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Exploring the prevalence and factors associated with self-reported HIV testing among women in Rwanda

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Abstract

Introduction: *despite various measures implemented to address the HIV pandemic in Rwanda, such as HIV counseling and testing (HCT), significant challenges remain. Many individuals continue to live with HIV without knowing their status, and there are considerable disparities in the uptake of HIV testing. According to UNAIDS, half of the 38 million people living with HIV have never been tested or diagnosed, presenting a substantial barrier to controlling the HIV epidemic. This study aims to explore the prevalence of self-reported HIV testing among women in Rwanda, as well as the socio-demographic, behavioral and barrier-related factors associated with it.* ***Methods:*** *a cross-sectional study design was utilized, analyzing data from 14,634 women aged 15-49 years from the Rwanda Demographic and Health Survey (RDHS). Descriptive statistics were employed to summarize socio-demographic characteristics and the prevalence of self-reported HIV testing. Multivariable logistic regression models were conducted to assess the associations between HIV testing and various socio-demographic factors, health behaviors and barriers to testing using Stata version 17.* ***Results:*** *the study found that the prevalence of self-reported HIV testing among women in Rwanda was 79.18%. Key socio-demographic factors such as age, educational attainment and urban residency were positively associated with higher testing rates. Women in higher age groups were 2.416 times more likely to report HIV testing and each additional level of education increased the likelihood of testing by 1.286 times. Risk behaviors, such as early sexual debut, were linked to an increased likelihood of testing (OR = 1.169), while condom use was associated with a decreased likelihood of testing (OR = 0.771). Barriers such as stigma, shame and embarrassment significantly impeded testing uptake. However, knowledge and use of HIV test kits substantially increased the likelihood of testing by 92.13% (OR = 1.428, 95% CI = 1.26-2.94), whereas feelings of shame reduced the likelihood of testing by 46.15% (OR = 0.538, 95% CI = 0.49-0.59).* ***Conclusion:*** *targeted interventions, including educational outreach, community engagement to reduce stigma and improved access to and awareness of HIV self-testing kits, are essential. Additionally, policy support to enhance healthcare infrastructure in underserved provinces is crucial to achieving the objectives of MDG 6, which aims to combat HIV/AIDS and other diseases.*

Introduction

The global HIV/AIDS epidemic remains a significant health challenge. Since its emergence in the early 1980s, HIV has claimed millions of lives worldwide. By the end of 2019, the World Health Organization (WHO) estimated that around 38 million peoples were living with HIV, with approximately 690,000 AIDS-related deaths that year [1]. Although there has been notable progress in treatment and prevention, HIV continues to be a major public health concern, especially among younger individuals aged 15-24, who account for over 40% of new infections, with approximately 7,000 new cases reported daily [2]. Africa carries a particularly heavy burden of this epidemic, with an estimated prevalence of 3.9% across its population [3,4].

Global initiatives to combat the epidemic focus on ambitious targets, such as the 90-90-90 and 95-95-95 goals, aimed at ensuring that 90% of people living with HIV know their status, 90% of those diagnosed receive antiretroviral therapy (ART), and 90% of those on ART achieve viral suppression [5]. By the end of 2019, 81% of people living with HIV were aware of their status, over 67% were receiving treatment, and nearly 59% had achieved viral suppression. Despite these efforts, 14% of people living with HIV globally remain unaware of their status, a figure that is lower in Rwanda, which stands at 5% [6].

In Rwanda, the HIV/AIDS epidemic has been a significant public health challenge since the late 1980s, exacerbated by the 1994 ***Genocide against the Tutsi***, which disrupted healthcare services.

Nevertheless, Rwanda has made significant strides in addressing HIV/AIDS through various government initiatives, including the provision of free ART and targeted prevention programs [7]. The Rwanda AIDS Indicator Survey (RAIS) indicates high levels of HIV testing and treatment, with 97.8% of adults tested for HIV, 97.5% enrolled in care, and 92% adhering to antiretrovirus (ART) [8]. Rwanda is also progressing toward achieving the UNAIDS 95-95-95 targets by 2030.

Despite the availability of free HIV testing services, uptake remains suboptimal, especially among rural women. The Rwanda Demographic and Health Survey (RDHS) 2019-20 shows that 84% of Rwandan women aged 15-49 have been tested for HIV, with higher rates among urban women (91%) compared to rural women (80%) [9]. Factors contributing to low testing rates include socio-cultural norms, stigma, fear of positive results, and a lack of awareness about the benefits of testing [10].

