explanation for this disparity given that they are both informal settlements?
"The study findings indicate that the testing prevalence for the participants in Kibra which is an informal settlement was 60.7%, the finding are not consistent with a study in Viwandani and Korogocho slums in Nairobi which showed that AGYW are less aware of their HIV status compared to those above 25 years16."

Conclusions:
The conclusions need to be matched with the findings of the study. This has been alluded to in the abstract section on how to go about it.

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and does the work have academic merit?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Partly

If applicable, is the statistical analysis and its interpretation appropriate?
Partly

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?
Partly

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Public Health and health systems management

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Reviewer Report 02 September 2024

https://doi.org/10.21956/openreseurope.19028.r43262

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?

Alfred Musekiwa
University of Pretoria, Pretoria, Gauteng, South Africa

Summary of article - The authors determined prevalence and determinants of HIV testing among AGYW in a sub-county in Kenya. Sufficient and up-to-date literature on the field has been cited, however the authors can include aspects of HIV self-testing among the study population, and also contextualise the study according to SDG's and Kenya's Ministry of Health priorities. Although appropriate statistical methods were used, such as logistic regression, the authors were not transparent enough to show sample size calculation parameters or assumptions. Importantly, the authors did not adjust their analyses for survey sampling. The findings have been properly presented, however the interpretation of odds ratios, in some instances, were incorrect. The Discussions and conclusions are congruent with the findings.

Below are the detailed comments, section by section;

ABSTRACT

Methods
1) Specify multivariable logistic regression model will be used to determine factors associated with HIV testing uptake
Results
The interpretation needs to be improved. The odds ratios should be interpreted in terms of the odds are x times higher in this group compared to that group. The interpretation in the abstract and manuscript is for risk ratios and not odds ratios.
Conclusions
The recommendations can be made more specific.

INTRODUCTION
Paragraph 3 - The language needs to be improved, for example do not use the word "don't". Also last sentence, age is not a risky sexual behaviour.
Paragraph 4, specify the years for these prevalences for the different countries.
Last paragraph, the authors may want to specify the risky sexual factors that the study analysed.
General comment: The authors may want to link the study with sustainable development goals (SDG's) and also the priorities of Kenya MOH.

METHODS
Study site and population:
The "multistage sampling technique" used has an implication on the analysis method - it requires the authors to adjust the analysis for complex survey sampling using survey weights.
Sample size determination:
More details are required on sample size calculation to enable a statistician to check if the calculation is correct.

Data analysis:
The analysis should have been adjusted for unequal sampling probabilities due to the complex survey design.

RESULTS
Testing service utilization: give units for the currency reported.
Bivariate analysis:
Table 2, it may benefit to add a column showing percent with outcome - to show these percent's for each category.
Multivariate analysis:
The interpretation "AGYW aged 20–24 years were 2.40 times more likely to undergo HIV testing (AOR: 2.40, 95% CI: 1.44, 4.02, p = 0.001)." is wrong, since the authors are interpreting an odds ratio as if it was a risk ratio; the authors can use the language of saying "The odds of HIV testing were 2.4 times higher...".
The comment above applies to the rest of the paragraph.
Also the authors need to indicate the total number in the final multivariable logistic regression model.
DISCUSSION
First sentence, see comment above regarding interpretation of odds ratios.
The authors may want to discuss how HIV self-testing can be promoted to increase uptake of HIV testing services among AGYW in Kenya.
When discussing marriage, the authors can also bring out how pre-marital HIV testing can also be used to promote HIV testing.
CONCLUSIONS
The statement "60.7% testing prevalence against a target of 95%, efforts to enhance testing rates are vital" is incorrect because the denominator for the first-95 of 95-95-95 is people living with HIV and not the general population like in this case. I suggest that the authors simply state that the percentage is low.

Is the work clearly and accurately presented and does it cite the current literature?
Yes

Is the study design appropriate and does the work have academic merit?
Yes

Are sufficient details of methods and analysis provided to allow replication by others?
Partly

If applicable, is the statistical analysis and its interpretation appropriate?
Partly

Are all the source data underlying the results available to ensure full reproducibility?
Yes

Are the conclusions drawn adequately supported by the results?

Yes

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Biostatistics, HIV/AIDS among adolescent girls and young women in Sub-Saharan Africa

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 10 Sep 2024

Onesmus Mutie

Alfred Musekiwa, University of Pretoria, Pretoria, Gauteng, South Africa Reviewer

Please take a look of the updated manuscript with tracked changes based on reviewers comments - https://s3-eu-west-1.amazonaws.com/openreseurope/linked/237947.Published_article_Reviewer_comments_addressed__onesr (17609 - Revised Manuscript as per Reviewer Alfred Musekiwa comments)

Summary of article - The authors determined prevalence and determinants of HIV testing among AGYW in a sub-county in Kenya. Sufficient and up-to-date literature on the field has been cited, however the authors can include aspects of HIV self-testing among the study population, and also contextualise the study according to SDG's and Kenya's Ministry of Health priorities. Although appropriate statistical methods were used, such as logistic regression, the authors were not transparent enough to show sample size calculation parameters or assumptions. Importantly, the authors did not adjust their analyses for survey sampling. The findings have been properly presented, however the interpretation of odds ratios, in some instances, were incorrect. The Discussions and conclusions are congruent with the findings.

Below are the detailed comments, section by section;
ABSTRACT

Methods
1) Specify multivariable logistic regression model will be used to determine factors associated with HIV testing uptake

a manual stepwise procedure was used to enter variables with p-values < 0.1 in the bivariate model analysis into the multivariate logistic regression model

Results
The interpretation needs to be improved. The odds ratios should be interpreted in terms of the odds are x times higher in this group compared to that group. The interpretation in the abstract and manuscript is for risk ratios and not odds ratios.

