



**UNIVERSITY of
RWANDA**

**FACTORS ASSOCIATED WITH NON-TESTING FOR HIV AMONG
THE SEXUAL ACTIVE POPULATION FROM RWANDA AIDS
INDICATOR AND HIV INCIDENCE SURVEY RESPONDENTS IN 2013-
2014, RWANDA.**

A dissertation submitted to the University of Rwanda in partial fulfillment of the requirements
of the degree of Master of Field Epidemiology and Laboratory Management.

by

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DECLARATION

I, Hosee NIYOMPANO, hereby, declare that the work presented in this dissertation has been carried out by me, and has not been previously submitted to any other university/college/ organization for academic qualification/certificate/ diploma or degree.

This work presented does not breach any copyright

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ABSTRACT

Background: There is a great number of people living with HIV and without knowing their HIV status; this is a big barrier to controlling HIV/AIDS epidemic. UNAIDS globally estimation was a half of 35 million of people living with HIV do not ever tested for HIV and diagnosed. This study was conducted with the general objective of to determine the prevalence and factors associated with non-testing for HIV among the sexual active population from RAIHIS.

Methods: This is a secondary data analysis conducted from the current RAIHIS. This study included 1846 sexual active participants aged 15 – 56 years. A univariate analysis and logistic regression model was done to determine the factors associated with non-testing for HIV using STATA 13.2 version.

Results: The prevalence of non-testing for HIV was 17.37%. Non-testing for HIV was found to be significantly associated with the young age group (15 - 30) years [adjusted odds ratio (aOR): 2.57, confidence interval (CI): 1.49 - 4.43, P. value (*p*): 0.001], male (aOR: 2.44, CI: 1.77 - 3.36, *p*: <0.001), the primary educational level (aOR: 2.17, CI: 1.41 - 3.34, *p*: <0.001), non-working as civil servant (aOR: 9.15, CI: 10.72 - 220.59, *p*: <0.001), non-using a condom with casual sex partners (aOR: 1.44, CI: 1.06 - 1.96, *p*: 0.019), buying condom is embarrassing (aOR: 1.43, CI: 1.00 - 2.03, *p*: 0.046), not know the place where to buy a condom (aOR: 1.66, CI: 1.09 - 2.52, *p*: 0.017) and unknowing where people can get HIV tested (aOR: 48.63, CI: 1.22 - 68.55, *p*: 0.031).

Conclusion: Findings from this study show that 17.37% were not tested for HIV. Further, non-testing was statistical significantly associated with age, gender, education level, civil servant, condom use with casual sex partners, not know the place where to buy a condom and knowing the place where people can get an HIV test. We suggest to increase awareness of HIV testing among youth under 30 years, male, people with primary education and non-civil servants.

Keywords: Non-testing, HIV test, risk factors, prevalence, Rwanda.

DEDICATION

To my creator the Almighty God,

To my parents and whole family who worked hard to make my education possible and successful,

To my friends who have been closer to me. Your contribution is valuable and unforgettable.

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ABBREVIATIONS AND ACRONYMS

aOR:	Adjusted Odds Ratio
CDC:	Centre for Disease Control and Prevention
CI:	Confidence interval
cOR:	Cruds Odds Ratio
ELISA:	Enzyme Linked Immuno Sorbent Assay
FLTP:	Field Epidemiology and Laboratory Training Program
HIV/AIDS:	Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome
MOH:	Ministry of Health
PLWHA:	People Living With HIV/AIDS
RAIHIS:	Rwanda AIDS Indicators and HIV Incidence Survey
RBC:	Rwanda Biomedical Center
RDS:	Respondent Driven Sampling
STATA:	Statistical Software Package
VCT:	Voluntary Counselling and Testing
ZSBS:	Zambia Sexual Behaviour Survey

I. INTRODUCTION

I.1. Background

As the HIV testing is the key of AIDS/HIV epidemic control and HIV is still a big problem in Rwanda due to its incidence rate of 0.27%. In order to achieve the UNAIDS target (90-90-90) which means that the 90% of people living with HIV should aware their HIV status, 90% of those who know the HIV status introduced to the treatment and 90% of those who introduced to the treatment should suppressed their viral loads; Rwanda has introduced an HIV self-testing in November 2017 for the first 90. Despite of all the efforts, we still had a great number of people have never tested to HIV include 24% of men and 16% of women. This study sought to determine the prevalence and factors associated with not being tested for HIV among the sexual active population from Rwanda AIDS Indicators and HIV Incidence Survey participants (1).

Among people living with HIV, the great number does not know their HIV status this becomes a big barrier in HIV/AIDS epidemic control because they have not been tested for HIV/AIDS in order to know their status on disease (2). In United States, it is estimated that one over seven means that more than 168,000 were unaware of their HIV status But UNAIDS Globally estimation was a half of 35 million of people living with HIV didn't ever tested for HIV and diagnosed (2). Globally, there are estimation of 37 million of people living with HIV after 30 years into a combined epidemic of HIV/AIDS, including 3.7 million of children (3,4). The highest prevalence of HIV/AIDS located in sub-Saharan with an estimation of 5.7 million (3). Worldwide HIV is transmitted mainly through heterosexual sex and more than 2 million of those infected are men aged 15 years and older (5,6). Also the prevalence of HIV is advanced among women compared to men (4). Annually the 90% (300,000/400,000) HIV infected children are due to mother to child HIV transmission (4). Form the previous studies, men are more likely to transmit an HIV to women with two to three times than the women are to men. This could also be attributable to HIV virus concentrations and other sexually transmitted infections (3,7).

A regular study review done in Indonesia, Thailand and Vietnam established that women are mainly at like, with the following estimated prevalence of HIV 26.1%, 12.2% and 6.7%, respectively(8,9). Above 80% of adults with HIV infection are lived in sub- Saharan Africa, the

area where HIV epidemic continue to be spread. Globally, Ethiopia is the third country with the large number of PLWHA, and becomes on sixteen position based on prevalence. Though Ethiopia is the most country among many countries from East Africa where the Ministry of Health estimates the prevalence among the adults of 23.4% from the Bahir Dar population, 19% from the Jijiga population and 18.7% from Nazret population in 2003 (10,11).

The ZSBS in 2005 indicated that women (15 %) and men (11 %) have ever been tested for HIV. This findings of low level of testing for HIV are in strong indicated that this population want to be tested for HIV or tested again. The following are the reason why some peoples choose not being tested for HIV when they asked, common replies were fear of results (75%), being fear of HIV-stigma and perception (34%) and belief that they aren't at the risk (17%) (12).

I.2. Problem statement

Unknowing the HIV status among people living with HIV, is big barrier in HIV epidemic control worldwide (13). There is needed to found out the factors that can contribute to not-testing for HIV.

