Assessment of factors associated with self-reported sexually transmitted infections: secondary analysis of Rwanda AIDS indicators and HIV incidence Survey data, 2013-2014. Rwanda 2019

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DECLARATION

I,TWAHIRWA Marie Solange, hereby declare that the thesis is my original work, except references cited in this work, and has not been submitted either wholly or in part of any other university, college or institution for any award.

Names: TWAHIRWA Marie Solange

Signed:

Date:

ABSTRACT

Background: Sexually transmitted infections (STIs) remain a significant public health concern, as more than 1 million sexually transmitted infections are acquired everyday worldwide. The STIs lead to multiple consequences that compromise quality of life. The burden of STI morbidity and mortality, especially in developing countries, leads to sexual, reproductive health, newborn and child health issues and enhance HIV transmission. This study aims to determine the factors associated with self-reported sexually transmitted infections, using the Rwanda AIDS indicator and HIV Incidence Survey (RAIHIS) data, 2013-2014.

Methodology: using a cross-sectional study involving secondary analysis of data collected in RAIHIS survey in 2013-2014, a total of 8176 participants were analyzed with STATA 13.0 version by running frequency of characteristics of variables. Bivariate and multivariate logistic regression modeling were performed where association between socio-demographic and sexual risk behavior factors with self-reported STIs were estimated using Chi-square test. The $p< 0.05$ was significant and the odds ratios (OR) were measured at 95% Confidence Interval (CI).

Results: a total of 8176 participants were considered, included 4365 female (53.4%) and 3811 male(46.6%).The age of study participants was between 15 and 59 years with the mean age of 33 years. Self-reported prevalence of STIs was 8.15%, HIV prevalence was 3.41% and among 279 HIV positive, 55 (19.7 %) had self-reported STIs. The risk of having self-reported STIs was higher in female person than male (AOR:1.34; 95%CI[1.06-1.70]);it was higher in persons with lower education level compared to others(AOR:1.7;95% CI[1.14-2.56] ; it was higher in residents of Kigali City(AOR: 2.02;95% CI[1.38-2.97]),in persons who had last sex with the person who had drunk alcohol(AOR:2.14;95% CI[1.39-2.29]),in persons who had multiple sexual partners (AOR:2.36;95%CI[1.65-3.37]),those who had HIV (AOR:2.76; 95% CI[1.85-4.12] and those who had ever been forced to have sex with a person in the last 12 months(AOR: 2.20; 95%CI[1.85-4.12]).

Conclusion: Considerable proportion of the population aged between 15-59 years was found to have self-reported STIs. This study also found a high prevalence of HIV among persons who had self-reported STIS and revealed that the factors associated with self-reported STIs were: being

female person, having lower education level, being residents of City of Kigali, having last sex with person who had drunk alcohol, having multiple sexual partners, having HIV, having ever been forced to have sex with a person in last 12 months. These findings designate the needs for reinforcement of the interventions aimed to prevent and control STIs in the population.

Key words: Sexually transmitted infections; factors; RAIHIS, cross-sectional.

DEDICATION

The present book is dedicated to my loved husband, Dr NKURIKIYUMUKIZA Sixbert. You have encouraged me, and trained me on hard work and determination. This is also dedicated to my daughters IRAKOZE Sancta, SANGWA Stella Elvira, and my son NKURIKIYUMUKIZAHIRWA Sanctus Bavon, your love and patience; and I will always remember how you have endured during the time of my studies. It is also dedicated to my family members and my family in law who encouraged me during my studies.

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God bless you!

LIST OF ACRONYMS

AIDS: Acquired Immune Deficiency Syndrome

ART: Anti-retroviral Therapy

BCC: Behavior Change Communication

CI: Confidence Interval

DHS: Rwanda Demographic and Health Survey

HBV: Hepatitis B Virus

HCV: Hepatitis C Virus

HIV: Human Immunodeficiency Virus

IEC: Information Education and Communication

MoH: Ministry of Health

MoH: Ministry of Health

OR: Odds ratio

PDA: Personal Digital Assistant

RAIHIS: Rwanda AIDS Indicator and HIV incidence Survey

RBC: Rwanda Biomedical Centre

STIs : Sexually Transmitted Infections

TPHA: Treponema Pallidum Haem Agglutination

WHO: World Health Organization

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CHAPTER I: INTRODUCTION

I.1 Background

Sexually transmitted infections (STIs)consist of progression of diseases of various infectious etiology that comprise sexual transmission as a main epidemiologic role(1). STIs continue to be an increasing public health concern in all countries, accounted as a major morbidity and mortality cause globally, particularly in developing countries which have problems of access to adequate diagnostic and treatment facilities. Further than the immediate impact of the infection itself, STIs can lead to severe reproductive health effects, such as infertility, mother-to-child transmission, adverse pregnancy outcomes, pelvic inflammatory disease, cervical cancer, multiple reproductive sequelae (2,3).

Sexually transmitted pathogens compromise quality of life consequential from their burden worldwide, with their harmful impact (4). Sexually transmitted infections also facilitate indirectly the sexual acquisition and transmission of HIV through the inflammation resulting from viral and non-viral STIs that rises viral shedding of HIV in the genital tract and in the sex, while it is predictable that the likelihood of HIV transmission per sexual contact is 6% if either partner has another STI other than HIV versus 0.2% if no STIs (2,3,5). In addition, STIs can cause cellular changes that precede some cancers, they also oblige an important strain on the budgets for the households and public health systems in middle- and low-income countries, and have undesirable consequence on the general welfare of individuals (4).

I.2.Problem statement

In 2016, according to the World Health Organization (WHO), more than 1 million STIs are daily acquired globally. Every year, estimated 357 million new infections are acquired for 1 of 4 curable STIs: Chlamydia Trachomatis (131 million), Trichomoniasis (142 million), gonorrhea (78 million) and syphilis (6 million) among people aged 15-49 years, and it is predictable that about 500 million people have genital infection with herpes simplex virus (HSV:417 million) worldwide , and approximately 291 million women harboring the human papillomavirus (2,3,6,7).