Response
The odds of undergoing HIV testing was higher for AGYW aged 20-24 years (aOR: 2.40, 95% CI: 1.44, 4.02, p = 0.001). Additionally, married AGYW exhibited significantly higher odds of getting tested, (aOR 11.04, 95% CI: 3.84, 46.75, p = 0.001). AGYW who did not use condoms in their last sexual encounter had a higher odds of opting for HIV testing (aOR: 4.27, 95% CI: 2.25, 8.30, p < 0.001). These findings highlight the substantial impact of age, marital status, and condom usage on HIV testing behaviors within this demographic group

Conclusions
The recommendations can be made more specific.
Response
Interventions should align with acceptable methods, focusing on this high-risk group to ensure effective HIV care and prevention. Consider integration of HIV services in various service delivery points, upscale the uptake of HIV self-testing for both oral and blood based, social support and protective measures for AGYW is crucial in HIV response.

INTRODUCTION
Paragraph 3 - The language needs to be improved, for example do not use the word "don't". Also last sentence, age is not a risky sexual behaviour.
Response
The word don’t has been reworded
Age removed as risky behavior since it is covered in the early sexual debut

Paragraph 4, specify the years for these prevalences for the different countries.
Years indicated

Last paragraph, the authors may want to specify the risky sexual factors that the study analysed.
Response
risky sexual behaviours such as early sexual debut, condom use, substance use, having multiple sexual partners, transactional sex, among others

General comment: The authors may want to link the study with sustainable development goals (SDG's) and also the priorities of Kenya MOH.
Response
The study will contribute to the body of knowledge regarding HIV testing services, add to the efforts to decrease HIV infections among the AGYW, contribute to interventions geared towards attainment of the 95-95-95 strategy to end HIV epidemic by 2030 and contribute towards attainment of SDG 3 target 3.3 which aims to fight communicable diseases.

METHODS
Study site and population:
The "multistage sampling technique" used has an implication on the analysis method - it requires the authors to adjust the analysis for complex survey sampling using survey weights.
Response:
The study used a four multistage sampling technique;

1. Using random numbers, 3 wards from the 5 were selected (Sarang'ombe, Laini saba and Lindi)
2. According to 2019 Census, the population of AGYW in Sarang'ombe ward is 5,741, Laini saba 2,870 and Lindi 3,565. This population is projected to grow at a rate of 2.2% per year which means that the current population will be (Sarang'ombe 6,263, Laini saba 3,131 and Lindi 3,889 giving a total population for the three wards as 13,283.
3. Proportions were used to allocate sample for each ward i.e Sarang'ombe ward 47% of 379 (179), Laini saba 24% of 379 (89) and Lindi 29% of 379 (111).
4. The study utilized the random walk sampling method whereby in each of the selected ward, a common meeting place, either a market, hospital or school was chosen as the starting point, with the help of a local guide, one route from the selected meeting point was chosen at random and the data collection proceeded along that route until the minimum sample size was reached. The first household along the route was skipped and the next household was assessed for presence of the population of interest. The data collector continued to skip one household in this manner until the minimum sample size was achieved. For households with more than one AGYW, use of random numbers written yes and no was used so that the one that picks yes was interviewed. Households without AGYW were skipped.

Sample size determination:
More details are required on sample size calculation to enable a statistician to check if the calculation is correct.
Response
Sample size was calculated using Cochran formula (1977) since the estimated population of AGYW in Kibra Sub County is above 10,000

$$n_0 = \frac{z^2\ pq}{e^2}$$

Where;
$\mathbf{n_0}$ - is the sample size;
$\mathbf{Z^2}$ = Is the standard normal deviate for alpha at 95% confidence level (1.96);
E = is the desired level of precision (0.05);
P = 56% proportion of AGYW ever tested for HIV and know their status in Kenya (Kenya Demographic Health Survey (KDHS 2022);
Q = is 1-p. (0.44);

The value for Z is found in statistical tables which contain the area under the normal curve. i.e. Z = 1.96 for 95 % level of confidence

$$nO = \frac{1.96^2 x 0.56 x 0.44}{0.05 x 0.05} = 378.6 \sim (379)$$

Data analysis:
The analysis should have been adjusted for unequal sampling probabilities due to the complex survey design.
Because the data collection tool was interviewer administered, there were no chances of non-response, this meant that there was no need of adjustment to cater for non-response.

RESULTS
Testing service utilization: give units for the currency reported.
Bivariate analysis:
Table 2, it may benefit to add a column showing percent with outcome - to show these percent's for each category.
Percentage added in the table

Multivariate analysis:
The interpretation "AGYW aged 20–24 years were 2.40 times more likely to undergo HIV testing (AOR: 2.40, 95% CI: 1.44, 4.02, p = 0.001)." is wrong, since the authors are interpreting an odds ratio as if it was a risk ratio; the authors can use the language of saying "The odds of HIV testing were 2.4 times higher...".
The comment above applies to the rest of the paragraph.
Also the authors need to indicate the total number in the final multivariable logistic regression model.
Response
Adjustment done to reflect suggested comments

DISCUSSION
First sentence, see comment above regarding interpretation of odds ratios.
The authors may want to discuss how HIV self-testing can be promoted to increase uptake of HIV testing services among AGYW in Kenya.
When discussing marriage, the authors can also bring out how pre-marital HIV testing can also be used to promote HIV testing.
CONCLUSIONS
The statement "60.7% testing prevalence against a target of 95%, efforts to enhance testing rates are vital" is incorrect because the denominator for the first-95 of 95-95-95 is people living with HIV and not the general population like in this case. I suggest that the authors simply state that the percentage is low.

Response
Adjusted accordingly

Competing Interests: No competing interests were disclosed.