The national survey in Brazil (n = 11,052; age 15 – 64 years) revealed that the females (55.3%) and the males (72.7%) had never been tested for HIV. The 53% of women routinely tested during the prenatal care while 53% of men said they impulsively sought testing (13).

In Canada, women and men show many different reasons for HIV testing. The majority among the patient initiated testing were comes from the MSM, in poor populations and those who living in big urban centers. The more likely to pursue HIV test were windowed women, separated and single (13). Some studies have also found the association between HIV testing at individual and contextual levels. A study conducted in Los Angeles with men and women, they found rates of HIV testing among these who reported not using a condom regularly and those who had more than one sexual partner while the gender was not associated (14).

Now the health providers still focus on identifying the new strategies for global HIV epidemic elimination. Globally, estimation of 20 million of people have died due to HIV/AIDS since 1981 where HIV was firstly diagnosed and 40 million people living with HIV. HIV test becomes a Testing for HIV has become a critical component of HIV/AIDS prevention strategies due to the

fact that an alarming number of the people afflicted with HIV remain unaware of their infection (15).

The fairly recent development of rapid HIV testing is transforming the HIV screening process, enabling low-resource countries to test more people without the use of a laboratory or expensive equipment. Due to lower costs and faster results, the use of rapid testing is especially practical for testing within mobile clinics and at community health screenings (16). With this new technology, patients are able to receive their results just twenty to thirty minutes after being tested, rather than waiting weeks for results through traditional testing methods. Within the U.S. alone, it is estimated that approximately 25% of HIV-positive patients who are tested via traditional methods such as the ELISA test do not return for their results. Rapid testing virtually eliminates this problem, enabling more people to become immediately aware of their HIV status (17). Theoretically, by making affordable testing available to more people and by increasing the likelihood that people will actually receive their results, rapid testing should have a considerably positive impact on public health prevention strategies to reduce and eventually eliminate HIV/AIDS transmission. However, the potential benefits of rapid HIV testing are not without drawbacks. Testing inaccuracies and ethical concerns draw attention to some of the more serious shortcomings of rapid testing (18).

In Rwanda, the RAIHIS survey collected reasons for not tested among the respondents that reported never having an HIV test, where they found that the most reason of non-testing for HIV was being confident of their HIV negative status (79.8%), those who were afraid of others knowing their HIV status (3.8%), those who did not want to know that they had HIV virus this was mostly reported by those aged 25 years and above and those who are not in union (3.5%) and those who reported that the testing sites are far (5.3). They also assessed the self-reported HIV testing and counselling among the participants by asking them the questions about the knowledge of where to get an HIV test, HIV testing status and reception of the results. Where they found that the almost universal women and men were know where to get an HIV test (95.7% and 98.3% respectively) while the percentage was lower among youth aged 15-24 years and single (67.2% and 66.3% respectively). Among those who ever had an HIV test, almost received their HIV test results (95.5%). But never d/etermined the factors associated with non-testing for HIV. This is the reason why this study was conducted aiming to analyze the

prevalence of non-testing and factors associated with HIV/AIDS non-testing among the Rwanda AIDS Indicators and HIV Incidence Survey (RAIHIS) respondents.

I.3. Objectives

I.3.1. Main objective

The main objective of this study was to determine the prevalence and factors associated with non-testing for HIV among the sexual active population from Rwanda AIDS Indicators and HIV Incidence Survey participants.

I.3.2. Specific objectives

- ✓ To determine the prevalence of non-testing for HIV among the sexual active population from Rwanda AIDS Indicators and HIV Incidence Survey participants.
- ✓ To assess the associated factors of non-testing for HIV among the sexual active population from Rwanda AIDS Indicators and HIV Incidence Survey participants.

I.4. Research question

- ✓ What is the prevalence of non-testing for HIV among the sexual active population from Rwanda AIDS Indicators and HIV Incidence Survey participants?
- ✓ What are the associated factors of non-testing for HIV among the sexual active population from Rwanda AIDS Indicators and HIV Incidence Survey participants?

I.5. Justification of the study

The purpose of this study was to determine the prevalence and factors associated with non-testing for HIV among the sexual active population from Rwanda AIDS Indicators and HIV Incidence Survey participants. The study significant was to identify the predictors that contribute to non-testing for HIV to inform the policy makers in Rwanda, to put strategies in place and scaled up the prevalence of non-testing for HIV in order to achieve the UNAIDS target.

I.6. Organization of the study

This study was organized as follows:

Introduction of this study including background, problem statement, objectives, research questions, justification of the study and the organization of the study; literature review focused on the knowledge on HIV status, VCT acceptability, prevalence of HIV not being tested, factors

associated with VCT uptake and conceptual framework; the method of this study based on study design and area, study population, study procedures: tools / questionnaires, data analysis, variables, study limitations and ethical issues; the results of this study focused on the findings from data used and analysis for the study; discussions was to compare findings from the current study to the other similar research conducted worldwide; the study organization also consist the conclusion and recommendations final consist the references.

II. LITERATURE REVIEW

II.1. Knowledge on HIV status

Knowledge of HIV status is important for both treatment and prevention efforts. This knowledge however is lacking due to the slow uptake of voluntary counseling and testing (VCT) in many parts of sub-Saharan Africa. VCT is a cornerstone of cost-effective HIV prevention and linkage to HIV treatment in low-resource settings (9,19). Wider access to knowledge of HIV status is beneficial both to the individual and community. It enables the individual to initiate or maintain behaviours to prevent further transmission of the virus, early access to HIV-specific care, treatment and support with access to interventions to prevent transmission from mothers to their infants. Knowledge of sero-status enables one to cope better with HIV infection and plan for the future. As for the community it enables reduction in denial, stigma and discrimination that surrounds HIV/AIDS and mobilization of support for appropriate responses. There is new information and momentum is increasing on using treatment in HIV infected individuals as a way of preventing transmission in the community (19,20).

To address this problem of low uptake of VCT, WHO explored innovative, ethical and practical ways to increase access to knowledge of sero-status in resource-constrained settings a consultative meeting was held in 2001 that discussed approaches to service delivery for different purposes and settings (9,21). In 2017, the Ministry of Health through Rwanda Biomedical centre will introduce HIV self-testing, an initiative expected to increase access and utilization of HIV testing. The new oral method does not require pricking or blood samples and it is part of the different initiatives Rwanda has unveiled as part of the World AIDS Day celebrations. Annually, Rwanda also identifies a theme for World AIDS Day. 2017 theme is “Get tested for HIV. If positive, Start and Stay on life-saving treatment.” The theme reaffirms Rwanda’s commitment to achieving the UNAIDS global target of 90-90-90; aiming at ensuring that 90% of people living with HIV know their status, 90% of people living with HIV who know their status are receiving antiretroviral treatment and 90% of people on treatment have viral load suppression. World AIDS Day campaign in Rwanda will be launched on December 1st, 2017, and will continue with various HIV/AIDS prevention activities including communication activities and scaling up for condom kiosks, for 3 months. These activities will increase HIV awareness, disseminating key messages on HIV and promote HIV services utilization (22). Scaling up the

highest-yield HIV testing services strategies, including extending hours for testing in Kigali, index testing, recency testing, self-testing, and testing among key populations and priority populations, to help reach those who are otherwise less likely to access testing and Reaching key populations, including through development of a national strategy for female sex workers (FSW), as well as adolescent girls and young women ages 10-24 and young men ages 25-35 to prevent infection and interrupt transmission (22).