The prevalence of these STIs varies by area and gender (7), and among adolescents and young adults people have been reported the utmost rates of incident STIs (8) with up to 1 in 20 adolescents develop a new STI every year (9).

In developing countries, STIs are included in the top 10 diseases that are most expected to lead people to request healthcare services and have serious health, social, and economic consequences(10).

In 2015,in the African region, the implication of STIs was thoughtful as they presented the total incidence greater than 19% of curable STIs (92.6 million cases) (2),including STIs 8.3 million cases of Chlamydia trachomatis, 21.1 million cases of Neisseria gonorrhoeae, 3.4 million cases of syphilis and 59.7 million cases of Trichomoniasis vaginalis(2,8). Although those bacterial STIs are curable, viral STIs such as Herpes Simplex Virus (HSV) are deemed to be continual and not curable(5,8).

Sub-Saharan Africa present the utmost rate of HIV and other STIs (11), where the greater part of new STIs going on in the population aged 15 to 49 years (3,9). In 2016, a study conducted in South Africa revealed that Self-reported prevalence of STIs was 20.4% in the study participants, 25.9% people were HIV positive and of these 19.9% reported a STI (2).

According to the study conducted in 2017 in Swaziland on the four most common curable STIs: Chlamydia Trachomatis, Neisseria Gonorrhea (NG), Trichomoniasis Vaginalis (TV), Syphilis, and genital warts, their general weighted prevalence was 19.4% equivalent to 72 990 women with STIs in Swaziland, the estimated prevalence were 7.0% for Chlamydia Trachomatis, 6.0% for NG,8.4% for TV,1.0% for Syphilis and 2.0% for genital warts. Regarding HIV prevalence the overall weighted was 42.7%, whereas among HPV positive women, 18.8% had one STI, while 6.3% had multiple STIs. The associated risk factors of STIs were being employed, self-employed and being hr-HPV positive, while age, being married and not using condoms with habitual partners were negatively associated with STIs(3).

A systematic review conducted in South Africa showed that alcohol consummation is associated with risks for STIs including HIV/AIDS, as well as alcohol is a psychoactive substance mainly usually taken, while it is included in the most common behaviors related with sexual risks for HIV and other STIs, together with the effect on self characters, drinking areas, concerning exciting and the psychogenic special effects of alcohol regarding decision making (12).

In Ethiopia, according to the study done in 2015, the prevalence of STIs using the approach regarding syndrome was counted at 8.5%, particularly for urethral discharge syndrome (4.6%), genital ulcer (2.8%), lower abdominal pain (2.5%), inguinal bubo (0.3%) and vaginal discharge (5.5%). There was 8patients (26.7%) who presented repeated illnesses and 28 patients (93.3%) who received treatment not including their partners. The multivariate logistic regression analysis revealed that the significantly factors related with STI syndromes were the age, marital status, and having new sexual partner in the past three months (5).

In Rwanda, in 2014, the AIDS indicator and HIV incidence survey revealed that the general prevalence of symptoms of STIs for women was 10.9% and 9.9% for men (13).
According to DHS 2005 and 2010, the HIV(counted in STIs) prevalence for the aged 15–49 people was around 3% and did not change in three years 2005 and 2010(14) even in 2015. It was intense among high risk groups for instance the female sexual workers; and HIV prevalence stayed elevated for women (3.7 %) than in men (2.2 %) and upper in Kigali City (7.3 percent) compared with other provinces (average 2.4 percent)(14,15).

Regarding HIV counting STIs solutions in Rwanda, major realizations have been achieved. Thus, rising regarding HIV services coverage of has continued to arrive at the levels related with the worldwide target, that was joined with the quality of offered services improvements ,and these achievements were related to the strengthening of the national health system, then, in order to make available the better services to the people, health care providers in health facilities are trained (15). However, the challenges stayed found in HIV and STI resolutions, as well as better oriented IEC and BCC messages offered through community outreach sessions and for key populations, concerning condom use stigma struggling and make sure improved access to

condoms regarding youth and key populations, and perform the community-based HIV and Monitoring and Evaluation system (15). Then, the screening and testing for STI and HIV are included in the utilized approaches to fight these challenges, together with regular condom provision (14).

In addition, other strategies like the implementation of rapid test of herpes simplex type 2, gonorrhea and chlamydia in all district hospitals were expected to be implicated , with the goal of updating STI national guidelines, continue to educate healthcare providers, and make available drugs for STI at all health facilities (15).

The prevention of STI is important for HIV prevention regarding the significant role of STI as co-factor of HIV infection(15). The incorporation of STI programs among HIV services was planned to be highlighted and to be implemented in all health facilities, youth-friendly centers, in schools and for key populations. Main intended actions were to focus on making available drugs and consumables using for STI screening and treatment; development/updating and production of STI diagnosis algorithm for all health facilities, development/updating of communication tools for healthcare providers regarding STI screening, counseling and transfer for key populations (15).

I.3 Rationale of the study

In Rwanda, in 2014, the AIDS indicator and HIV incidence survey revealed that the overall prevalence of symptoms of STIs among women was 10.9% and 9.9% among men (13).The problem of STIs in Rwanda is in general thought to be comparable with other developing countries.

As supported by the WHO Global Health Sector Strategy on Sexually Transmitted Infections 2016±2021 that outlined the goals and targets for global STI prevention and control ,included the first strategic direction that concerning to collect information on STI prevalence and incidence across representative populations, and showed that understanding regional and national STI epidemics is essential to advocate, fund, plan, and implement interventions for STI prevention and control (16) it is important to conduct a study on STIs ,as well as , few epidemiological surveys had been carried out on factors associated with self-reported STIs, and the studies are very limited, therefore, conducting research on STIs in general is an important input to contribute

in designing interventions aimed at preventing and controlling the infections especially STIs. Thus, this study aims to determine factors associated with self-reported STIs among the population of Rwanda, 2013-2014.

1.4 Research questions

-What is the magnitude of sexual risky behaviors among persons self-reporting STIs?
-What are the factors associated with self-reported STIs?

