

5-11-2013

# Comparison of HIV-Related Knowledge, Attitudes, and Behavior Among People Aged 15-49 Years Between Lesotho and Senegal

Sophoan Tun  
*Institute of Public Health*

Follow this and additional works at: [http://scholarworks.gsu.edu/iph\\_theses](http://scholarworks.gsu.edu/iph_theses)

---

## Recommended Citation

Tun, Sophoan, "Comparison of HIV-Related Knowledge, Attitudes, and Behavior Among People Aged 15-49 Years Between Lesotho and Senegal." Thesis, Georgia State University, 2013.  
[http://scholarworks.gsu.edu/iph\\_theses/256](http://scholarworks.gsu.edu/iph_theses/256)

This Thesis is brought to you for free and open access by the School of Public Health at ScholarWorks @ Georgia State University. It has been accepted for inclusion in Public Health Theses by an authorized administrator of ScholarWorks @ Georgia State University. For more information, please contact [scholarworks@gsu.edu](mailto:scholarworks@gsu.edu).

COMPARISON OF HIV-RELATED KNOWLEDGE, ATTITUDES, AND BEHAVIOR  
AMONG PEOPLE AGED 15-49 YEARS BETWEEN LESOTHO AND SENEGAL

by

SOPHOAN TUN

GEORGIA STATE UNIVERSITY

A Thesis Submitted to the Graduate Faculty  
Of Georgia State University in Partial Fulfillment  
of the  
Requirements for the Degree

MASTER OF PUBLIC HEALTH

ATLANTA, GEORGIA

30303

## TABLE OF CONTENTS

	Page
ACKNOWLEDGEMENTS .....	iii
LIST OF TABLES .....	iv
CHAPTER	
I. INTRODUCTION	
1. Background .....	1
2. Research Questions .....	7
II. LITERATURE REVIEW	
1. HIV Epidemics .....	8
2. HIV-related Factors .....	14
III. METHODS AND PROCEDURES	
1. Background .....	20
2. Demographic and Health Surveys .....	20
3. Sample Design .....	21
4. Study Population .....	23
5. Data Variables .....	24
6. Statistical Analysis .....	40
IV. RESULTS	
1. Descriptive Analysis .....	41
2. Logistic Regression Analysis .....	50
V. DISCUSSION AND CONCLUSION	
1. Discussion .....	58
2. Strength and Limitations .....	63
3. Conclusion .....	63
REFERENCES .....	65

## **Acknowledgements**

I would like to acknowledge the United State government, and the Fulbright Scholarship, the Institute of International Education, for giving me the great opportunity to study in the United States. I would like also to thank the faculties and staffs of Institute of Public Health at Georgia State University. I would like to especially thank Dr. Richard Rothenberg, my thesis chair, Dr. Sheryl Strasser, my thesis committee member, and Dr. Solomon Okosun for providing guidance and support throughout the process. Last, I am grateful for support and encouragement of my family and friends during my study in the United States.

## List of Tables

	Page
Table 1.1: Socio-demographic characteristics of people aged 15-49 years between Lesotho (2009) and Senegal (2010-11) .....	42
Table 1.2: HIV prevalence of people aged 15-49 years between Lesotho (2009) and Senegal (2010-11) .....	43
Table 1.3.1: Descriptive characteristics of HIV-related knowledge among people aged 15-49 years between Lesotho (2009) and Senegal (2010-11) .....	45
Table 1.3.2: Descriptive characteristics of HIV-related attitudes among people aged 15-49 years between Lesotho (2009) and Senegal (2010-11) .....	46
Table 1.3.3: Descriptive characteristics of sexual behavior among people aged 15-49 years between Lesotho (2009) and Senegal (2010-11) .....	48
Table 1.3.4: Descriptive characteristics of other HIV-related factors among people aged 15-49 years between Lesotho (2009) and Senegal (2010-11).....	49
Table 2.1.1: Univariate analysis of associations between HIV status and selected variables of HIV-related knowledge, attitudes, and behavior in Lesotho (2009) and Senegal (2010-11).....	51
Table 2.1.2: Multivariate analysis of associations between HIV status and selected variables of HIV-related knowledge, attitudes, and behavior controlled for socio-demographic characteristics (Age, Gender, Residence, Education, Wealth Index, and Marital Status) in Lesotho (2009) and Senegal (2010-11) .....	53
Table 2.2.1: Univariate analysis of associations between countries and selected variables of HIV-related knowledge, attitudes, and behavior .....	55
Table 2.2.2: Multivariate analysis of associations between countries and selected variables of HIV-related knowledge, attitudes, and behavior controlled for socio-demographic characteristics (Age, Gender, Residence, Education, Wealth Index, and Marital Status) .....	57