VCT was developed in the mid-1980s as the standard of care for individuals seeking to know their infection status. The goals of testing are to ascertain the client's sero -status and to contribute to promoting motivation, increasing knowledge to support risk reduction and planning for the future (23,24).

To increase access to knowledge of sero-status, large scale implementation of VCT is required. Such a move is limited by the availability of staff who are familiar with client centered counselling, have been trained in pre- and post-test counselling techniques, and the heavy work demands placed on staff in busy healthcare settings. To respond to these challenges, the VCT model needs to be tailored in some settings to make it more suitable as an entry point to life-saving interventions as well as make it more feasible and affordable when scaled up. A range of models of service delivery for HIV testing and counselling are in place, including free-standing services, integrated services (for example in maternal and child health programmes) and outreach services for vulnerable groups. In all these models, the greatest variation is observed in approaches to HIV counselling. Pre- and post-test counselling are often carried out in individual sessions, though other approaches are common, such as giving information to a group, followed by individual-level informed consent prior to HIV testing, and individual post-test counselling. To increase uptake, opt-out strategies, as used in Thailand, are an alternative approach to HIV testing; using this strategy all clients are offered HIV testing, though they may decline [and thus opt-out] during the informed consent procedure (9,10,24).

Centre for Disease Control and Prevention (CDC) recommended routine HIV testing for all Americans between 13 and 64 (MMWR Recommendations and Reports September 22, 2006). The New York State Department of Health goes further to recommend that if a child is found to be perinatally HIV infected, his/her siblings also should be tested (23,25,26).

VCT is a key component of both care and prevention, but has so far reached only a minority of Africans. A median of 9 percent of men and only 7 percent of women reported ever having had an HIV test in surveys conducted in 25 African countries since 2000 (Measure DHS 2006 HIV/AIDS survey indicators database) (9,27).

According to RAIHIS 2013 – 2014, the results showed that almost all respondents (99.2% of females and 99.1% of men) have ever heard of HIV/AIDS. This knowledge was almost universal in all socio- demographic characteristics. By using the first definition, the HIV comprehensive knowledge was 53.6% among females and 52.6% among males. Comprehensive knowledge is high in Kigali City (61.4% and 63.5%) as well as other urban areas for both males and females. Comprehensive knowledge is low in western Province (41.4% and 42.6%), among both females and males. Knowledge also varies by the education level. It increases by the increase in education level. It is lower among people with never attended the school (43.7% and 39.9%) and higher among those with higher level of education (76.0% and 82.4%) for both females and males. The increase of comprehensive knowledge of HIV in Kigali city and other cities could be due to exposure to radio and television, as per results from this survey showing that the exposure to radio and television was higher in the city of Kigali compared to other provinces (28).

Participant's knowledge of HIV testing locations and prior testing history shows that knowledge of where to get an HIV test is almost universal among women (95.7%) and men (98.3%) and little variation is seen by demographic characteristics of HIV status. However, fewer individuals reported ever being tested for HIV with 80.2% of men and 84.8% of women self-reported to have ever had an HIV test. This percentage is lower among youth aged 15-24 (67.2%) and singles (66.3%). By marital status, the percentage is high among people in union (94.6%). For those that ever had an HIV test, an almost equal proportion of males (95.4%) and females (95.9%) received their HIV test results. The percentage is lower among young people (15-24), where 9.8% did not receive their HIV test results. The percentage is also lower among singles (90.5%) (28).

II.2. Acceptability of VCT

The acceptability of a programme will determine to what extent it will be used by the target population. Therefore, assessment of programme acceptability before implementation is important (9). Studies done in various countries have shown that generally the number of people

expressing a desire to test (readiness to test) outnumbered the number that actually go ahead and have the test done (9). Generally, acceptability of VCT is quite good. A study to determine the acceptability levels of VCT in a rural village in Kagera, Tanzania by Killewo et al (1998) found that 54 percent (245/450) of the population that had been informed about the programme responded to the invitation to be tested and 55.9 percent of these agreed to be tested. Kipp W et al 2002 in Kigoyera, Uganda found an acceptance level of 74 percent among people above the age of 15 years.

In Uganda high acceptability of routine testing was demonstrated in a medical setting where 95 percent were interested in testing and of these 83 percent were not aware of their HIV status (9). In Botswana, 90 percent of pregnant women had an HIV test due to introduction of routine HIV testing as a national policy in antenatal clinics (9).

Data on HIV testing and counselling in the 12 months preceding the survey were also collected. Of all males participated in the survey, 46.0% had an HIV test in the last 12 months; the percentage was similar among women (45.8%). Self-reported HIV testing in the last 12 months declined with age and was lowest among respondents aged 35 and older (i.e.: 39.6% and 35.7% among males and females, respectively). Of those who had an HIV test in the last 12 months, nearly all received their HIV test results (95.3% of men and 96.3% of women). Of those who received their HIV test results, 2.7% of males and 3.1% of females self-reported being tested HIV positive.

The findings showed that the self-reported HIV prevalence varies with marital status where it was 0.6% among never married, 3.1% (men) and 3.7% (women) being in union and 5.4% of men and 11.8% of women who ever been married (28).

II.3. Prevalence of HIV non-testing

HIV voluntary counseling and testing (VCT) is a cornerstone of HIV prevention and is also a vital point of entry into other HIV/AIDS services, such as HIV treatment and care and psychosocial and legal support. The sentinel surveillance in 2004 reported that 32.1% of Thai men and 36.0% of Thai women in the general population (age 15–49 years) had undergone HIV testing (29,30).

In the study conducted in china 830 (63.1 %) individuals out of 1316 participants reported ever having been tested for HIV and the RDS adjusted rate of prior HIV testing was 55.9 %. The RDS adjusted rates of prior HIV testing in Hangzhou, Ningbo, and Wenzhou were 62.8 %, 61.9 %, and 48.0 % respectively, while the crude rates of prior HIV testing in these cities were 67.9 %, 70.9 %, and 51.5 %, respectively (7,17).