I.5 Objectives

I.5.1 Overall objective

The overall objective of this study was to determine factors associated with self-reported sexually transmitted infections, using RAIHIS survey data, 2013-2014.

I.5.2 Specific objectives

-To estimate the magnitude of sexual risky behaviors among persons self-reporting STIs
- To determine the factors associated with self-reported STIs

CHAPTER II. LITERATURE REVIEW

STIs remain a growing public health concern in all countries, spread predominantly by sexual contact, while some STIs including Chlamydia, gonorrhea, primarily hepatitis B, HIV, and syphilis can also be transmitted from mother to child during pregnancy and child birth. A person can have the STI without having obvious symptoms of disease. Common symptoms of STIs include vaginal discharge, urethral discharge or burning in men, genital ulcers, and abdominal pain (6). Once identified, some STIs can be cured following appropriate therapy; for others, suppressive regimens and approaches to prevent ongoing transmission are important (2).STIs are biological markers for risky sexual behaviors, increase susceptibility to HIV acquisition through genital ulcers, and increase onward transmission of HIV associated with HIV viral spikes (17).

The factors affecting the spread of STIs, including HIV, have been documented in many epidemiological studies across different populations, STIs and HIV share the same behavioral,

socioeconomic and demographic risk factors, including age at first sexual intercourse, inconsistent condom use, having multiple sexual partners, female sex, being single and the partner's sexual behavior, location and culture (3). The increase of susceptibility to HIV infection two- to five-fold by STIs, including those that are asymptomatic, have shown, due to several reasons including direct damage to the mucosa through ulceration that facilitates infection, and through inflammatory processes that increase the proliferation of immune cells that are also targets for HIV STIs also lead to higher HIV loads in the genital secretions of HIV-positive individuals, thereby increasing the chance of infecting their sexual partners (17). Thus, targeting HIV prevention and testing to populations with STIs remains key, especially as many may be co-infected with HIV and STIs, or be acutely HIV infected and therefore at greater risk of transmitting HIV (17). There is a substantial potential for co-benefits and synergies in treating STIs in those who are co-infected with HIV including: delaying HIV progression; ensuring optimal HIV care, including for opportunistic infections; and providing an entry point for other HIV prevention and care services (17).

Each STI has the different epidemiology compared with others and is influenced by various factors, including sexual mixing patterns (moderated by protective behaviors), the transmissibility of each pathogen, and the duration of infectiousness (moderated by access to effective treatment), demographics, and social circumstances (8).Commonly known risk factors for STIs include inconsistent condom use, having multiple sex partners, female gender, being single and among HIV positive people, not initiating antiretroviral treatment (ART), physical and sexual intimate partner violence has also been found to be associated with increasing risk of STIs and HIV among women (2,18).

In 2016, a study conducted in South Africa revealed that Self-reported prevalence of STIs was 20.4% among the study participants, 25.9% people were HIV positive and of these 19.9% reported a STI (2).The study conducted on STIs among youth in Malawi revealed that it has been affected by the epidemic of HIV/AIDS and other STIs, a result of youth's irresponsible sexual practices ,a number of contributing factors have been suggested in an attempt to explain reasons for the high prevalence of STIs, especially HIV/AIDS, in the sub-Saharan regions of Africa. This includes factors such as poverty, lack of male circumcision, migration, untreated

sexually transmitted infections, and multiple sexual relationships, in Malawi, 11% of youth are infected with STIs especially HIV/AIDS and most of these infections (90%) are transmitted through heterosexual contact (11).

A previous study conducted in Tanzania on risk factors for active syphilis revealed that the prevalence of active syphilis was 7.5%in men and 9.1% in women, but in youths (aged 15–19 years) the prevalence was higher in women (6.6%) than in men (2.0%). The incidence of TPHA sero-conversion was highest in women aged 15–19 at 3.4% per year, and around 2% per year at all ages among men. A higher prevalence of syphilis was found in those currently divorced or widowed, and those previously divorced or widowed. Among men, prevalence was associated with lack of circumcision, traditional religion, and reporting five or more partners during the past year, while incidence was associated with no primary education, farming, and a self perceived high risk of STD. In women, prevalence was associated with no primary education, early sexual debut and a self perceived high risk of STD (19).

In 2003, a survey on STIs conducted among Rwandan refugee in Tanzania showed that Men and women reported frequent experience with STIs, with around 10% having experienced genital discharge or genital ulcer syndromes in their lifetime. About2.5% of both men and women reported having had some of these syndromes over the previous three months, covering the period between fleeing their homes and settling into the camps. Men reported risky sexual behavior before the exodus, with 10% indicating they had paid for sex at some time in their lives while only 16% of men admitted using condoms during casual sex. This appeared to be partly because of various myths surrounding the use of condoms (20).

In 2015, a study conducted in Africa showed that of 4,057 individuals who had engaged in sexual activity, 6.3% reported previous history of a STI: 4.3% of women and 8.2% of men. The factors associated with STI were being aged over 34 years and not using a condom during first sexual intercourse, among men, and being aged over 25 years among women. Protective factors included not having had sexual intercourse with someone from the same sex, among men, and having initiated sexual activity after the age of 15 years and not having a casual sex partner over the last 12 months, among women (8).

The prevention and control of STI is based on health education, appropriate diagnosis and treatment, the identification of asymptomatic infections, partner treatment and counseling and the immunization of those cases for which there is an available vaccine (1).

In Rwanda, according to DHS 2005 and 2010, the HIV(included in STIs) prevalence in the population aged 15–49 approximately 3 percent and remained the same in both years 2005 and 2010.It was concentrated in some high risk groups such as FSW, and HIV prevalence remained higher among women (3.7 percent) than in men (2.2 percent) and higher in Kigali City (7.3 percent) than in the other provinces (average 2.4 percent) (15).

There is limited information on the risk factors associated with STIs at population level in Rwanda, as well as few epidemiological surveys had been carried out on STIs prevalence and factors associated and the studies are very limited, therefore the availability of epidemiological data on STIs and associated risk factors in the population is essential for the development of successful prevention, diagnosis and management strategies in the country. Thus, the results from the study on STIs in general will be an important input to contribute in designing policy and strategy aimed at preventing and controlling the infections especially STIs.