**APPROVAL PAGE**

**COMPARISON OF HIV-RELATED KNOWLEDGE, ATTITUDES, AND BEHAVIOR  
AMONG PEOPLE AGED 15-49 YEARS BETWEEN LESOTHO AND SENEGAL**

by

SOPHOAN TUN

Approved:

Dr. Richard Rothenberg

---

Committee Chair

Dr. Sheryl Strasser

---

Committee Member

April 15, 2013

---

Date

## CURRICULUM VITAE

### SOPHOAN TUN

1179 Church Street, Unit N  
Decatur, GA 30030

(678) 644 0483  
[tunsophoan@gmail.com](mailto:tunsophoan@gmail.com)

### EDUCATION

**Fulbright Student Scholarship** 2011-2013  
**Georgia State University**, Atlanta, Georgia Expected graduation May 2013  
*Master of Public Health, Prevention Sciences*

**Institute of Foreign Languages**, Phnom Penh, Cambodia October 2004 – August 2008  
*Bachelor of Education*

**University of Health Sciences**, Phnom Penh, Cambodia October 2002 – September 2007  
*Bachelor of Pharmacy*

### WORK EXPERIENCE

**Emerging Infectious Disease Journal** December 2012 – April 2013  
**Centers for Disease Control and Prevention**, Atlanta, Georgia  
*Student Intern*

**Royal Rattanak Hospital**, Phnom Penh, Cambodia February 2009 – June 2011  
*Pharmacist*

**Pharmalink Pharmacy**, Phnom Penh, Cambodia July 2008 – January 2009  
*Pharmacist*

### COMPUTER SKILLS

- Microsoft: Word, Excel, PowerPoint, and Outlook
- Statistical Software: SPSS (working knowledge), Epi Info (basic knowledge)

## ABSTRACT

**INTRODUCTION:** HIV-related knowledge, attitudes, and behavior are important for HIV prevention, so many studies had been conducted to assess these factors in each country. However, not many studies had been done to compare these factors between high and low HIV prevalence countries. This study aimed at comparing HIV-related knowledge, attitudes, and behavior between an African country with high HIV prevalence, Lesotho, and an African country with low HIV prevalence, Senegal.

**METHODS:** The study used secondary data from Demographic and Health Surveys (DHS), including the 2009 Lesotho DHS and the 2010-11 Senegal DHS, which were nationally representative datasets. Sample sizes of study population were 10,623 in Lesotho and 20,102 in Senegal. IBM SPSS 20 was used to run chi-square tests for descriptive results of all independent and dependent variables, and binary logistic regression for associations between HIV-related knowledge, attitudes, and behavior and HIV status, and associations between these factors and countries.

**RESULTS:** In both countries, HIV infection had significantly positive associations with having more than one sex partners (Lesotho OR 1.4, Senegal OR 2.7), and with having sexually transmitted disease (STD) in the last 12 months (Lesotho OR 2.0, Senegal OR 4.0). Besides, other variables relating to HIV knowledge, attitudes, and behavior did not show necessarily important associations with HIV status. The study also found that people in Lesotho were less likely to have better comprehensive correct knowledge (OR .8), and use condom with the most recent partner (OR .3), but more likely to have better knowledge of mother-to-child transmission (MTCT) (OR 1.9) and its prevention (OR 3.8). In terms of attitudes, respondents from Lesotho were more likely to have positive HIV-related attitudes toward people living with HIV (OR 15.2), agree with women's ability to negotiate safer sex (OR 1.7), and support condom education for youth (OR 2.2). Behaviors between respondents in Lesotho and Senegal were also significantly different, with more respondents in Lesotho reporting earlier sexual initiation (OR 1.4), having more sex partners (OR 4.0), paying for sex in the last 12 months (OR 2.0), having any STD in the last 12 months (OR 3.0), and receiving the most recent HIV test results (OR 2.0) than people in Senegal. Knowledge of HIV prevention methods in Lesotho did not differ significantly from Senegal (p-value .9).

**CONCLUSION:** Having more than one sexual partners and having STD were important indicators for HIV infection in both countries. Compared to Senegal, people in Lesotho seemed to have better knowledge relating to MTCT of HIV, more positive HIV-related attitudes, but more risky sexual behavior. Continued intervention research is warranted as there are clear patterns of risk between Lesotho and Senegal that highlight opportunities for more tailored prevention efforts surrounding HIV knowledge, attitudes, and sexual risk-taking behavior.