According to RAIHIS in 2014, of all males participated in the survey, 46.0% had an HIV test in the last 12 months; the percentage was similar among women (45.8%). Self-reported HIV testing in the last 12 months declined with age and was lowest among respondents aged 35 and older (i.e.: 39.6% and 35.7% among males and females, respectively). Of those who had an HIV test in the last 12 months, nearly all received their HIV test results (95.3% of men and 96.3% of women). Of those who received their HIV test results, 2.7% of males and 3.1% of females self-reported being tested HIV positive. The findings showed that the self-reported HIV prevalence varies with marital status where it was 0.6% among never married, 3.1% (men) and 3.7% (women) being in union and 5.4% of men and 11.8% of women who ever been married (28).

II.4. Factors associated with VCT uptake

VCT uptake can be associated with many potentially factors, that should help the VCT program to increase the prevention of HIV infection transmission from mother to child (9).

In the Gulu district North Uganda having some education and being unmarried were significantly associated with VCT uptake. Associations of borderline significance were found for: recent change of residence, having a partner with a modern occupation, and past use of contraceptives. VCT uptake is still low in this district of North Uganda (9,27).

In Ethiopia the three major factors perceived as inhibiting for the utilization of Voluntary Counseling & Testing (VCT) service were fear of stigma and discrimination, fear of coping with positive HIV test result and high HIV risk perception (10,31).

In Tanzania support from husbands and family was an important factor in deciding to be tested, (9). Similar results were observed in Uganda of increased willingness to accept the test with the approval of husbands. Studies from South Africa and Cote d'Ivoire identified factors including fear of a positive HIV test, low levels of education and poor housing as associated with low uptake (9). This was also seen in Uganda where mothers beyond seven years of primary

education were more likely to report a willingness to be tested compared to those who had not finished primary nor had no education at all. (9,32)

Factors associated with never testing on HIV in South Africa are being in the age-group 18–23 year, not having tertiary education, having had sex in the last 6 months and having more than one sexual partner predicted not testing (33).

A study done in Nigeria in antenatal women showed that willingness for counselling and testing (CT) was positively associated with education. More of those with self-perceived risk expressed willingness to test for HIV. The study identified 4 key factors associated with willingness for CT these are – increasing educational level, not fearing a blood test, confidentiality and perceptions of higher levels of social support from relatives and peers (9,34).

In Rwanda, the RAIHIS survey collected reasons for not testing among the respondents that reported never having an HIV test. As per Table 13, being confident of their HIV negative status was the most frequent reason for not having had an HIV test reported by 79.8% of respondents that had not had an HIV test. This was mostly cited by adults aged above 35 years (83.1%), females (82.6%), not in union (81.1% of those singles, 81.1% among the widows/separated/divorced) and those in urban areas (9).

Only 3.8% of the respondents said that were afraid of others knowing their HIV status. Similarly, 3.5% said they did not want to know that they have the HIV virus. This was mainly reported by those aged 25 years and above and those out of union. Only 5.3% say that the testing sites are far. This was less than 1% among those that tested HIV positive during the survey (28).

CONCEPTUAL FRAMEWORK

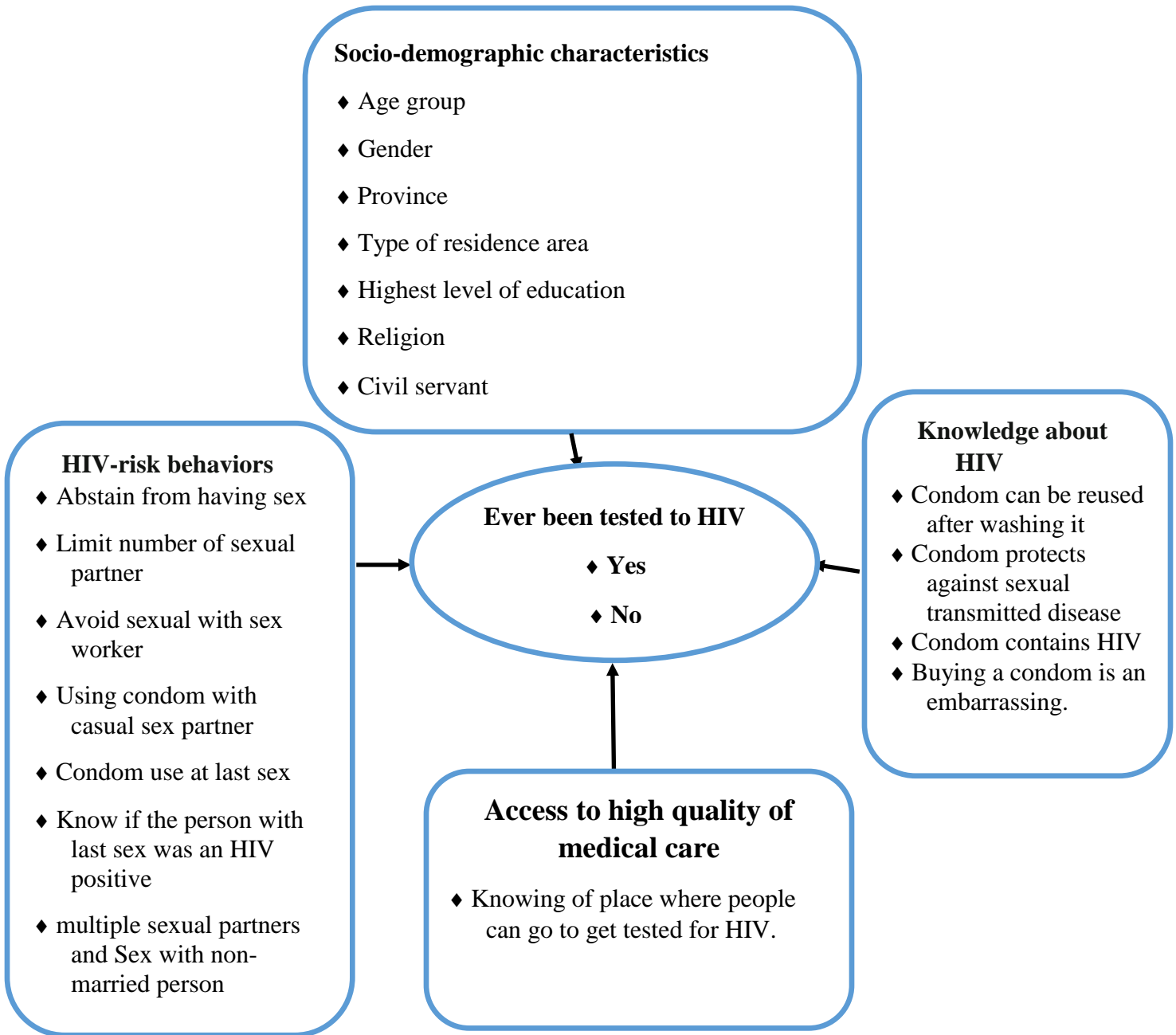


Figure 1: Conceptual framework of HIV not testing among RAIHIS respondents.