Conceptual framework

Using different studies that had been conducted on STIs, the study analyzes the background characteristics of participants and also explores the sexual risky behaviors factors that act among self-reported STIs persons.

Factors affecting the spread of STIs, including HIV, have been documented in many epidemiological studies across different populations. Thus STIs and HIV share the same behavioral, socioeconomic and demographic risk factors, including age at first sexual intercourse, inconsistent condom use, having multiple sexual partners, female sex, being single, partner's, location and culture. Furthermore, HIV infection increases the acquisition of other STIs (3,5,16,18). For other study, the risk factors for STIs infection in African women includes; younger age*;* being <25 years old, having a history of STIs, having new or multiple sex partners, inconsistent condom use, commercial sex work and drug addiction, being single and unmarried, low socio-economic status and poor hygiene practices, lower levels of education, early sexual debut, having concurrent partners, and engaging in transactional sex are amongst the risk factors

associated with syphilis infection. The factors associated with increased risk of HPV infection include co-infection with HIV or other STIs, younger age, increased number of lifetime sexual partners and having had a recent new sexual partner (8) .

Based on the previous studies, the assumed factors in predicting self reported STIs included in the present study, but not exhaustive, are the following: Socio-demographic characteristics (age, sex, occupation, education level, marital status, type of residence, province).

The risky sexual behavior factors: not using a condom at the first sex, drinking alcohol status at last sex, drinking alcohol status at last sex by the person with last sex, having multiple sexual partners in the past 12 months, having HIV, ever been forced to have sex with a person in the last 12 months.

The factors that had been explored are the following variables:

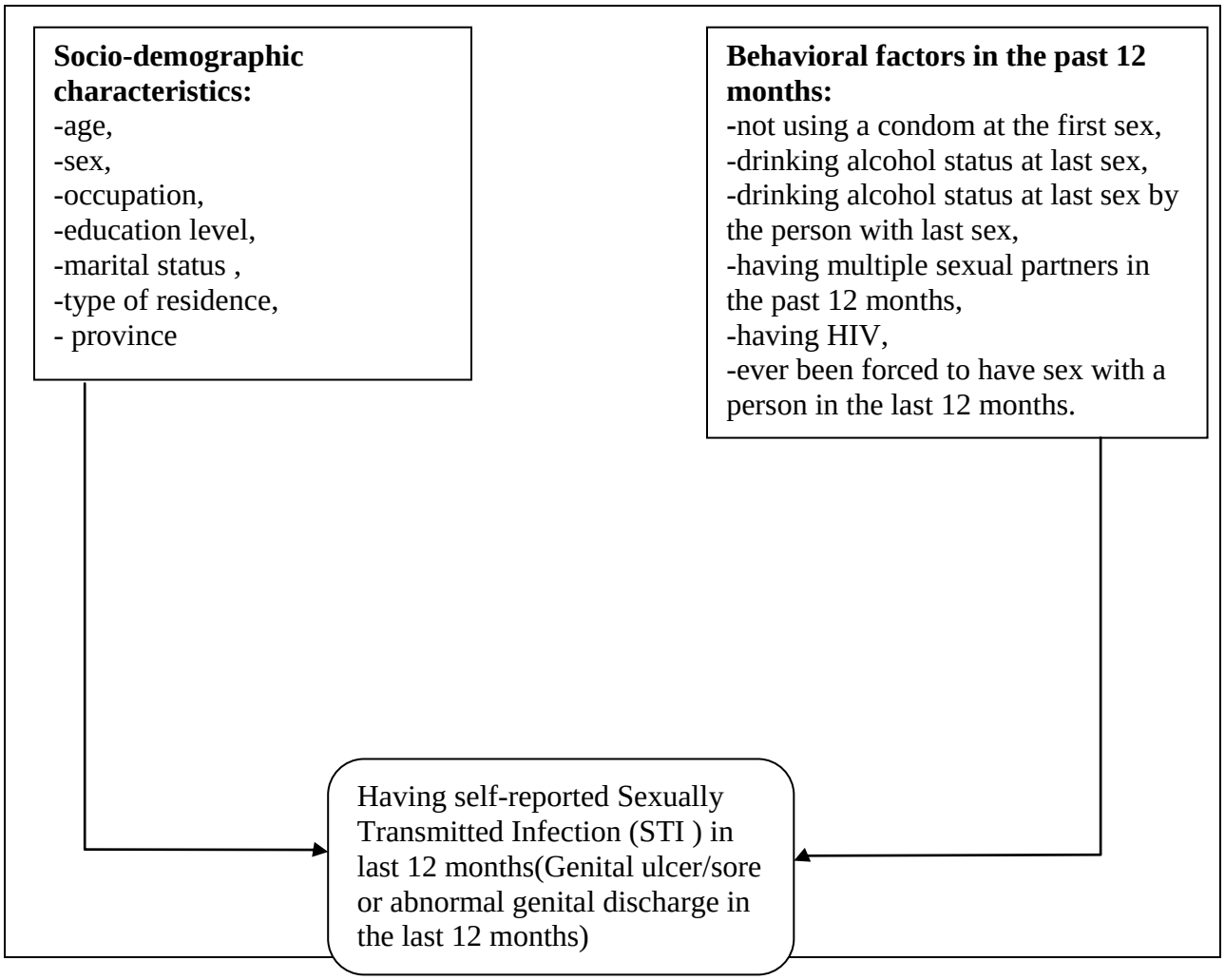

Figure1. **Conceptual framework of factors associated with self-reported STI in Rwanda, 2013-2014**

CHAPTER III. METHODOLOGY

III.1 Study design

This is a cross-sectional study using secondary data analysis of the Rwanda AIDS Indicator and HIV Incidence Survey (RAIHIS), conducted from 2013 to 2014. The RAIHIS was a nationally representative study, population-based, HIV behavioral and serological survey. It was implemented by the Ministry of Health (MoH) through the Rwanda Biomedical Centre (RBC) and coordinated by the HIV/AIDS, STIs and Other Blood Born Infections Division.