Objective and research questions

This study aims to explore the factors influencing HIV testing behaviors among women in Rwanda. The specific research questions guiding this investigation include: 1) what demographic factors affect the uptake of HIV testing among women in Rwanda? 2) How do socio-cultural norms and economic barriers impact HIV testing behaviors? 3) What role does access to healthcare services play in facilitating HIV testing among women, particularly in rural areas? Understanding these factors is essential for designing effective interventions to promote HIV testing among women in Rwanda, ultimately contributing to the broader efforts in combating the HIV/AIDS epidemic (Figure 1).

This is the conceptual framework based on the analytical framework documented in the Demographic and Health Survey (DHS). The conceptual framework comprises four variables: the dependent variable, self-reported HIV testing among women in Rwanda, and three categories of independent variables, sociodemographic factors, including age group, education level, etc., directly influence women's access to and attitudes to word HIV testing services. Risk behavioral factors such as early sexual debut, number of sexual partners, and condom use may affect testing decisions. Furthermore, barriers, include perceived stigma, knowledge and use of HIV test kits, etc. Understanding the complex interplay of these variables is essential for designing effective interventions to promote HIV testing in women in Rwanda.

Methods

Study design

This research performs a secondary cross-sectional analysis using data from the 2019-2020 Rwanda Demographic and Health Survey (RDHS) to assess the prevalence of self-reported HIV testing among women in Rwanda and identify the factors that influence it. The RDHS, a nationally representative survey, offers extensive data on various health indicators, including mortality, morbidity, family planning, fertility and maternal and child health.

Settings and participants

The study was conducted in Rwanda, a country known as the land of a thousand hills, located in East Africa and a member of the East African Community. Rwanda is divided into four provinces and Kigali City, with its borders shared with Uganda to the North, Burundi to the South, Tanzania to the East, and the Democratic Republic of Congo to the West. The country has a life expectancy of 69 years, and 39% of its population is youth. Rwanda's health development strategy emphasizes decentralized management and district-level service delivery [11]. The RDHS used a two-stage sampling design: first, clusters consisting of enumeration areas were selected, followed by systematic sampling of households within these areas. This approach resulted in a total sample of 14,634 women. Data collection took place from November 2019 to July 2020,

targeting eligible women aged 15-49 years, including permanent residents and visitors who spent the night before the survey in the household.

Variable measurement

The dependent variable in this study was the self-reported HIV testing status, defined as whether the respondent had ever been tested for HIV. This binary outcome was coded as "yes" or "no" and was derived from data collected in the HIV/AIDS section of the questionnaire administered to individual women. Independent variables included several sociodemographic characteristics, such as age group (15-24, 25-34, 35 and above), place of residence (rural or urban), province (Kigali, South, North, West, East) and education level (no education, primary, secondary, more than secondary). Risk behavior factors were also considered, including early sexual debut (yes or no), the number of sexual partners (a continuous variable), and condom use during at least one sexual encounter in the past 12 months (yes or no). Additionally, barriers to HIV testing were examined, such as perceived stigma and discrimination (yes or no) and knowledge and use of HIV test kits (never heard of, has tested, knows HIV test kits). Discriminatory attitudes towards HIV were assessed by responses to specific questions: a "no" response to whether they would buy vegetables from a vendor with HIV, and a "yes" response to whether people hesitate to take HIV tests due to fear of others' reactions if positive, and whether they would feel ashamed if someone in their family had HIV.

Data analysis

Descriptive analysis: descriptive statistics were employed to summarize participant characteristics, with categorical variables expressed as frequencies and percentages, including 95% confidence intervals. These statistics were used to determine the distribution of sociodemographic and other relevant variables within the study population.

Inferential analysis: to assess factors associated with HIV testing among women in Rwanda, we employed logistic regression models. The logistic regression model is appropriate for predicting binary outcomes based on a set of independent variables.

Logistic regression models

We specified three logistic regression models to investigate the associations between socio-demographic factors, behavioral variables, barriers to testing, and self-reported HIV testing among women in Rwanda:

Model 1: sociodemographic factors: Logit (P(Y=1)) = β_0+ β_1(age) + β_2(educational level) + β_3(residence) + β_4(province) + ε_tDependent Variable: Self-reported HIV testing (1 = tested, 0 = not tested). Independent variables: age, educational level, residence (urban/rural), province (Kigali, South, West, East, North).