Conceptual framework summary

This conceptual framework had four type of variables. One was the dependent variable and second were the independent variables that contribute to dependent one indirectly or directly. For those which contribute indirectly include knowledge about HIV all those lead the participants to do unprotected sex that cause the low acceptance of HIV test among participants. For HIV-Risk behavior some (abstain from having sex, limit number of sexual partner, avoid sexual with sex worker and using a condom) should make the participants have a confident that there are HIV negative, there is no reason for seeking HIV test. Other like knowing the person with last sex was an HIV positive and multiple sexual partners and sex with non-married person should make the participants had fear of knowing their HIV status, this also hind the participants getting HIV test. While for those which contribute direct include the socio-demographic characteristics and access to high quality of medical care.

III. METHODOLOGY

III.1. Study design and area

The RAIHIS survey that was of a cross-sectional study design, was performed in two steps, the first was a baseline survey while the second was a follow-up survey one year later.

During the sampling, the RAIHIS survey used a two stage sampling design. Further, the sampling frame used was the same as the 2010 Rwanda Demographic and Health Survey. The households and individual questionnaires were developed and used. In addition to conducting individual interviews, blood sample were collected in the RAIHIS survey. The current study is also a cross-sectional study that uses secondary data from the 2013 – 2014 RAIHIS. The most recent Rwanda AIDS indicator HIV incidence survey. This study was a nationally representative study with a sample extracted in RAIHIS database of women aged 15 – 49 years and men aged 15 – 59 years from all 5 provinces and 30 districts of Rwanda.

III.2. Study population

The population targeted in the RAIHIS 2013-2014 were 13,816 participants from 6,918 households while the sample of 14,222 respondents from 6,792 households participated in the survey. The women were 7,419 aged 15-49 while the male were 6,803 aged 15-59 years old. During the data collection of RAIHIS survey, the respondent's rate was 98.2% and 98.4% from the households and individuals response respectively. The current study was focused on those who were sexual active from RAIHIS 2013-2014 survey where a total number of 1846 people sexual active were extracted in the Rwanda AIDS indicator and HIV incidence Survey 2013-2014 database where its population was located in all five provinces of Rwanda and in all 30 Districts. Per each District, 16 villages were selected, except in Kigali City where 20 villages were selected. Per each selected village, 14 households were selected, apart from the selected villages of Kigali City where 14.5 ~ 15 households were selected (28).

III.3. Study procedures: tools / Questionnaires

During this study, we extracted the interested variables which were help us to determine the factors associated with non-testing for HIV. The variables were grouped into two types, one was dependent and another were independent where the dependent variable was “being ever been tested for HIV” with the two options of response (yes and no) while the independent variables were also divided into six parts include socio-demographic characteristics, Access to high quality medical care, HIV-risk behaviors, Health status, HIV Knowledge and HIV-related stigma. The

Rwanda AIDS indicator and HIV incidence Survey 2013-2014 involved both individual interviews and blood sample collection (28). This study focused on these individual interviewed especially who were sexual active population.

III.4. Sampling method and strategy

In the RAIHIS survey the sampling was selected from the 14.5 ~ 15 households from 20 selected Villages in Kigali city while 14 households were selected from the 16 Villages selected in the four province remained excluding Kigali city. In the current study we selected these who were sexual active with all interested variables into the Rwanda AIDS Indicator and HIV Incidence Survey 2013 – 2014. The following map shows the villages selected during the data collection in RAIHIS 2013 – 2014.

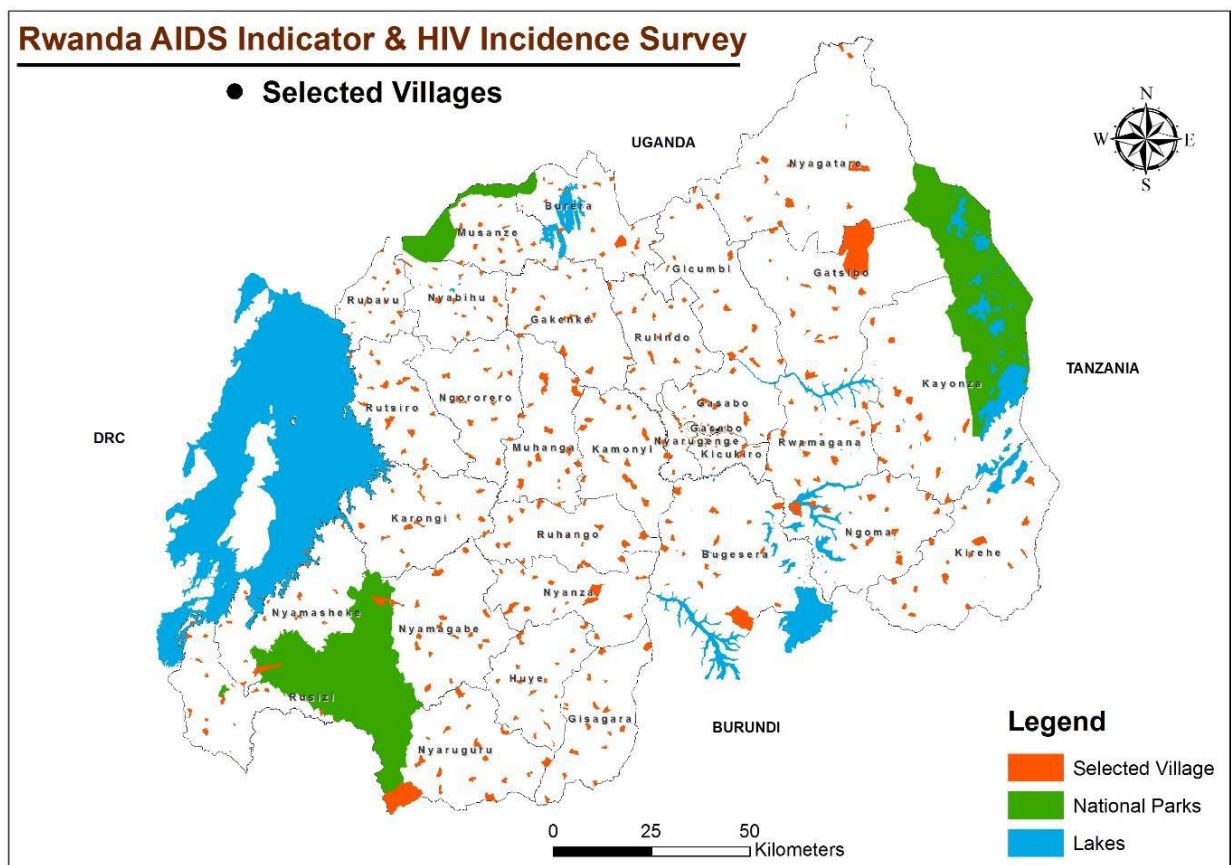


Figure 2: Villages selected in Rwanda AIDS Indicator and HIV Incidence Survey. (28)

III.5. Variables

Dependent variable

Ever been tested to check if you have the virus that causes HIV/AIDS

Independent variables

Socio-demographic characteristics:

Age group was used as a continuous variable in the descriptive analysis but it was a categorical in the bivariate and multivariate analysis with less than 31 years old as first category and 31 years old and above as the second category. Gender (was a categorical in both model of analysis with the female as the first category and male as the second category), Province (was a categorical where the Kigali city as the first category, East province as the second category, North province as the third category, South province as the fourth category and West as the fifth category), Type of residence area (was a categorical with the Rural as the first category, Suburban as the second category and Urban as the third category) , highest level of education (was a categorical with the O'level as the first, preschool as the second, primary as the third, secondary as the fourth, university as the fifth and vocation as the sixth category) and Job in public service (was a binary with yes or no).