III.2 Study population

The study population was composed of all Rwandese population between the ages of 15-49 years for females or 15-59 years for males. Differences in age categories are based on differences in fertility, from which the sample was selected within the selected households. In addition, the eligible participants were the usual residents of the selected household, needed to be present in the household at the time of the survey and who were able to both respond and provide the consent.

III.3 Sampling method and strategy

The RAIHIS 2013-2014 study used a two-stage probability sample design, the first stage, making a sample of 492 villages that were selected across the country. The sampled villages covered all five provinces of Rwanda and each of the 30 districts of Rwanda, with 58 villages in urban areas and 434 in rural areas. Following the selection of villages, a comprehensive households listing activity was conducted within them, which was in turn used to construct sampling frames for the second stage of random sampling, all households located in the selected villages were listed and then randomly selected. Usual residents of the selected household had to be present in the household at the time of the survey and those who were able to both respond and provide the consent. Then, while the study targeted 13,816 participants from 6,918 households, a sample of 14,222 survey respondents from 6,792 households participated;

including 7,419 women aged 15-49 and 6,803 men aged 15-59. The household response rate was 98.2% whereas the individual response rate was 98.4% (13).

III.4 Study setting

The data was collected across all the country, 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 households were selected. Within the selected households, individuals were eligible to participate in the survey if they were a female between the age of 15-49 years or a male aged 15-59 years.

III.5 Study procedures: Questionnaires, variables

The survey involved both individual interviews and blood sample collection. Then, aspects of RAIHIS 2013-2014 study data collection were pretested, preceding the actual data collection activities. The pre-test data collection was conducted in four villages other than those selected for the main survey. Hence, the lessons learned from the pre-test were used to validate and finalize the survey tools and logistical arrangements for the main survey. Two types of questionnaires were used for interviews: the household and individual questionnaire, where the first helped to identify eligible participants for the interview in the selected household, according to age and usual resident of the household, as primary inclusion criteria, this interview was conducted with the head of household.

The individual questionnaire was used to determine the eligible survey participants, as per other eligibility criteria, and to collect individual data among them. Participants who were eligible for individual interviews were only the usual members of the selected household falling within the survey range age, who are able to respond and who signed the informed consent. Both questionnaires were filled in Personal Digital Assistants (PDAs) that were used to conduct interviews. Interviews for the Rwanda AIDS Indicator Survey were conducted between July, 2013 and November 5, 2013.The individual questionnaire covered different information, but this study considered the factors that have been listed above.

III.6 Data Analysis

The data on factors associated with self reported STIs were analyzed using STATA software 13.0.Description of characteristics was performed by running frequency distributions of socio-demographic and risky sexual behavior factors associated with self-reported STIs in the population. Bivariate analysis was performed, where analysis was made by the chi square (X^2) test for categorical variables, the association between outcome (self-reported STIs) and independent variables (socio-demographics and risky sexual behaviors) was measured by means of odds ratio for which 95% confidence interval was calculated. The risk factors that showed statistically significant association ($p < 0.10$) were selected for the next step of analysis which was the multivariate analysis using logistic regression model for testing the association between more than two independent variables and dependent variable; then the adjusted odds ratios were measured at 95% CI and the $p<0.05$ was considered.

III.7. Limitations

This research used a secondary data analysis of Rwanda AIDS indicator and HIV incidence Survey 2013-2014 database. This presents a limitation to the research since it is not exhaustive on the expected STIs risk factors and used only the variables collected and responded during the survey. Self-report of health conditions such as STIs is likely to be an underestimate of the actual magnitude due to social acceptability bias in interviews during the primary survey and also due to the fact that individuals do not always feel free to talk about STIs and HIV infections that are very sensitive among community members. It might therefore have led to an underestimation of self-reported STIs.

III.8 Ethical considerations

This study used secondary data from Rwanda AIDS indicator and HIV incidence Survey 2013-2014 , therefore ethical approval was already obtained at NISR and the National ethical committee. For getting access and authorization for using these data, agreement was obtained from Rwanda Biomedical Center, which has allowed us to obtain the raw data on their database, and then all data had been fully available without restriction.

III.9 Potential findings implications

This study generated knowledge on factors associated with STIs in the Rwandan population that might contribute in general as an important input to consider in designing the policy and interventions aimed at preventing and controlling the infections especially STIs in Rwanda.

CHAPTER IV. RESULTS

4.1 Background characteristics of the study population

4.1.1 Socio-demographic characteristics

A total of 8176 participants were included in the study. The majority were females (53.4%), aged between 30-39 years (35.78%), married or cohabitated (76.13%), with a primary education level (71.76%) and residing in rural setting (82.06%) (Table1).

Table 1: Socio-demographic characteristics of the study population

Variables	Frequency (N=8176)	Percentage
1.Sociodemographic features		
Sex		
Male	3,811	46.61
Female	4,365	**53.39**
Age		
15-24	1,415	17.31
25-29	1,775	21.71
30-39	2,925	**35.78**
40-49	1,599	19.56
50-59	462	5.65
Marital status		
Single	1,301	15.91
Married/Cohabitation	6,224	**76.13**
Divorced/Widow	651	7.96
Occupation		
Public servant		
Yes	217	2.65
No	7,959	**97.35**
Highest education level		
Secondary and Higher	893	10.92
Primary/O'level/vocation	5,875	**71.86**
No education	1,408	17.22
Type of Residence		
Urban	1,219	14.91
Rural	6,709	**82.06**
Semi-urban	248	3.03
Province		
North	1,276	15.61
South	1,859	22.74
East	2,117	**25.89**
West	1,784	21.82
City of Kigali	1,140	13.94

4.1.2 Sexual risky behaviors in the study population

Among the study population, the majority did not use condom at first sex (89.5%), some persons had drunk alcohol at last sex (16.6%), some had sex with the person who had drunk alcohol at last sex (18.4%), some had multiple partners (7.3%), some had ever been forced to have sex with a person in the last 12 months (1.6%), 3.4% were HIV positive and 8.15% self-reported STI symptom (Table 2).**Table 2: Distribution of sexual risky behaviors in the study population**