Model 2: sexual behavior factors: P(y=1) = β_0+ β_1(Age) + β_2(number of sexual partners) + β_3(condom use) + $\beta_?$. This model examines behavioral factors influencing HIV testing likelihood, including: age, number of sexual partners, condom use.

Model 3: barriers to HIV testing: P(y=1) = β_0+ β_1(stigma) + β_2(shame) + β_3(HIV test kits access) + β_4(knowledge of HIV testing facilities) + ε_t.

All statistical analyses were conducted using Stata 17 software. The level of significance was set at 0.05, and all tests were two-tailed. The results are reported as odds ratios (OR) with 95% confidence intervals (CI), allowing for the interpretation of the strength and direction of associations between sociodemographic factors, barriers and HIV testing uptake. Variables with p-values < 0.05 were considered statistically significant.

Results

Demographic characteristics of participants

The analysis of demographic characteristics (Table 1) shows that among the 8,481 surveyed women, the largest age group is 15-19 years (22.6%), whereas the smallest is 45-49 years (8.4%). A significant majority (75.73%) of participants reside in rural areas, compared to 24.27% in urban locations, with a Pearson Chi-square value of 34.9. Regarding educational attainment, 22.94% of women have incomplete primary education, and 37.22% have completed primary education, while those with a higher education degree demonstrate a strong association with HIV testing.

Sexual behavior and HIV testing

The data in Table 2, analyzing 8,481 women, reveals that 89.22% did not use a condom with their most recent partner, showing a near-significant relationship with HIV testing ($p = 0.064$). The majority of women (57.84%) had their first sexual experience between ages 15-19, while only 0.21% reported initiating sexual activity between 36-49 years. However, early sexual debut demonstrated a weak association with HIV testing behavior. Regarding the number of sexual partners, 87.75% of women reported having no sexual partners, while those with at least one partner demonstrated a moderate association with HIV testing (Pearson Chi-square = 90.4).

Knowledge and perception of HIV testing

Findings from Table 3 deals with awareness of HIV testing methods and societal attitudes toward HIV significantly influence testing uptake. Among respondents, 87.75% stated they would buy vegetables from vendors with HIV, though this variable showed minimal association with actual testing behaviors (Chi-square = 26.1). A considerable 97.44% of participants knew a place to get tested, while 87.75% affirmed that they would buy food from a vendor with HIV. Furthermore, 82.14% of respondents reported never having heard of HIV test kits, a factor significantly associated with lower rates of HIV testing (Chi-square = 203.8). Perceived stigma and discrimination also affected HIV testing behaviors. While a majority of respondents believed they would not discriminate against people with HIV (87.75%), the stigma associated with purchasing goods from an HIV-positive vendor was only weakly related to actual HIV testing behavior.

Age and HIV testing

Table 4 represents the age of a significant determinant of HIV testing. Compared to individuals aged 15-19, those aged 20-24 were 110.13% more likely to have been tested (Odds ratio = 2.101, 95% CI: 6.850 - 2.101). The likelihood of testing increased for women aged 30-34, who were 112.37% more likely to have been tested (Odds ratio = 2.124, 95% CI: 1.671-2.698). In contrast, women aged 30-34 years were the most likely to undergo testing, with an odds ratio of 4.635 (95% CI: 4.978-6.850). In contrast, women aged 40-44 and 45-49 were 32.39% and 36.99% more likely to have been tested compared to the baseline age group, both with significant p-values ($p < 0.001$).

Educational attainment and HIV testing

Table 5 represents a higher education level were strongly correlated with higher HIV testing rates. Women with incomplete primary education were 22.94% more likely to have been tested (Odds ratio = 1.229, 95% CI: 0.984-1.537, $p = 0.069$). Those with complete primary education were 37.22% more likely to have been tested (Odds ratio = 1.372, 95% CI: 1.602 - 3.559), whereas women with complete secondary education had a significantly higher probability of testing (Odds ratio = 2.124, 95% CI: 1.671-2.698). Those with complete tertiary education had an even stronger association with HIV testing (Odds ratio = 3.558, 95% CI: 2.563 - 4.939, $p < 0.001$).

Place of residence and regional variations

Table 6 represents the place of residence that had a statistically significant impact on HIV testing. Women living in rural areas were 32.39% less likely to have been tested compared to those residing in urban regions (Odds ratio = 0.825, 95% CI: 0.718-0.947, p = 0.006). Regional disparities were also evident, with women in the West (Odds ratio = 0.621, 95% CI: 0.555 - 0.852, p < 0.001) and the South (Odds ratio = 0.807, 95% CI: 0.661 - 0.985, p = 0.035) being significantly less likely to have been tested compared to women in Kigali. In contrast, women in the North and East showed no significant differences compared to Kigali.