Knowledge about HIV: Condom can be reused after washing it (was binary with agree and disagree), Condom protects against sexual transmitted disease (was binary with agree and disagree), Condom contains HIV (was a binary with agree and disagree), Buying a condom is an embarrassing (was binary with agree and disagree).

Access to high quality of medical care: Know the place where a person can buy a condom (was a binary with yes or no) and knowing of place where people can go to get tested for HIV (was a binary with yes or no).

HIV-risk behaviors: Abstain from having sex (was binary with yes or no), Limit number of sexual partner (was a binary with yes or no), Avoid sexual with sex worker (was binary with yes or no), Using condom with casual sex partner (was a binary with yes or no), Condom use at last sex (was a binary with yes or no), Know if the person with last sex was an HIV positive (was a binary with yes or no), multiple sexual partners and Sex with non-married person (was binary with yes or no).

III.6. Data Analysis

Descriptive statistics computed to determine frequencies and summary statistics (mean, standard deviation and percentage) to describe the study population in relation to socio-demographic and other relevant variables. The variables with P value ≤ 0.05 in bivariate analysis were transferred to multivariate analysis. Multiple logistic regression model were done to test the presence of

association between independent and dependent variables. P value <0.05 at 95% confidence interval considered as cut point to declare that there is statistical significance association between independent and dependent variables. All analyses will be conducted in STATA 13.0 software.

III.7. Data management

Data set acquired from RBC/ HIV Division and was used only for dissertation purpose and publish findings from this study. We keep the independent and dependent variables from the database.

III.8. Study limitations

As this study was a cross-sectional study, we are limited in the determination of the causality. Further, given its secondary data analysis nature, all specific research questions or specific information that is needed may not be available.

III.9. Ethical issues

During the survey implementation, the protocol of the survey was reviewed by the Rwanda National Ethics Committee (RNEC). In addition, because the survey was a countrywide and covering the all province of Rwanda, the survey protocol was also reviewed by the National Institut of Statistics of Rwanda (NISR).

Before conducting the RAIHIS survey, they trained all involved staff on good clinical practices and research ethics, also the RAIHIS 2013-2014 study respected research ethics including: using both informed consent and assent forms. Consent form was used for participants aged 21 years and above while the assent form was used for those who aged less than 21 years, they were used a study code playing the role of participants identification and no name or geographical characteristics which identifying the participants were collected and also to following the national testing protocols for HIV, CD4 and syphilis tests. This current study was a second data analysis of the data collected in the above mentioned survey.

VI. RESULTS

IV.1. Socio-demographic characteristics and prevalence of non-testing for HIV

The table 1 shows the prevalence of non-testing for HIV among sexual active respondents from Rwanda AIDS Indicator HIV Incidence Survey was 17.4%. The majority were in the age group of 21–30 years (57.4%), were male (57.5%), were living in Kigali city (26.7%), had a primary level of education (61.9%) and were not civil servant (96.5%).

Table 1: Socio-demographic characteristics and prevalence of non-testing for HIV

Variables	Frequency	Percent
Ever been tested for HIV (n=1,702)		
Yes	1,406	82.61%
No	296	17.39%
Age group (n=1,846)		
15 – 20 years	523	28.33
21 – 30 years	1,060	57.42
31 – 40 years	223	12.08
41 years and above	40	2.17
Gender (n=1,846)		
Female	784	42.47
Male	1,062	57.53
Province (n=1,846)		
City of Kigali	494	26.76
East	399	21.61
North	218	11.81
South	415	22.48
West	320	17.33
Residence (n=1,846)		
Rural	1,230	66.63
Suburb	57	3.09
Urban	559	30.28
Education level (n=1,707)		
O'level	173	10.11
Primary	1,060	61.92
Secondary	321	18.75
University	125	7.30
Vocation	28	1.64
Civil servant (n=1,846)		
No	1,782	96.53
Yes	64	3.47

IV.2. Knowledge, Access to high quality of care and HIV-risk behaviors

Findings of the study in the table 2 below show that the majority of participants were not using a condom at their last sex (56.9%) were know that the person with last sex had not an HIV (96.7%), had not had a multiple sex partners (79.2%), had a sex with married person (54.4%), know where the person can buy a condom (81.6%), disagree that the condom can be reused after washing it (92.6%), agree that the condom can protect STIs (98.2%), disagree that condom contain HIV (92.9%), disagree that buying a condom is embarrassing (78.6%), do not limit the number of sexual partners (71.1%), do not avoid sexual with sex workers (76.63%), using a condom with casual sex partner (70.9%) and abstain for having sex (67.5%).

Table 2: Knowledge, Access to high quality of care and HIV-risk behaviors

Variables	Frequency	Percent
Condom use at last sex (n=1,838)		
Yes	791	43.04
No	1,047	56.96
Know the person with last sex was an HIV positive (n=460)		
No	445	96.74
Yes	15	3.26
Multiple sex partner (n=1,836)		
No	1,455	79.25
Yes	381	20.75
Sex with non-married person (n=1,835)		
No	999	54.44
Yes	836	45.56
Know the place where person can buy a condom (n=1,845)		
Yes	1,505	81.57
No	340	18.43
Condom can reused after washing it (n=1,756)		
Disagree	1,627	92.65
Agree	129	7.35
Condom can protect STIs (n=1,825)		
Agree	1,792	98.19
Disagree	33	1.81
Condom contain HIV (n=1,727)		
Disagree	1,605	92.94
Agree	122	7.06
Buying a condom is embarrassing (n=1,822)		
Agree	390	21.41
Disagree	1,432	78.59
Limit number of sexual partners (n=1,760)		
Yes	509	28.92
No	1,251	71.08
Avoid sexual with sex workers (n=1,759)		
Yes	411	23.37
No	1,348	76.63
Using condom with casual sex partner (n=1,762)		
Yes	1,249	70.89
No	513	29.11
Abstain from having sex (n=1,761)		
Yes	1,189	67.52
No	572	32.48

IV.3. Association between non-testing for HIV and socio-demographic characteristics of study participants (Bivariate analysis)

In the bivariate model analysis (Table 3), we found that four variables out of six were significant to non-testing for HIV include being aged between 15 – 30 years (OR 1.90; CI 1.24 – 2.92), being male (OR 1.78; CI 1.36 – 2.33), educated at the primary (OR 1.99; CI 1.22 – 3.26) and not being a civil servant (OR 6.23; CI 1.53 – 26.04). From the variables not associated, more were lived in Kigali city with (19.20%, n = 474) and who were come from the urban area (19.85%, n = 534).