Variables	Frequency (N=8176)	Percentage
Condom use at first sex		
Yes	854	10.45
No	7,322	**89.55**
Drinking alcohol status at last sex		
No	6,814	83.34
Yes	1,362	**16.66**
Drinking alcohol status at last sex by person with last sex		
No	6,669	81.60
Yes	1,504	**18.40**
If had multiple sex partners in last 12 months		
No	7,580	92.71
Yes	596	**7.29**
Ever been forced to have sex with a person in the last 12 months		
No	8,047	98.42
Yes	129	**1.58**
Person who had HIV		
No	7,897	96.59
Yes	279	**3.41**
Person who had STI in last 12 months		
No	7,510	9.85
Yes	666	**8.15**

4.2 Bivariate analysis of factors associated with self-reported STI, using RAHIS 2013-2014

4.2.1 Socio-demographic characteristics

The risk of having a self-reported STI in the last 12 months was 1.4 times higher in female persons compared to male (OR: 1.40;CI(1.19-1.65),p < 0.001),it was 0.70 times lesser among person aged from 20 to 29 compared with younger persons(OR:0.70;CI:0.54-0.91; p=0.008).

For marital status, the risk of having self-reported STIs was 0.8 times lesser in married or cohabitated persons compared with single person(OR:0.80;CI:0.65-0.99; p=0.042). The risk of having a self-reported STI in the last 12 months was 1.4 times higher in persons who had primary/ordinary level or vocation education level compared to other with secondary or higher level (OR:1.45; 95%CI; 1.09-1.94;p=0.011), and it was about 1.8 higher in persons from City of Kigali compared with the persons from Northern province(OR: 1.76;CI: 1.30-2.39;p<0.001)(Table 3).

Table 3: Bivariate analysis of socio demographic factors associated with self-reported STI, using RAIHIS 2013-2014

Variables	Self-reported STI N=666 N Yes(%)	OR	CI	Pvalue
Sex (n=666)				
Male	260(6.82)	1		
Female	406(9.30)	**1.40**	**1.19-1.65**	**<0.001**
Age group(n=666)				
15-24	130(9.19)	1		
25-29	118(6.65)	**0.70**	**0.54-0.91**	**0.008**
30-39	248(8.48)	0.91	0.73-1.14	0.438
40-49	145(9.07)	0.98	0.77-1.26	0.910
50-59	25(5.41)	**0.56**	**0.36-0.88**	**0.011**
Marital status (n=666)				
Single	120(9.22)	1		
Married/Cohabitation	470(7.55)	**0.80**	**0.65-0.99**	**0.042**
Divorced/Widow	76(11.67)	**1.30**	**0.95-1.76**	**0.090**
Occupation (n=217)				
Public servant				
Yes	12(5.53)	1		
No	205(94.47)	1.5	0.85-2.75	0.156
Highest education level (n=666)				
Secondary and Higher	54(6.05)	1		
Primary/O'level/vocation	503(8.56)	**1.45**	**1.09-1.94**	**0.011**
No education	109(7.74)	1.30	0.93-1.83	0.124
Type of Residence (n=666)				
Rural	540(8.05)	1		
Urban	104(8.53)	1.06	0.85-1.32	0.57
Semi-urban	22(8.87)	1.11	0.71-1.74	0.64
Province (n=666)				
North	75(5.88)	1		
South	145(7.80)	1.35	1.01-1.80	0.039
East	183(8.64)	1.51	1.15-2.00	0.003
West	150(8.41)	1.47	1.10-1.96	0.009
City of Kigali	113(9.91)	**1.76**	**1.30-2.39**	**0.001**

4.2.2 Bivariate analysis of sexual risky behaviors

The risk of having a self-reported STI in the last 12 months was 1.4 times higher in the persons who drank alcohol at last sex compared with other who did not(OR: 1.40;95% CI: 1.15-

1.70;p<0.001); it was 2 times higher in persons had the last sex with the person who had drunk alcohol(OR:2.14;95% CI:1.80-2.56; p<0.001); it was 2 times higher in persons who had multiple sexual partners compared with those who did not(OR: 2.36;95% CI:187-2.98,p< 0.001),it was about 3 higher in persons who had ever been forced to have sex with a person(OR: 2.92;95% CI: 1.88-4.52;p<0.001)and was about 3 in persons who had HIV compared with those who did not(OR:2.93;95% CI:2.15-3.98;p<0.001)(Table 4).

Table 4: Bivariate analysis of sexual risky behaviors associated with self-reported STIs, using RAIHIS 2013-2014

Variables	Self-reported STI Yes n=666(%)	OR	CI	Pvalue
Condom use at first sex				
Yes	66(7.73)	1		
No	600(8.19)	1.06	0.82-1.38	0.64
Drinking alcohol status at last sex				
No	524(7.69)	1		
Yes	142(10.43)	**1.40**	**1.15-1.70**	**0.001**
Drinking alcohol status at last sex by person with last sex				
No	459(6.88)	1		
Yes	206(13.70)	**2.14**	**1.80-2.56**	**0.001**
Had multiple sex partners in last 12 months				
No	570(7.52)	1		
Yes	96(16.11)	**2.36**	**1.87-2.98**	**0.001**
Ever been forced to have sex with a person in the last 12 months				
No	640(7.95)	1		
Yes	26(20.16)	**2.92**	**1.88-4.52**	**0.001**
Had HIV				
No	611(7.74)	1		
Yes	55(19.71)	**2.93**	**2.15-3.98**	**0.001**

4.3 Multivariate analysis of factors associated with self-reported STI, using RAIHIS 2013-2014

The factors that showed association with self-reported STI at the p-value< 0.05were included in multivariate logistic regression model .

The risk of having a self-reported STI in the last 12 months was 1.3 times higher in female persons compared with male (AOR:1.34;at 95%CI[1.06-1.70]); it was 1.70 times greater for the

persons who had the education level of primary/ordinary level/vocation than other who had secondary or higher level (AOR:1.7;95% CI[1.14-2.56].