**Key words:** HIV/AIDS, HIV knowledge, HIV attitudes, Sexual behavior, Senegal, Lesotho



### **Author's Statement Page**

In presenting this thesis as a partial fulfillment of the requirements for an advanced degree from Georgia State University, I agree that the Library of the University shall make it available for inspection and circulation in accordance with its regulations governing materials of this type. I agree that permission to quote from, to copy from, or to publish this thesis may be granted by the author or, in his/her absence, by the professor under whose direction it was written, or in his/her absence, by the Associate Dean, College of Health and Human Sciences. Such quoting, copying, or publishing must be solely for scholarly purposes and will not involve potential financial gain. It is understood that any copying from or publication of this dissertation which involves potential financial gain will not be allowed without written permission of the author.

Sophoan Tun

---

Signature of Author

### Notice to Borrowers Page

All these deposited in the Georgia State University Library must be used in accordance with the stipulations prescribed by the author in the preceding statement.

The author of this thesis is:

Sophoan Tun  
1179 Church St Unit N  
Decatur, GA 30030

The Chair of the committee for this thesis is:

Richard Rothenberg, MD, MPH  
Institute of Public Health  
College of Health and Human Sciences

Georgia State University  
P.O. Box 3995  
Atlanta, Georgia 30302-3995

Users of this thesis who not regularly enrolled as students at Georgia State University are required to attest acceptance of the preceding stipulation by signing below. Libraries borrowing this thesis for the use of their patrons are required to see that each user records here the information requested.

NAME OF USER	ADDRESS	DATE	TYPE OF USE (EXAMINATION ONLY OR COPYING)

## **Chapter I**

### **INTRODUCTION**

#### **1. Background**

##### **1.1. General Knowledge about HIV**

According to World Health Organization (WHO), human immunodeficiency virus (HIV) is “a retrovirus that infects cells of the immune system, destroying or impairing their function” (WHO, 2013, para. 1), which can lead to acquired immunodeficiency syndrome (AIDS), the latest stage of HIV infection when the body’s immune system has been severely damaged and lacks of capacity to fight against diseases.

Scientists believed that HIV was originated from the mutation of Simian immunodeficiency virus (SIV) found in a type of chimpanzee in West Africa. People got infected with the virus because of contacting with infected blood of this type of chimpanzees when people hunted them for meat (NIAID, 1999). The first known case of HIV infection in human was diagnosed in the blood of a man in Kinshasa, Democratic Republic of the Congo in 1959 (CDC, 2012). The cases of AIDS were first recognized in 1981 when the Centers for Disease Control and Prevention (CDC) reported the rare cases of unusual clusters of Pneumocystic carinii pneumonia and Kaposi’s sarcoma among homosexual men in New York and California (CDC, 1981).

People who get infected with HIV usually do not develop into AIDS immediately. During the first few weeks of infection, some people may have no symptoms at all, while some might have flu-like symptoms for one to two weeks. People infected with HIV may feel or look healthy for many years although HIV is still affecting their body before developing into AIDS when the immune system becomes very weak, and the patients will experience many symptoms caused by opportunistic infections, and finally die due to these infections. There is no cure for HIV/AIDS, but antiretroviral drugs can help to slow down the progression of developing HIV infection to AIDS, which allows people living with HIV to be able to live longer (CDC, 2012).

HIV can be transmitted from one person to another through three main ways, including sexual transmission (unprotected sexual intercourse either anal or vaginal), transmission through blood (transfusion of contaminated blood, sharing of contaminated needles), and mother-to-child transmission (during pregnancy, delivery, or through breastfeeding) (WHO, 2013).

## **1.2. Global Epidemic of HIV**

According to the Joint United Nation Programme on HIV/AIDS (UNAIDS, 2012), the incidence of HIV infection has been decreasing globally since 1997, the year that the incidence reached the peak with 3.2 million people acquiring HIV infection. At the end of 2011, there were about 2.5 million people newly infected with HIV, which were 20 percent fewer than in 2001. Even though there has been a decline in the global trend of new HIV infections, not all the regions have the same trend. The regions that had the highest rate of decline from 2001 to 2011 were Caribbean (42 percent) and sub-Saharan Africa (25 percent). By contrast, in the Middle East and North Africa, HIV incidence

went up from 27,000 in 2001 to 37,000 in 2011, which accounted for more than 35 percent of increase. In Eastern Europe and Central Asia, the number of people newly infected with HIV remained stable for several years before it started increasing in the late 2000s. In Western and Central Europe and North America, the rate has been stable for the last several years.

Likewise, AIDS-related mortality has been declining worldwide. The reductions started since the mid-2000s due to the scaled-up antiretroviral therapy (ART) and the decrease of HIV new cases. Globally, there was a decline in the number of deaths from AIDS-related causes from 2.3 million in 2005 to 1.7 million in 2011 by 24 percent. Between 2005 and 2011, AIDS-related mortality decreased by 32 percent in sub-Saharan Africa, 48 percent in Caribbean, 41 percent in Oceania, 10 percent in Latin America, 4 percent in Asia, and 1 percent in Western and Central Europe and North America. On the other hand, the increase of people dying from AIDS occurred in other two regions, Eastern Europe and Central Asia region, and the Middle East and North Africa region by 21 and 17 percent, respectively (UNAIDS, 2012).