Table 3: Association between non-testing for HIV and socio-demographic characteristics of study participants.

Variables	Non-testing for HIV		Statistical tests	
	n	%	cOR (95% CI)	P. value
Age Group (Years) (n=1,702)				
31-56 Years	26	10.66	1	
15-30 Years	270	18.52	1.90 (1.24 - 2.92)	0.003
Gender (n=1702)				
Female	92	12.80	1	
Male	204	20.75	1.78 (1.36 - 2.33)	< 0.001
Residence (province) (n=1,702)				
City of Kigali	91	19.20	1.40 (0.88 - 2.20)	0.147
East	70	18.28	1.31 (0.82 - 2.11)	0.250
North	29	14.50	1	
South	57	16.67	1.17 (0.72 - 1.91)	0.506
West	49	16.17	1.13 (0.69 - 1.87)	0.612
Type of residence area (n=1,702)				
Rural	184	16.53	1	
Surburb	6	10.91	0.61 (0.26 - 1.46)	0.274
Urban	106	19.85	1.25 (0.95 - 1.62)	0.098
Education level (n=1,702)				
Secondary	20	12.12	1	
O'level	31	10.16	0.82 (0.45 - 1.49)	0.515
Primary	208	21.60	1.99 (1.22 - 3.26)	0.006
University	16	13.11	1.09 (0.54 - 2.21)	0.802
Vocation	3	11.11	0.24 (0.24 - 3.28)	0.881
Civil servant (n=1,702)				
Yes	2	3.33	1	
No	294	17.90	6.32 (1.53 - 26.04)	0.011

IV.4. Association between non-testing for HIV and knowledge on HIV and Access to high quality of medical care from study participants (Bivariate analysis)

Knowledge on HIV

The findings indicated that the independent variable of buying condom is embarrassing (OR 1.75; CI 1.27 – 2.42) was statistically significant with non-testing for HIV (Table 4).

Access to high quality medical care

We found that there is association between non-testing for HIV and didn't know the place where a person can buy a condom (OR 1.75; CI 1.27 - 2.42) and didn't know the place where people can go to get an HIV Test (OR 56.36; CI 13.1 - 241.08).

Table 4: Association between non-testing for HIV and knowledge on HIV and Access to high quality of medical care from study participants

Variables	Non-testing for HIV		Statistical tests	
	n	%	cOR (95% CI)	P. value
Condom can be reused after washing it (n=1,623)				
Disagree	266	17.00	1	
Agree	15	25.86	1.70 (0.93 - 3.11)	0.083
Condom protects against sexual transmitted disease (n=1,687)				
Agree	288	17.38	1	
Disagree	6	20.00	1.18 (0.48 - 2.93)	0.708
Condom contains HIV (n=1,599)				
Disagree	264	17.18	1	
Agree	16	25.81	1.67 (0.93 - 3.00)	0.080
Buying a condom is an embarrassing (n=1,682)				
Disagree	225	16.52	1	
Agree	70	21.88	1.41 (1.04 - 1.91)	0.024
Know the place where a person can get a male condom (n=1,704)				
Yes	234	16.07	1	
No	62	25.20	1.75 (1.27 - 2.42)	0.001
Knowing of place where people can go to get an HIV test (n=1,702)				
Yes	274	16.33	1	
No	22	91.67	56.36 (13.1 - 241.08)	< 0.001

IV.5. Non-testing for HIV and HIV-risk behaviors from study participants

Table 5 shows the association between non-testing for HIV and HIV-risk behaviors from study participants. HIV-risk behavior factor that significant associated with non-testing for HIV was non-using a condom with casual sex partner (OR 1.34; 1.05 – 1.82).

Table 5: Association between non-testing for HIV and HIV-risk behaviors from study participants.

Variables	Non-testing for HIV		Statistical tests	
	n	%	cOR (95% CI)	P. value
Abstain from having sex (n=1,643)				
Yes	183	16.44	1	
No	96	18.11	1.12 (0.85 - 1.47)	0.399
Limit number of sexual partner (n=1,642)				
No	211	18.07	1	
Yes	68	14.35	1.31 (0.97 - 1.77)	0.070
Avoid sexual with sex worker (n=1,641)				
Yes	52	13.94	1	
No	227	17.90	1.34 (0.97 - 1.86)	0.074
Using condom with casual sex partner (n=1,644)				
Yes	186	15.64	1	
No	93	20.44	1.38 (1.05 - 1.82)	0.021
Condom use at last sex (n=1,695)				
Yes	123	14.78	1	
No	169	18.04	1.13 (0.88 - 1.46)	0.327
Know if the person with last sex was an HIV positive (n=447)				
No	22	5.08	1	
Yes	1	7.14	1.43 (0.17 - 11.48)	0.732
Multiple sexual partners (n=1,694)				
No	250	18.02	1	0.122
Yes	44	14.33	0.87 (0.73 - 1.03)	
Sex with non-married person (n=1,695)				
No	165	18.64	1	
Yes	129	15.93	0.87 (0.73 - 1.03)	0.123

IV.6. Multivariate analysis

The adjusted risk factors of non-testing for HIV are presented in the table 6. In logistic regression model, being in the age group 15 – 30 years was highly significant associated with non-testing for HIV (aOR: 2.57; 95% CI: 1.49 - 4.43; $p = 0.001$), there were two and half times more likely to indicate non-testing for HIV compared with being in the age group of 31 years and above. Being male was statistically significant associated with non-testing for HIV (aOR: 2.44; 95% CI: 1.77 – 3.36; $p < 0.001$), male was two and half times more likely to indicate non-testing for HIV compared to the female. Reference on using a condom with casual sex partner, not using a condom with casual sex partner was significant associated with non-testing for HIV (aOR: 1.44; 95% CI: 1.06 – 1.96; $p = 0.019$). To agree that buying a condom is embarrassing was significant associated with non-testing for HIV (aOR: 1.43; 95% CI: 1.00 – 2.03; $p = 0.046$), they were one and half times more likely to indicate non-testing for HIV. Unknowing the place where to buy a condom was one and half times more likely to indicate non-testing for HIV (aOR: 1.66; 95% CI: 1.09 – 2.52; $p = 0.017$). Unknowing where people can go to get an HIV test was forty eight times more likely to indicate non-testing for HIV (aOR: 48.63; 95% CI: 1.22 – 68.55; $p = 0.031$). Non-working as civil servant was nine times more likely to indicate non-testing for HIV (aOR: 9.15; 95% CI: 10.72 – 220.59; $p < 0.001$). Reference to secondary level of education, primary was statistically significant associated with non-testing for HIV (aOR: 2.17; 95% CI: 1.41- 3.34; $p < 0.001$).