Risk behaviors and HIV testing

The influence of risk behaviors on self-reported HIV testing. Condom use is associated with a positive but non-significant increase in testing likelihood (Odds ratio = 1.339, 95% CI: 0.983-1.825, p = 0.064). Early sexual debut strongly predicts HIV testing, with individuals who initiated sexual activity before age 15 being 676.27% more likely to have been tested (Odds ratio = 7.763, 95% CI: 5.279-9.597). Those initiating between 16-24 years were also significantly more likely to have been tested (Odds ratio = 1.742, 95% CI: 3.139-6.850). The number of sexual partners is another factor influencing testing. Individuals with only one partner were 45.72% less likely to have been tested (Odds ratio = 0.543, 95% CI: 0.429-0.686), while those with multiple partners showed varied but largely non-significant associations with testing.

Barriers to HIV testing

The highlights key barriers to HIV testing. A significant proportion (82.14%) of women were unaware of HIV test kits, strongly influencing testing rates (Chi-square = 203.8). Stigma remains a challenge, with 82.81% believing that fear of societal reactions deters testing, though this factor showed a weaker association with testing behavior (Chi-square = 26.1). Additionally, discrimination against people living with HIV was low, as 87.75% of respondents reported they would buy food from an HIV-positive vendor, though this had minimal association with testing (Chi-square = 1.1).

Ethical consideration

Authorization to use the DHS data was requested via the DHS Program website, and all relevant rules and regulations for accessing and utilizing the data were strictly adhered to (NISR, 2020).

Discussion

Patterns in HIV testing behaviors

Our research findings reveal several significant patterns in HIV testing behaviors across different demographics, comparing them with other studies to highlight similarities and differences.

Age and HIV testing

Firstly, age plays a crucial role in the likelihood of HIV testing. Women aged 30-34 are 49.63 times more likely to undergo testing compared to other age groups, with a 95% confidence interval ranging from 53.37 to 90.55. This aligns with other research indicating that older individuals in sub-Saharan Africa are more likely to test for HIV, likely due to heightened perceptions of risk in this age group [12].

Education as a factor

Education also influences testing behaviors. Our study found that women with incomplete secondary education are 2.12 times more likely to test for HIV, with a 95% confidence interval of 1.67 to 2.70. This is consistent with global trends where higher education levels are associated with an increased likelihood of HIV testing, as supported by findings from [13].

Impact of residency

Residency has a notable impact on testing likelihood as well. Rural residents are 0.82 times less likely to test compared to their urban counterparts, with a 95% confidence interval of 0.72 to 0.95. This finding reflects the rural-urban disparities observed in Kenya and the US [14,15], which underscore significant barriers faced by rural residents in accessing HIV testing services.

Early sexual debut and testing

The timing of sexual debut also correlates with testing behaviors. Our results show that an early sexual debut increases the likelihood of HIV testing, with an odds ratio of 7.76 and a 95% confidence interval from 6.28 to 9.60. This finding is supported by similar results from Tanzania, where early sexual debut is associated with higher rates of testing [16].

Condom use and its implications

Interestingly, condom use appears to be inversely related to testing likelihood. Our research indicates that condom use reduces the likelihood of testing by 23%, with an odds ratio of 0.77 (95% CI: 0.43-1.23). This is consistent with other studies suggesting that perceived lower risk due to condom use can lead to reduced testing rates [17].

Barriers to testing: stigma and shame

Barriers such as stigma and shame significantly affect testing rates. Our study found that feelings of shame reduce the likelihood of testing by 46.15%, with an odds ratio of 0.54 and a 95% confidence interval of 0.49 to 0.59. This is in line with research from Ethiopia, which also emphasizes stigma and shame as major deterrents to testing [18].

Knowledge of HIV test kits

Knowledge of HIV test kits greatly influences testing behaviors. Our findings indicate that knowledge and use of test kits increase the likelihood of testing by 92.13%, with an odds ratio of 1.92 and a 95% confidence interval of 1.26 to 2.94. This is supported by previous studies, highlighting that increased awareness of test kits boosts testing rates [19].

Awareness versus accessibility

Lastly, despite high awareness of testing locations, knowledge gaps persist. In our study, 2.56% of women were unaware of where to access testing services. This finding is consistent with other research, such as a study in Japan, which also identifies barriers despite high levels of awareness [20].