The risk of having a self-reported STI in the last 12 months was 2 times higher in residents of Kigali City compared with those from Northern province(AOR: 2.02;,95% CI[1.38-2.97]).

Considering sexual risky behavior factors, the risk of having a self-reported STI in the last 12 months was 2 times higher in person who had the last sex with the partner who had drunk alcohol than those who did not(AOR:2.14;95% CI[1.39-2.29]).

The risk of having a self-reported STI in the last 12 months was 2 times higher in persons who had multiple sexual partners than others (AOR:2.36;95%CI[1.65-3.37]);it was 2 times higher in persons who had HIV than others (AOR:2.76; 95% CI[1.85-4.12] and 2 times higher for those who ever been forced to have sex with a person in last 12 months than others (AOR: 2.20;95%CI[1.85-4.12])(Table 5).

Table 5: **Multivariate analysis of factors associated with self-reported STI, using RAIHIS 2013-2014**

Variables N=666	Self-reported STI N Yes(%)	Adjusted OR	CI	Pvalue
Sex				
Male	260(6.82)	1		
Female	406(9.30)	**1.34**	**1.06-1.7**	**0.014**
Age group				
15-24	130(9.19)	1		
25-29	118(6.65)	0.78	0.55-1.11	0.174
30-39	248(8.48)	0.91	0.66-1.25	0.565
40-49	145(9.07)	1.07	0.75-1.52	0.699
50-59	25(5.41)	0.73	0.42-1.28	0.278
Marital status				
Single	120(9.22)	1		
Married/Cohabitation	470(7.55)	1.16	0.74-1.79	0.510
Divorced/Widow	76(11.67)	1.04	0.58-1.88	0.878
Highest education level				
Secondary and Higher	54(6.05)	1		
Primary/ O'level/vocation	503(8.56)	**1.7**	**1.14-2.56**	**0.010**
No education	109(7.74)	1.4	0.87-2.25	0.159
Province				
North	75(5.88)	1		
South	145(7.80)	1.28	0.90-1.81	0.151
East	183(8.64)	1.56	**1.12-2.18**	**0.009**
West	150(8.41)	1.56	**1.10-2.20**	**0.014**
City of Kigali	113(9.91)	2.02	**1.38-2.97**	**0.001**
Drinking alcohol status at last sex				
No	524(7.69)	1		
Yes	142(10.43)	1.16	0.88-1.53	0.296
Drinking alcohol status at last sex by person with last sex				
No	459(6.88)	1		
Yes	206(13.70)	**2.14**	**1.39-2.29**	**0.001**
Had multiple sex partners in last 12 months				
No	570(7.52)	1		
Yes	96(16.11)	**2.36**	**1.65-3.37**	**0.001**
Ever been forced to have sex with a person in the last 12 months				
No	640(7.95)	1		
Yes	26(20.16)	**2.20**	**1.20-4.03**	**0.010**
Had HIV				
No	611(7.74)	1		
Yes	55(19.71)	**2.76**	**1.85-4.12**	**0.001**

CHAPTER V. DISCUSSION

The results showed that the prevalence of self-reported STIs was 8 %.This prevalence showed that STIs are a major public concern, even it was less than that found in other previous studies e.g. in South Africa among adult population, where it was 20% (21) and in Swaziland (19.4%) (3);this might be due to the small sample size used (N=808) compared to ours (N=8176) and also the differences in the population, and that prevalence was less than that found in the study conducted in Uganda for HIV Positive Women Opting for Intrauterine Contraception where the overall prevalence of STIs was 11.1% (22).This difference might also be due to the differences of the population as well as the RAHIS used the sample from general population while compared study used only HIV positive women attended the health facility.

For HIV prevalence that was 3% among the population included in the study, this was the same with HIV prevalence shown by Rwanda DHS in the general population (14,15),despite many undergoing strategies used by the ministry of health to fight again HIV infections, that might allow to the decrease of HIV new infection, then on its prevalence.

The findings revealed that among 279 persons who had HIV, 55 (19.7 %) had self-reported STIs. The study done in Ethiopia found STI prevalence among HIV positive patients at 8.5%. This difference might also due to the differences of the studies population as well as our study was community based, while that compared used specific group. The present study showed similar results with other done in South Africa which revealed that Self-reported STIs prevalence was 19.9% among people who were HIV positive.

This prevalence of self-reported STIs showed that it was taken as public health problem in general population and especially for the person who had HIV as well as it was estimated that the probability of HIV transmission per sexual contact is 6% if either partner has another STI other than HIV compared to 0.2% in the absence of STIs (3,21), hence, that might be considered for increasing STI screening and treatment among the population, especially the target group of person who have HIV infection.

Regarding social demographic risk factors, the risk of having self-reported STI was 1.34 times higher in female person than male. The results were similar with the previous study conducted in

Tanzania on risk factors for active syphilis which revealed that the prevalence of active syphilis was 9.1% in women and 7.5%in men and, but in youths (aged 15–19 years) the prevalence was higher in women (6.6%) than in men (2.0%)(19).The reason behind might be that women had more opportunity than men for being screened of STIs during antenatal consultation and thus, they might be aware of the presence of STIs and reported them, while men might have confusion of STI symptoms and not report them even if they had.

The risk of having self-reported STI was 1.70 times higher for the persons who had the **education level** of primary/ordinary level/vocation than other who had secondary or higher level These results were consistent with the previous study done by Themba G. Ginindza et al. in Swaziland which found that woman with lower education level were more likely to have a STI (11) and other studies had shown that women with less education have an increased risk of STIs, shown by Kakaire et al.;that women who have lower education may be predisposed to not have formal employment and may be sometimes dependent on the male sexual partner and unable to negotiate safer sex. In addition, they are supposed to not have access to STI preventive information and healthcare services (22). Hence, that might be evidence based for reinforcing the education sessions on STIs in the population with lower education level in order to allow them to the acquisition of information regarding STI preventive measures.