Table 6: Factor associated with non-testing for HIV

Risk Factor	Adjusted Odds Ratio (AOR) 95% confidence interval (CI)	P values
Age group		
31 - 56 Years	1	
15 - 30 Years	2.57 (1.49 - 4.43)	0.001
Gender		
Female	1	
Male	2.44 (1.77 - 3.36)	<0.001
Using condom with casual sex partner		
Yes	1	
No	1.44 (1.06 - 1.96)	0.019
Buying condom is embarrassing		
Disagree	1	
Agree	1.43 (1.00 - 2.03)	0.046
Know the place where to buy condom		
Yes	1	
No	1.66 (1.09 - 2.52)	0.017
Knowing of place where people can go to get an HIV test		
Yes	1	
No	48.63 (1.22 - 68.55)	0.031
Civil servant		
Yes	1	
No	9.15 (10.72 - 220.59)	< 0.001
Education level		
Secondary	1	
O'level	1.25 (0.67 - 2.31)	0.477
Primary	2.17 (1.41- 3.34)	< 0.001
University	1.36 (0.67- 2.75)	0.857
Vocation	1.35 (0.37- 4.92)	0.649

V. DISCUSSION

This cross-sectional was a secondary data analysis reveal that the majority (57.4%) of participants were aged between 21 and 30 years, males (57.5%), living in Kigali city (26.7%), from rural area (66.6%), educated at the primary (61.9%) and non-civil servant (96.5). Our predominate age range was similar to other study in South Africa (3). This is probably due to the younger generation are more than the elder, the males are lesser likely to seeking health care, the more peoples are lived in urban than the rural, generally more are educated primary than other revel of education and more non-civil servant than the civil servant.

In this study, the prevalence of non-testing for HIV among the sexual active population from RAIHIS was 17.39% (296/1702), the majority of them were the male with 20.75% (204/983). This prevalence was very low compared with the prevalence in a study from Soweto, South Africa by sakhile m. *at al* where findings showed that over two thirds (71%) of men had not tested for HIV(3). It is also lower than the prevalence found in Rwanda National AIDS/HIV targets report where they were found that 86.6% of FSW and 63% MSM had an HIV test within 12 Months preceding to Survey (35). This lowest prevalence of non-testing for HIV my caused by the Rwanda implementation of UNAIDS 90-90-90 targets state that 90% of who living with HIV will know their HIV status, 90% of these who diagnosed HIV infection will received antiretroviral therapy and 90% of those who received ARTs will suppressed to HIV viruses (36). This study found that the majority was younger age group 15 – 30 years (18.52%) non-testing for HIV. Non-testing was stronger associated with a younger aged 30 and below compared to those who aged 31 and above. This suggested by the younger should be confident of their HIV negative status than the elders however they were not had an HIV test, they were also afraid of others to knowing their HIV status and other didn't want to know their HIV status. It is the same as the finding from the study done at Soweto, South Africa by sakhile M. *at al* (3).

The study also suggest the following associated factors, due to the age of participants we found that those who had 30 years and below were highly significant associated with non-testing for HIV reference to those who had 31 years and above. The reason should be that the young were feared to know their HIV status, they should be confident with they are HIV negative and also to fear others to know their HIV status than those who old. This was the same like the findings from the Soweto study where they found that the majority who had not an HIV test were the young (3).

Due to the gender, the majority who were statistically significant associated with non-testing were the male (20.75%) reference to the female (12.80%). The reason should be, the male may have more sex partners than female this read them to fear knowing their HIV status. This was the same of the findings from RAIHIS where they found 80.2% of men and 84.85 of female self-reported that they have ever had an HIV test means that 19.8% of men and 15.15% of female they have not ever had an HIV test (28). Non-testing for HIV was higher in the males compared to females. This is probably due to the differences in health care seeking behavior between males and females, where the different studies shows that the females were more likely for seeking health care than males. This findings has implication on the need to escalate targeted men and to enhance testing among males.

Condom use is also a key for HIV testing, the study shows that those who not using a condom with casual sex partner were more likely non-testing for HIV reference to those who using it. This suggested that, once you do unprotected sex you are exposed to HIV and also fear to get an HIV test. However, Rwandan culture allow the majority thinking that buying condom is embarrassing. Those who agree that buying a condom is embarrassing were more likely non-testing compared to those who disagree that buying a condom is embarrassing. This suggested that, if you are embarrassed by buying a condom you should do unprotected sex that read to fear knowing your HIV status and increase the rate of HIV not testing. Even though you should know where the people can go to get an HIV test you shouldn't go there because of fear. However the study found that, those who don't know the place where can people go to get an HIV test were more likely non-testing for HIV reference those who know it.

Based to the know the place where person can by a condom, the study found that to know the place where person can by a condom was highly significant protective factor with non-testing for HIV reference to not know the place where person can buy a condom, means that the majority of non-testing for HIV were who don't know the place where person can by a condom. The reason may be if they don't know where can by a condom they should do unprotected sexual that read to fear of being tested for HIV. Knowledge of HIV status among men is a critical party in prevention of HIV as it has connected to the decrease of risk-behavior among who tested positive for HIV(3). Our study show an association between low education levels with non-testing for HIV where the strongly association were found in those who had primary level of education reference to those who had secondary. The reason may be that literacy is the one of the barrier

for accessing to the voluntary and cancelling testing among the participants. This was the same as what found in Soweto where there was a strong association between not testing for HIV and low level of education among men sexually active (3).

Our study also show a high association between non-testing for HIV and the occupation, where those who non-civil servant were highly significant associated with non-testing for HIV compared with those who civil servant. It means that the majority non-testing for HIV were those who non-civil servant. This may suggested that to being tested for HIV was the one criteria or one requirement for entrance in the public services.

VI. CONCLUSIONS AND RECOMMENDATIONS

VI.1. Conclusions

The data of this study revealed that, the prevalence of non-testing for HIV among sexual active from RAIHIS participants was 17.4%. The study suggest the factors associated with non-testing for HIV were the following: age group, gender, know the place where can buy a condom, working in public service and education level of participants. This study suggest a need to emphasize on awareness of HIV testing in order to help youth and community for more access on it, increase the sensibilisation of HIV testing and counselling program and also to distribute the free condom site in the community.

VI.2. Recommendations

Reinforce the scaled up the awareness on HIV testing and counselling among the young under 30 years, males, non-using condom with casual sex partner, agree that buying a condom is embarrassing, unknowing of place where people can go to get an HIV test, not know the place where can by a condom, non-civil servant and educated primary where are predicted to non-testing for HIV, thus increasing HIV testing.

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