Political implications

The findings of this study have significant political implications for policymakers in Rwanda. Understanding the sociodemographic factors influencing HIV testing can inform targeted interventions and resource allocation. Policymakers should focus on improving access to testing services in rural areas and enhancing educational initiatives that promote HIV testing awareness, particularly among younger populations. Additionally, addressing the stigma and shame surrounding HIV testing through public health campaigns can further increase-testing rates and support the national goals for HIV prevention and treatment.

Conclusion

In conclusion, our study highlights the significant role of demographic characteristics, sexual behavior and sociocultural factors in influencing HIV testing among women in Rwanda. While there is a high prevalence of self-reported HIV testing, disparities persist based on education level, place of residence, and societal attitudes towards stigma and discrimination. Addressing these barriers through targeted interventions, including awareness campaigns, stigma reduction programs and improved access to testing services, is crucial. Further qualitative research is necessary to gain

deeper insights into the underlying factors affecting HIV testing behavior and to develop evidence-based policies that support increased testing rates. Additionally, strengthening healthcare infrastructure, particularly in underserved regions, is essential for achieving national and global HIV prevention and treatment goals. Efforts to enhance community awareness, integrate HIV testing into routine healthcare services and combat stigma should be prioritized. Addressing social determinants such as education and regional disparities can further improve access and encourage more women to undergo HIV testing. Strengthening policy support and healthcare infrastructure, particularly in rural and underserved areas, will be critical in achieving universal health coverage and meeting global HIV/AIDS targets.

What is known about this topic

- *Despite efforts like HIV counselling and testing (HCT), many individuals remain unaware of their HIV status, with UNAIDS reporting that half of the 38 million people living with HIV have never been tested or diagnosed;*
- *Previous studies have shown that factors like age, education and urban residency are positively associated with higher HIV testing rates, while barriers such as stigma, shame and lack of knowledge can deter testing.*

What this study adds

- *This study reveals that 79.18% of women in Rwanda aged 15-49 years have self-reported HIV testing, with key factors such as age, education and urban residency being significant predictors of higher testing rates;*
- *The study finds that knowledge and use of HIV self-test kits increases the likelihood of testing by over 90%, while stigma and feelings of shame significantly reduce the likelihood of testing, highlighting the need for targeted interventions to address these barriers.*

Competing interests

The authors declare no competing interests.

Authors' contributions

Roger Muremyi contributed to conceptualization, methodology, formal analysis, and writing (original draft, review, and editing); Gasafari Mpabuka Willy was involved in methodology, and writing (review and editing); Jennifer Batamuliza contributed resources, visualization and writing (review and editing); Ndikubwimana Jean Baptiste contributed in writing (review and editing). All authors read and approved the final manuscript.

Tables and figure

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Table 2: sexual behavior characteristics of respondents and associated chi-square test results (n = 14,634)

Table 3: risk behavior factor and self-reported HIV testing among participants, (RDHS, 2020)

Table 4: association between self-reported HIV testing and socio-demographic factors of the study participants, (RDHS, 2020)

Table 5: association between self-reported HIV testing and risk behaviors from the study participants

Table 6: association between self-reported HIV testing and barriers to HIV testing from the study participants