Residents of Kigali City were 2.4 times more likely to have self-reported STIs compared with those from other provinces. These results were in similar line with other conducted in Ghana which showed association between regions and STIs(24).The reason of that results might be that City of Kigali has many population who has different culture including many sexual workers, as well as the susceptibility to infection is dependent with the level of prevalence in a given geographical area. The differences might also probably be attributed to differences in access to health care facilities that are more available in City of Kigali than in other provinces, therefore the person with STIs might seek care and that allow them to be aware of their status concern the presence of STIs. This indicated that more attention should be taken in City of Kigali for the response of the needs in STI preventions.

For sexual risky behavior factors; the risk of having self-reported STIs was 2 times greater for those who had **last sex with person who had drunk alcohol** than those who did not. Our results are consistent with the study done in India which found that Indian men who were under the influence of alcohol while having sex with female sex workers, compared to those who were sober at the time, were more likely to be infected with HIV or to have an STI, as well as it was assumed that men who drank had more partners and were less likely to use condoms and for these reasons would be at greater risk (25). Otherwise, it was supposed that men who drink may also be more likely to see sex workers who drink, and the prevalence of HIV and STIs might be higher among these women (25).

Our findings were aligned with a systematic review conducted in South Africa and showed that alcohol consummation is associated with risks for STIs including HIV/AIDS, as well as alcohol is the most commonly used psychoactive substance and alcohol is among the most prevalent behaviors associated with sexual risks for HIV and other sexually transmitted infections , including risk-taking personality characteristics, drinking environments, expectations regarding the effects of alcohol on risk-taking and the psychogenic effects of alcohol on decision making (12).These results demonstrate the need of health education on STI and HIV prevention for the person who drink alcohol.

The risk of having self-reported STI was 2.3 times greater for those who had **multiple sexual partners** than others. That result was consistent with the similar study achieved in Ghana by Charles Agyei-Asabere on multiple sexual partnerships and sexually transmitted infections (24),and our study was comparable with that conducted on STIs among youth in Malawi which showed that among the factors associated with STIs multiple sexual relationships was included (11). Other study consistent with ours is that worked in Swaziland which found that the risk associated with STIs among women with two or more sexual life-time partners was five to eight times higher as compared to women with no sexual partners (3).Similarly with a study done in Ethiopia on sexually transmitted infections based on the syndromic approach where the multivariable logistic regression analysis, having new partner in the last three months or multiple sexual partners, were significantly associated with STI syndromes(5).Thus, having more than one sexual partner, engaging in casual sex, commercial sex work, greatly increases considerably

the probability of acquiring STIs. That was evidence that inspire to reinforce health education on STI prevention in the population and motivate the use of preventive measure such as the use of condom.

The odds of having self-reported STI was about 3 times greater for the person who **had HIV** compared with other who had not. Our study was not consistent with the study conducted in HIV positive status by Kakaire, where it was not associated with STIs in general, but when assessed by individual STIs Furthermore, biological findings sustain the mechanisms for STIs rising HIV acquisition and transmission through direct mucosal disruption, recruitment of HIV target cells to the genital tract, and by increased HIV load in plasma and genital secretions (22). In 2016,a study conducted in South Africa revealed that Self-reported prevalence of STIs was 20.4% ,among the study participants, 25.9% people were HIV positive and of these 19.9% reported a STI(2). That was just related with the reason behind that STIs increase risk of HIV acquisition and transmission as furthermore, the inflammation resulting from viral and non-viral STIs increases viral shedding of HIV in the genital tract and also increases the risk of HIV transmission to the sex and it is estimated that the probability of HIV transmission per sexual contact is 6% if either partner has another STI other than HIV compared to 0.2% in the absence of STIs (2,3,5).

The risk of having self-reported STI was 2.2 times greater for those who **ever been forced to have sex with a person** in last 12 months than others. These results were similar with other found in previous study conducted in South Africa in which HIV positive status and being forced to have sex with a person were associated with having STIs (18,21). Studies have established that sexual and gender-based violence is associated with poor reproductive health outcomes, including STIs (26). The risk of contracting STIs is higher among women who experience sexual violence (23). Partner abuse, increases the risk of STIs, including HIV and Intimate partner violence limits the possibility of negotiating for safer sex, forced sex is usually unprotected, thus exposing the victims to the risk of STIs(23). Hence, it is assumed that reply to sexual violence would diminish effects on STIs (23).

CONCLUSION

Considerable proportions of the population aged between 15-59 years were found to have self-reported STIs (8.5%). This study also found a high prevalence of HIV among person who had self-reported STIs and revealed that the factors associated with self-reported STIs were: being female person, having lower education level, being residents of City of Kigali, having last sex with person who had drunk alcohol, having multiple sexual partners, having HIV and having ever been forced to have sex with a person in last 12 months. These findings highlight the need for reinforcement of the interventions aimed to prevent and control STIs in the population.

RECOMMENDATIONS

- **To MoH/RBC/HIV division:**

- Improve the existing responses in STI prevention through increasing the follow up of the implementation of related measures such as IEC sessions conducted on STIs, access to condoms
- Enhance the implementation of the screening of STI in the population in health facilities for public awareness.

- **Health facilities and community level:**

- Enhance education sessions regarding STIs preventive measures including to avoid sexual risky behaviors in the population
- Increase the IEC on STIs, especially for female, those who have lower education level, the residents of City of Kigali and the person living with HIV, in order to allow them the acquisition of information regarding STI preventive actions.
- To council and convince the population on the awareness of the adoption of safe sexual behaviors (abstinence or use of condom), especially in the area of alcohol consummation, and for the persons who should have multiple sexual partners.
- Enhance the IEC to the population for avoiding rape in sexual relationship and this would prevent the effects on STIs.
- Enhance the screening of the population on STIs in health facilities for public awareness of these infections especially for the persons living with HIV.

- A study on STIs prevalence and associated risk factors using recent data and comparing with this one should be the model setting.

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APPENDICES

Ethical approval from IRB (see annex)

Authorization letter from RBC for publication of findings using RAIHIS data 2013-2014

(see annex)