Although the incidence of HIV and the mortality of AIDS have dropped during the last several years, the global prevalence of HIV/AIDS has accelerated. This is because of the scaled-up ART that can prolong the life of people infected with HIV. In 2011, there were about 34 million people living with HIV worldwide, which increased from 29.4 million in 2001. The global prevalence of HIV/AIDS in 2011 was 0.8 percent among adult aged 15-49 years (UNAIDS, 2012).

### **1.3. Preventions of HIV Transmissions**

The most effective way to prevent infectious diseases is vaccination.

Unfortunately, HIV vaccine is still not available for the public although many researchers have tried to develop the vaccine for more than 20 years (NIAID, 2012). The challenges in developing HIV vaccine that is safe, effective, and durable include the high genetic variability of HIV, the lack of knowledge of immune correlates of protection, the absence of relevant and predictive animal models, and the complexity of the implementation of efficacy trials, especially in developing countries (WHO, 2013). Moreover, even though antiretroviral drugs can help prolong the life of those who infected with HIV, there is no cure for HIV/AIDS. Thus, to control the epidemic of HIV, the effective methods are those dealing with the prevention of HIV transmission (Biswas, 2012).

It is believed that combination prevention strategies by using behavioral, biomedical, and structural strategies together can be more effective in preventing the new HIV infection among vulnerable groups as well as in general population (Hankins & Zalduondo, 2010). In spite of some cases of HIV infection found to be transmitted via other routes of transmission, such as drug injections, transfusion of blood products, and mother-to-child transmission (MTCT), sexual transmission remains the primary mode of HIV transmission, which accounts for 85 percent of all worldwide cases (Quinn, 2006). Thus, many programmes focus the prevention of HIV from sexual transmission. Combination prevention of the sexual transmission of HIV should deal with behavior change, condom provision, male circumcision, programmes for sex workers and men who have sex with men (MSM), and access to ART (UNAIDS, 2012).

The studies in many countries with generalized epidemics of HIV showed the associations between the changes of sexual behavior and the decline of HIV prevalence (Hallett et al., 2006; Timothy et al., 2009; Gregson et al., 2006). However, it is still

challenging to change people behaviors, including knowledge, motivations and choices, which are influenced mainly by sociocultural norm and risk assessment of immediate benefits and future consequences (UNAIDS, 2012). In addition, stigma and discrimination is an obstacle for HIV prevention because it leads to denying HIV testing, limiting access to healthcare services and education, and withholding information about the status from family members, friends and health care providers (Tomaszewski, 2012). Thus, it is crucial for society to promote laws and policies that ensure the human rights in accessing HIV prevention, treatment, care and support (UNAIDS, 2006).

According to UNAIDS (2012), “condom use is a critical element in a comprehensive, effective and sustainable approach to HIV prevention and treatment” (p. 19). Condom is considered to be one of the most efficient methods that can prevent the transmission of sexually transmitted diseases (STDs), including HIV. Condom use increases in many countries with high HIV prevalence, except for a few countries, such as Benin, Burkina Faso, Côte d’Ivoire and Uganda, where the use of condom decreases (UNAIDS, 2012). Moreover, knowledge about condoms in some countries with high prevalence of HIV is still limited, in particular among young females who are usually denied information about and access to condoms, and who do not have right in negotiating the use of condom (Tomaszewski, 2012). To have an effective prevention, HIV prevention education and condom promotion need to overcome the issues of gender and cultural factors.

Male circumcision was found in three randomized controlled trials in Kenya, South Africa, and Uganda to reduce the risk of heterosexually acquired HIV infection in men by approximately 60 percent (Auvert et al., 2005; Bailey et al., 2007; Gray et al.,

2007). Since 2007, voluntary medical male circumcision has been recommended by WHO/UNAIDS for HIV prevention, especially in countries and regions with heterosexual epidemic, and high HIV and low male circumcision prevalence (WHO, 2013). To implement this intervention, those countries need to adopt policies and train healthcare providers about the safe circumcision procedures (UNAIDS, 2012).

Sex workers have higher chance of acquiring HIV. A systematic review reported that female sex workers were 13.5 times more likely to live with HIV than all women of reproductive age (Baral et al., 2012). Thus, the efforts of prevention should also specifically target this group of population. Based on UNAIDS (2012), risk-reduction programmes for sex workers have been practiced in 73 percent of reported countries.