Figure 1: conceptual framework of the study

References

1. World Health Organization. HIV and AIDS. Geneva, WHO. 2019. Accessed on November 14, 2024.
2. UNAIDS. Global HIV & AIDS statistics - Fact sheet. 2020. UNAIDS. Accessed on November 14, 2024.
3. UN. Joint United Nations Programme on HIV/AIDS (UNAIDS). 2019. UN. Accessed on November 14, 2024.
4. UNAIDS. 2017 Global AIDS update - Ending AIDS: progress towards the 90-90-90 targets. 2017. UNAIDS. Accessed on November 14, 2024.
5. UNAIDS. 2020 Global AIDS Update - Seizing the moment - Tackling entrenched inequalities to end epidemics. 2020. UNAIDS. Accessed on November 14, 2024.
6. Ministry of Health, Rwanda. Rwanda AIDS Indicator Survey (RAIS) Report. 2020. Kigali: Ministry of Health, Rwanda. Accessed on November 14, 2024.
7. Pierre G, Umutoni A, Dzinamarira T. A qualitative study on oral-fluid-based HIV self-testing experiences among men in Kigali, Rwanda. Pan Afr Med J. 2020 Oct 8;37: 138. **PubMed**| **Google Scholar**
8. Bassett IV, Govindasamy D, Erlwanger AS, Hyle EP, Kranzer K, van Schaik N *et al*. Mobile HIV screening in Cape Town, South Africa: clinical impact, cost and cost-effectiveness. PLoS One. 2014 Jan 22;9(1): e85197. **PubMed**| **Google Scholar**
9. Wachinger J, Kibuuka Musoke D, Oldenburg CE, Bärnighausen T, Ortblad KF, McMahon SA. "But I Gathered My Courage": HIV Self-Testing as a Pathway of Empowerment Among Ugandan Female Sex Workers. Qual Health Res. 2021 Feb;31(3): 443-457. **PubMed**| **Google Scholar**
10. Sabo KG, Seifu BL, Kase BF, Asebe HA, Asmare ZA, Asgedom YS *et al*. Factors influencing HIV testing uptake in Sub-Saharan Africa: a comprehensive multi-level analysis using demographic and health survey data (2015-2022). BMC Infect Dis. 2024 Aug 13;24(1): 821. **PubMed**| **Google Scholar**
11. Tran L, Tran P, Tran L. Influence of Rurality on HIV Testing Practices Across the United States, 2012-2017. AIDS Behav. 2020 Feb;24(2): 404-417. **PubMed**| **Google Scholar**
12. Wang Y, Kinsler JJ, Kiwuwa-Muyingo S. Factors associated with HIV testing among youth in Tanzania based on the 2016-2017 Tanzania HIV Impact Survey (THIS). PLOS Glob Public Health. 2022;2(11): e0000536. **PubMed**| **Google Scholar**
13. Teffo ME, Mokgatle MM. Assessing Condom Use and Views on HIV Counselling and Testing among TVET College Students in Limpopo Province, South Africa. Int J Environ Res Public Health. 2023 Jun 3;20(11): 6044. **PubMed**| **Google Scholar**
14. Bogart LM, Kgotlaetsile K, Phaladze N, Mosepele M. HIV self-testing may overcome stigma and other barriers to HIV testing among higher-socioeconomic status men in Botswana: A qualitative study. Afr J AIDS Res. 2021 Dec;20(4): 297-306. **PubMed**| **Google Scholar**

15. Mukashyaka R, Kaberuka G, Favina A, Lutasingwa D, Mulisa F, Turatsinze E *et al*. Enhancing HIV self-testing uptake among university students in Rwanda: the proportion, barriers, and opportunities. BMC Public Health. 2025 Mar 28;25(1): 1173. **PubMed**| **Google Scholar**
16. Lammers J, van Wijnbergen SJ, Willebrands D. Condom use, risk perception, and HIV knowledge: a comparison across sexes in Nigeria. HIV AIDS (Auckl). 2013 Oct 21;5: 283-93. **PubMed**| **Google Scholar**
17. Shfare MT, Wasihun AG, Kidane KM, Gebremeskel TK, Mahmud MA, Degene TA. The wartime prevalence of HIV, HBV, and reported STI-related syndromes among tested individuals in Ayder Comprehensive Specialized Hospital, Tigray, Ethiopia. BMC Infect Dis. 2025 May 24;25(1): 743. **PubMed**| **Google Scholar**
18. Akweh TY, Adoku E, Mbiba F, Teyko F, Brinsley TY, Boakye BA Jr *et al*. Prevalence and factors associated with knowledge of HIV Self-Test kit and HIV-Self Testing among Ghanaian women: multi-level analyses using the 2022 Ghana demographic and health survey. BMC Public Health. 2025 Mar 27;25(1): 1161. **PubMed**| **Google Scholar**
19. Nshimirimana C, Vuylsteke B, Smekens T, Benova L. HIV testing uptake and determinants among adolescents and young people in Burundi: a cross-sectional analysis of the Demographic and Health Survey 2016-2017. BMJ Open. 2022 Oct 13;12(10): e064052. **PubMed**| **Google Scholar**

Table 1: socio-demographic characteristics of respondents and associated chi-square test results (n = 14,634)			
Variables	**Frequency**	**Percentage (%)**	**Pearson Chi-square**
Age (year groups)			$\chi^2 = 4.9$
1519	3,308	22.6	
20–24	2,424	16.56	
25–29	2,047	13.99	
30–34	2,095	14.32	
35–39	2,043	13.96	
40–44	1,487	10.16	
45–49	1,230	8.41	
Region			$\chi^2 = 47.2$
Kigali	1,921	13.13	
South	3,482	23.79	
West	3,312	22.63	
North	2,294	15.68	
East	3,625	24.77	
Type of residence			$\chi^2 = 34.9$
Urban	3,551	24.27	
Rural	11,083	75.73	
Educational level			$\chi^2 = 606.14$
No education	1,352	9.24	
Incomplete primary	5,265	35.98	
Complete primary	3,235	22.11	
Incomplete secondary	3,026	20.68	
Complete secondary	1,084	7.41	
Higher	672	4.59	

Table 2: sexual behavior characteristics of respondents and associated chi-square test results (n = 14,634)			
Variables	**Frequency**	**Percentage (%)**	**Pearson chi-square**
Condom use during last sex with most recent partners (n = 8,481)			$\chi^2 = 615.8$
No	7,567	89.22	
Yes	914	10.77	
Early Sexual Debut (n = 14,634)			$\chi^2 = 4.8$
< 10 Years	4,142	28.3	
11 – 15 Years	765	5.23	
16 – 24 Years	8,464	57.84	
25 – 35 Years	1,233	8.43	
36 – 49 Years	30	0.21	
Number of sexual partners (n = 14,634)			$\chi^2 = 90.4$
No Partner	13,348	91.21	
1 Partner	1,162	7.94	
2 Partners	99	0.68	
3 Partners	6	0.04	
4+ Partners	14	0.1	
Other	3	0.02	
Don’ t Know	2	0.01	

Table 3: risk behavior factors and self-reported HIV testing among participants (RDHS, 2020, n = 14,634)			
Variables	**Frequency**	**Percentage (%)**	**Pearson chi-square**
Knowledge and use of HIV test kits (n = 14,634)			$\chi^2 = 203.8$
Never heard of HIV test kits	12,020	82.14	
Has tested with HIV test kits	200	1.37	
Knows test kits but never tested	2,414	16.5	
Stigma (people hesitate to take HIV test due to others' reactions) (n = 14,634)			$\chi^2 = 26.1$
No	2,409	16.46	
Yes	12,119	82.81	
Don't know/not sure/depends	106	0.72	
Embarrassing (people talk badly about those with or believed to have HIV)			$\chi^2 = 76.6$
No	7,404	50.59	
Yes	7,100	48.52	
Discrimination (would buy vegetables from vendors with HIV?) (n = 14,634)			$\chi^2 = 1.5$
No	1,762	12.04	
Yes	12,841	87.75	
Don't know	31	0.21	
Ashamed (n = 14,634)			$\chi^2 = 437.6$
Disagree	10,804	73.83	
Agree	3,787	25.88	
Don't know/not sure/depends	43	0.29	
Know the place to get an HIV test (n = 14,634)			$\chi^2 = 1.5$
No	375	2.56	
Yes	14,259	97.44	

Table 4: association between self-reported HIV testing and socio-demographic factors of study participants (RDHS, 2020)					
Variable	**Odds ratio**	**Std. Err.**	**Z**	**p > z**	**95% confidence interval**
Age group (Ref: 20–24)					
15–19	2.101	0.4684	29.72	0	[6.240, 8.081]
25–29	1.583	3.2064	32.62	0	[1.602, 3.559]
30–34	4.635	5.9782	32.42	0	[4.978, 6.850]
35–39	0.52	9.3762	31.45	0	[0.371, 1.555]
40–44	2.94	4.5197	29.5	0	[2.064, 4.951]
45–49	1.37	2.5184	27.6	0	[1.041, 2.893]
Educational level (Ref: incomplete primary)					
Complete primary	1.372	0.1621	2.68	0.007	[1.089, 1.730]
Incomplete secondary	2.124	0.2596	6.16	0	[1.671, 2.698]
Complete secondary	3.558	0.5955	7.58	0	[2.563, 4.939]
Higher	1.624	0.3201	2.46	0.014	[1.103, 2.389]
Place of residence (Ref: urban)					
Rural	0.825	0.0584	-2.72	0.006	[0.718, 0.947]
Province (Ref: Kigali)					
South	0.807	0.0822	-2.22	0.035	[0.661, 0.985]
West	0.676	0.0683	-3.87	0	[0.555, 0.824]
North	0.983	0.1071	-0.15	0.877	[0.794, 1.217]
East	0.928	0.0945	-0.73	0.463	[0.760, 1.133]
Constant	0.469	0.0667	-5.32	0	[0.355, 0.620]