HIV epidemic among MSM continues to expand in countries of all incomes in 2012 (Beyrer et al., 2012). In many high income countries, such as Australia, France, United Kingdom and United States, although overall trend of HIV epidemic has been decreased, the trend among MSM is increasing (CDC, 2010; Sullivan et al., 2009). In most countries of Africa, Asia, and Latin America, HIV infection rates among MSM are the highest (Beyrer et al., 2010). Despite the high HIV burden, prevention coverage for MSM is not sufficient. In 2011, the median prevention coverage among MSM worldwide was 55 percent in capital cities, while most of countries reported at least 40 percent coverage (UNAIDS, 2012). In addition, the median proportion of MSM receiving HIV test in the last 12 months was only 38 percent (UNAIDS, 2012). Therefore, funding for HIV programmes targeted MSM has increased between 2006 and 2011 (UNAIDS, 2012).

ART has also been proven to reduce sexual transmission of HIV. A study about Prevention of HIV-1 infection with early ART (Cohen et al., 2011) found that ART



reduced the odds of sexual transmission within serodiscordant heterosexual partners. Moreover, WHO (2012) recommended the partner living with HIV to be offered ART regardless of his or her CD4 count. Besides, other studies also demonstrated that antiretroviral drugs could decrease the chance of being infected with HIV for an uninfected person (UNAIDS, 2012).

## **2. Research Questions**

Advances in HIV research are attributed to biological, clinical science. However, attention to behavioral risk factors offers the opportunity to explore avenues for intervention development. Therefore, many studies have been done to assess HIV-related knowledge, attitudes, and behavior in each country, but not many of them compared these factors between countries with high and low HIV prevalence. The purpose of this study is to compare HIV-related knowledge, attitudes, and behavior between an African country with high HIV prevalence, Lesotho, and an African country with low HIV prevalence, Senegal.

Research questions of this study include:

1. Does HIV-related knowledge, attitudes, and behavior of people aged 15-49 years living in an African country with high HIV prevalence, Lesotho, differ from those living in an African country with low HIV prevalence, Senegal?
2. What are the associations between the factors regarding HIV-related knowledge, attitudes, and behavior and HIV status in Lesotho and Senegal? How are they different between these two countries?

## **Chapter II**

### **LITERATURE REVIEW**

#### **1. HIV Epidemics**

##### **Sub-Saharan Region**

According to UNAIDS (2012), sub-Saharan Africa has been the region that bears the highest burden of the global HIV. In 2011, there were about 23.5 million people in the region living with HIV, which accounted for 69 percent of the global total of people living with HIV. Because of increasing investment in the HIV response by national governments, partners, and multilateral and bilateral initiatives, progress in HIV prevention and response has been made within Africa. After peaking in 1997, new HIV infections began to decrease. Between 2001 and 2011, HIV incidence in sub-Saharan Africa declined 25 percent from 2.4 million to 1.8 million cases per year, although these cases represented 71 percent of all new global infections (UNAIDS, 2012). Due to the increase in availability of ART and improved quality of care and support for people living with HIV, it resulted in a decline of 32 percent in AIDS-related mortality in the region from 1.8 million in 2005 to 1.2 million in 2011 (UNAIDS, 2012). Nevertheless, 70 percent of global AIDS-related mortality occurred in sub-Saharan Africa. In addition, the prevalence of people living with HIV declined from 5.9 percent in 2001 to 5.0 percent

in 2009 among adult aged 15-49 years. The HIV prevalence across the region ranged from 0.2 percent in Madagascar to 25.9 percent in Swaziland (UNAIDS, 2012).

However, HIV epidemics varied considerably across sub-Saharan Africa. Southern Africa has been the most severely affected with about 11.3 million people living with HIV, according to the United States Agency for International Development (USAID) HIV/AIDS Health Profile of Southern Africa (2011). This number increased by 31 percent between 1999 and 2009. In 2009, this sub-region accounted for about 31 percent of HIV incidence, 34 percent of AIDS-related mortality, and 34 percent of HIV prevalence worldwide. Among 10 countries (Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Swaziland, Zambia, and Zimbabwe), except for Angola, the other nine countries had more than 10 percent of HIV prevalence. Among them, three countries had greater than 20 percent of HIV prevalence, including Swaziland (25.9 percent), Botswana (24.8 percent), and Lesotho (23.6 percent).

In East Africa including nine countries (Burundi, Democratic Republic of Congo, Ethiopia, Kenya, Madagascar, Rwanda, Sudan, Tanzania, and Uganda), based on the USAID HIV/AIDS Health Profile of East Africa (2010), HIV prevalence has stabilized and declined in selected areas. In 2009, adult HIV prevalence in this sub-region was greater than 1 percent, except for Madagascar where HIV prevalence was only 0.1 percent. Among them, Kenya, Tanzania, and Uganda had more than 5 percent of adult HIV prevalence.

According to the USAID HIV/AIDS Health Profile of West Africa (USAID, 2011), HIV prevalence is classified as relatively stable and lower than in the East and Southern Africa. In 2009, adult HIV prevalence was 2 percent or lower in most of

countries in this sub-region, consisting of Benin, Burkina Faso, Gambia, Ghana, Guinea, Liberia, Mali, Mauritania, Niger, Senegal, and Sierra Leone, except for four countries where adult HIV prevalence exceeded 2 percent, including Cameroon (5.3 percent), Côte d'Ivoire (3.4 percent), Gabon (5.2 percent), and Nigeria (3.6 percent).

Based on WHO data of the African region (2012), in spite of overall progress in fighting against HIV epidemics in sub-Saharan African, many challenges for health-sector response to HIV exist. Some of the challenges include: limited qualified human resources for health services, inadequate laboratory capacity and supply management system, and insufficient financial resources. Moreover, high comorbidity levels because of diseases such as tuberculosis, frequent outbreaks of other communicable diseases, and natural or human-made disasters further affected the already-weakened health systems. Additionally, issues of high levels of stigma and discrimination related to HIV/AIDS in most countries pervade, and existent national legal frameworks are unable to effectively uphold the rights of all people to access high quality HIV prevention, treatment, care and support services.

### **Lesotho**

According to the World Bank (2012), Lesotho is a small landlocked country of about 30,000 square kilometer in size with about 2 million of population in Southern Africa. The country is under a constitutional monarchy. Although it has a lower middle income level, there are still about 60 percent of people living below the poverty line (average per capita income estimated to be US\$1.50 dollars per day). Lesotho faces many issues, such as income inequality, HIV/AIDS, water resource management, transportation, disasters, and education. The country has weak health service performance that leads to

poor health outcomes, which have been exacerbated by the HIV epidemic. Based on the Lesotho 2009 Demographic Health Surveys (DHS), HIV/AIDS has affected the country negatively in terms of: life expectancy, productivity, household poverty, family structures, orphans, and child-headed households (MOHSW & ICF Macro, 2010).

UNAIDS (2012) estimated that adult prevalence rate of HIV in Lesotho was 23.3 percent in 2011, which was the third highest in the world. According to the USAID Lesotho HIV/AIDS Health Profile (2010), HIV was first reported in 1986, and spread rapidly after 1993. The adult prevalence increased from about 4 percent in 1993, to 15 percent or higher since 1995. However, the epidemic appeared to have stabilized since 2000. HIV prevalence in Lesotho varied across the demographic and socioeconomic status. According to the Lesotho 2009 DHS (MOHSW & ICF Macro, 2010), HIV prevalence among women was higher than men (27 and 18 percent, respectively). Moreover, the prevalence increased with age. The highest percentage of HIV prevalence for women was among the age group of 35-39 years, while for men was among the age group of 30-34 years. The rate of HIV positive among people living in urban area (27 percent) was higher than those living in rural area (21 percent). The infection levels did not differ by educational level. However, notable patterns of HIV by gender were observed: women with no education had the lowest prevalence, while men with no education had the highest prevalence. The relationship between HIV status and wealth quintile was not uniform, but men and women in the lowest wealth quintile had the lowest HIV prevalence. For marital status, HIV prevalence was highest among men and women who were widowed, divorced or separated, and lowest among those who had never been married.

The number of AIDS-related deaths peaked in 2005 (20,000) and declined to 14,000 in 2011. This was mainly because of the introduction of ART (Khobotlo et al., 2009). The coverage of ART among people in need increased sharply from 10 percent in 2005 to 68 percent in 2009 (USAID, 2010).

The report of Lesotho HIV prevention response and modes of transmission analysis (Khobotlo et al., 2009) revealed that HIV incidence in Lesotho also declined from the peak incidence 3.6 percent in 1995 to 1.7 percent in 2007. In 2008, about 25,000 people were newly infected with HIV. Interestingly, HIV infections appeared to be high among people in “low risk” partnerships (those who had a single partner). Based on a study from the National AIDS Commission (NAC) in 2008, people reporting a single partner accounted for 35 to 62 percent of HIV incident cases. This may have been due to a high level of HIV discordancy in steady couples, combined with low condom use and possibly secret sexual partners without reporting in the surveys. Another important mode of HIV transmission was MTCT. However, because of ART, the number of new cases attributed to MTCT had been declining. Besides the heterosexual transmission and MTCT of HIV, other factors appeared to be less important. Among total incidence, the rates were about 3 percent for commercial sex, and 3 to 4 percent for MSM. Moreover, a small number of new infections were estimated to be attributable to unsafe medical injection, while blood transfusion was assumed to have no contribution to the total incidence. Additionally, the incidence rate of HIV infection relating to injection drug use was negligible based on survey data.