Table 5: association between self-reported HIV testing and risk behaviors from the study participants						
Self-reported HIV testing	**Odds Ratio**	**Std. Err.**	**Z**	**P>Z**	**[95% conf. Interval]**	
Condom use						
Yes	1.339091	0.2114041	1.85	0.064	0.9827202	1.824696
(Base level) : No						
Early sexual debut						
<15 (base level)	7.762758	0.8400236	18.94	0	6.279222	9.596796
16-24	3.74205	1.406987	53.45	0	3.13853	6.66623
25-35	1.61914	6.828683	22.72	0	0.710179	4.57465
36-49	1.26944	7.4872	4.11	0	1.019144	2.57465
Number of sexual partners						
1 (base level)	0.5428345	0.0649191	-5.11	0	0.4294078	0.6862225
2	0.6209147	0.2175473	-1.36	0.174	0.3124641	1.233854
3	0.3002706	0.3354802	-1.08	0.282	0.0336124	2.682415
4	1.346315	1.419729	0.28	0.778	0.1704233	10.63566
-cons	0.7334648	0.0230694	-9.86	0	0.6896151	0.7801027

Table 6: association between self-reported HIV testing and barriers to HIV testing from the study participants						
Self-reported HIV testing	**Odds ratio**	**Std. Err.**	**Z**	**P>Z**	**[95% Conf. Interval]**	
Ashamed						
Agree	0.5385041	0.0264683	-12.59	0.001	0.4890476	0.592962
Don't know/not sure/depends	0.2814585	0.810667	-4.40	<0.001	0.1600473	0.49497
Disagree (base level)						
Discrimination						
Yes	1.865012	0.1137642	10.22	< 0.0001	1.654852	2.10186
Don' t know	0.8838817	0.3433935	-0.32	0.751	0.4127594	1.89274
Baseline (base level)						
Stigma						
Yes	1.437916	0.0854774	6.11	0.000	1.279775	1.615592
Don' t know/not sure/depends	1.046114	0.2596205	0.18	0.856	0.6431776	1.701466
(Base level) No						
Embarrassing						
Yes	0.83401	0.0398186	-3.80	0.002	0.7595072	0.9158214
Don' t know/not sure	0.5458342	0.1102755	-3.00	0.003	0.3673597	0.81101
(Base level) No						
Knowledge and use of HIV Skits						
Has tested with HIV test kits	1.921262	0.4169937	3.01	0.003	1.255569	2.93990
Knows test kits but never tested	1.83834	0.1262917	8.81	0.000	1.602285	2.09884
-cons	2.297956	0.176022	10.86	0.000	1.977608	2.67019

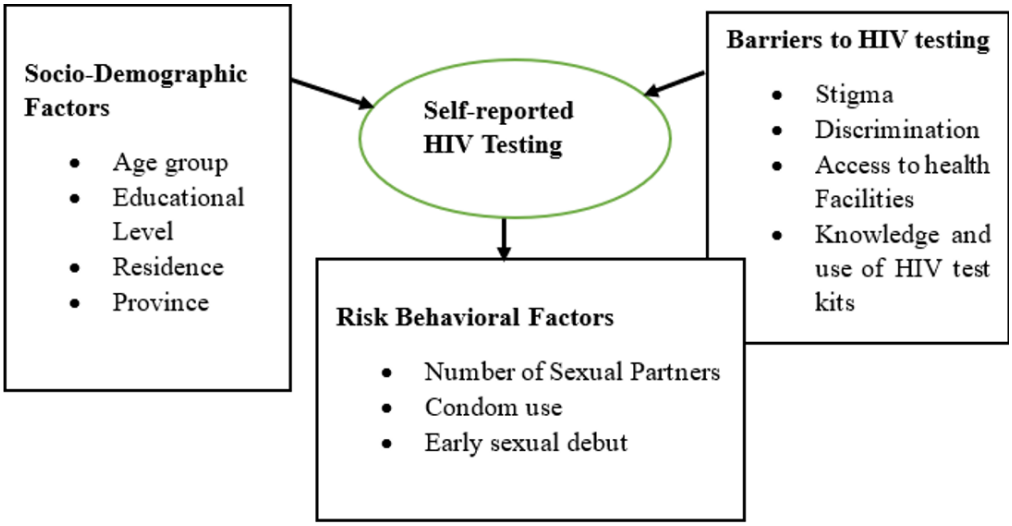

Figure 1: conceptual framework of the study