### **Senegal**

According to the World Bank (2012), Senegal is a Sahelian country of about 13.7

million of population with a national territory of 196,722 square kilometers in Western Africa. It is a lower middle income country. Unlike most of countries in sub-Saharan Africa, Senegal has been successful in preventing HIV epidemic. It is among the countries having the lowest HIV prevalence in the region despite the regional, surrounding epidemic, meaning that the HIV is concentrated within particular subgroups of the population (USAID, 2010).

HIV epidemic in Senegal has stabilized. In 2011, HIV prevalence among people aged 15 to 49 years was 0.7 percent (UNAIDS, 2012), which was the same as in 2005 (DHS, 2005). In 2011, there were 53,000 people living with HIV, and 1,600 HIV/AIDS-related deaths (UNAIDS, 2012). According to the USAID Senegal HIV/AIDS Health Profile (2010), HIV was concentrated among female commercial sex workers with the prevalence rate of 19.8 percent in Dakar and 29 percent in Ziguinchor in 2006, and among MSM with the prevalence rate of 21.5 percent in Dakar in 2004. Based on the International HIV/AIDS Alliance, HIV prevalence rates among the general population vary on a regional basis. The regions that border Guinea-Bissau to the south, including Kolda and Ziguinchor had more than 2 percent of HIV prevalence. According to the Senegal 2010-11 DHS, the HIV prevalence among women aged 15 to 49 years was 0.8 percent, which was higher than men (0.5 percent). For women, the highest prevalence of HIV was among those in the age group of 45-49 years with the rate of 2.4 percent, while it was among those in the age group of 40-45 years for men with the rate of 1.5 percent. Unlike men, women living in rural area had higher prevalence of HIV than those living in urban area. For the levels of education, the highest rate of HIV was among women with primary education (1.2 percent), and among men with no education (0.9 percent). Based

on wealth index, women in the second wealth quintile (1.5 percent) and men in the lowest wealth quintile (0.8 percent) had the highest prevalence of HIV. In both women and men, those who were divorced or separated (4.6 percent for women, 3.7 percent for men) had the highest prevalence when compared with single individuals (0.4 percent for women, 0.3 percent for men).

USAID (2010) attributes a number of reasons for Senegal's success in controlling the HIV epidemic, including the country's conservative sexual norms and active public/private stakeholder engagement since the initial HIV crisis in the mid-1980s. Senegal has championed condom use among sex workers and the general population and rates of use increased threefold within the span of a decade. Despite the success, some challenges for HIV prevention exist, such as population movement across borders, early sexual debut, lack of knowledge about HIV status, and high HIV prevalence among sex workers and MSM.

## **2. HIV-related Factors**

### **2.1. HIV-related Knowledge**

HIV knowledge plays very important role in HIV prevention. WHO (1999) stated that without available vaccine or cure, public knowledge about HIV was the most fundamental tool to fight against HIV epidemic. A study in Namibia in 2009 showed the relationships between improvements across key knowledge and behavior and declines in HIV prevalence among young people aged 15-24 years (UNAIDS, 2010). In addition, UNAIDS (2010) also indicated that behavior change and increased comprehensive correct knowledge were associated with the reduction of HIV incidence and prevalence in many countries with high HIV prevalence.



## 2.2. HIV-related Attitudes

HIV stigma and discrimination is a barrier to HIV prevention. The United Nation Secretary-General Ban Ki Moon mentioned in *The Washington Times* (August 6, 2008) that:

Stigma remains the single most important barrier to public action. It is a main reason why too many people are afraid to see a doctor to determine whether they have the disease, or to seek treatment if so. It helps make AIDS the silent killer, because people fear the social disgrace of speaking about it, or taking easily available precautions. Stigma is a chief reason why the AIDS epidemic continues to devastate societies around the world. (para. 7)

A study found that people living with HIV experienced high levels of stigma were more than four times more likely to report poor access to care (Sayles et al., 2009). In Nigeria, more than 1 in 5 people living with HIV reported to be refused for health services because of their HIV status (UNAIDS, 2012). Although reducing stigma and discrimination has been addressed in the national AIDS response in 81 percent of countries worldwide, the levels of stigma and discrimination are still high in some countries (UNAIDS, 2010). A nine-country study conducted by the International Labor Organization and the Global Network of people living with HIV (2012) found that the percentage of people living with HIV who reported discriminatory attitudes among employers and co-worker ranged from 8 percent in Estonia to 54 percent in Malaysia. Another study also documented high levels of HIV stigma reported by both people living with HIV and nurse in five African countries, including Lesotho, Malawi, South Africa, Swaziland, and Tanzania (Holzemer et al., 2009).

Gender inequality also drives the HIV epidemic. In sub-Saharan African, among people living with HIV, women account for 58 percent, and bear the highest burden of care (UNAIDS, 2012). Moreover, due to social and economic power imbalances between men and women and the associated limitations in access to services, many women and girls do not have much ability to negotiate safer sex to protect themselves from HIV. Based on DHS in 19 sub-Saharan Africa countries, less than 75 percent of women in 12 countries believed that a woman was justified in refusing to have sex with her husband if she knew that he had sex with other women (UNAIDS, 2012).

### **2.3. Sexual Behavior**

#### **2.3.1. Early sexual debut**

Early initiation of intercourse poses potential risks for unintentional pregnancy, abortion, and STDs, especially HIV, among young people. A systematic review about the early sexual debut as a risk factor for HIV infection among women in sub-Saharan Africa showed significant association between early sexual debut and HIV infection (Stockl et al., 2013). Two studies in Zimbabwe demonstrated that young people having first sex intercourse before the age of 15 years had an increased risk for HIV transmission (Pettifor et al., 2004; 2009).

#### **2.3.2. Multiple sex partners**

People who have multiple sex partners are considered to be one of the high risk groups of acquiring HIV (Case et al., 2012). The more sex partners people have, the greater their chances are of getting HIV or other STDs (CDC, 2007). A study about multiple sex partners and perceived risk of HIV infection in Zambia (Meekers, 2009) indicated that having multiple sexual partners was the strongest predictor of perceived

risk of HIV. Compared to women, men were more likely to have multiple partners, but less likely to consider themselves at risk of HIV.

### **2.3.3. Condom use**

Apart from abstinence, condom use is one of the most efficient methods to reduce the sexual transmission of HIV. Many studies showed the effectiveness of condom use in preventing HIV of about 80 percent or more. Weller and Davis (1999; 2002) conducted two studies about the effectiveness of condom use in HIV prevention. The study in 2002 found that the proportionate reduction in HIV seroconversion with condom use was approximately 80 percent, while the one in 1999 estimated the effectiveness at 87 percent. Pinkerton and Abramson (1997) suggested that consistent use of condom was 90 to 95 percent effective in HIV prevention and that consistent condom users were 10 to 20 times less likely to be infected with HIV when exposed to the virus, compared to inconsistent or non-users.

A systematic review regarding condom use in sub-Saharan Africa (Maticka-Tyndale, 2012) identified that condom use in the region was generally rare, and the factors including poverty; relationships with parents, peers and partners; limited, insufficient or absent information; gender and sexual norms, and gender/power dynamics; and beliefs and attitudes about HIV, condoms and sexuality, were barriers to condom use for a large proportion of African people. Nevertheless, the study found the increasing trends of condom use among single women in many countries, increasing acceptance and condom use among some university students, successes in producing potentially sustainable condom use resulting from select interventions, and resistance to succumbing

to the dominant gender-power dynamics and structural-cultural impediments that women in groups had mobilized.

#### **2.3.4. Commercial sex**

Paid sex is one of the main risk factors in many countries in Western, Central, and Eastern Africa. UNAIDS (2010) estimated that 32 percent of new HIV infections in Ghana, 14 percent in Kenya and 10 percent in Uganda were linked to sex work. A systematic overview of 68 epidemiological studies on sexual risk factors for HIV infection in early and advanced HIV epidemics in sub-Saharan Africa also supported the association between paying for sex and HIV infection (Chen et al., 2007).

### **2.4. Other factors related to HIV**

#### **2.4.1 Sexually Transmitted Diseases**

STDs are also another factor that increases the risk of infecting with HIV. Wasserheit (1992) found that compared to people without STDs, those with STDs were two to five times more likely to become infected with HIV, and were more likely to transmit HIV through sexual contact. Furthermore, biological evidence also showed the association between the presence of other STDs and increased likelihood of transmitting and acquiring HIV. A Morbidity and Mortality Weekly Report (CDC, 1998) explained that STDs could increase susceptibility to HIV infection by two mechanisms, including genital ulcers that broke the genital tract lining or skin, which created a portal of entry for HIV; and inflammation resulting from genital ulcers or non-ulcerative STDs that increased the concentration of cells in genital secretions which could serve as targets for HIV. The report also mentioned that STDs could increase the risk of HIV transmission from a HIV-infected person to his or her sex partner(s) because those who had HIV

positive and also had other STDs tended to shed HIV in their genital secretions. Because STDs increased the risk of HIV infection, detecting and treating them may reduce HIV risk. Fleming and Wasserheit (1999) found that treating STDs in HIV-infected persons decreased levels and frequency of HIV found in genital secretions.

#### **2.4.2 HIV Testing**

HIV testing is important for HIV interventions. Early diagnosis can help individuals receive appropriate HIV counseling and treatment to prolong their life. Additionally, knowing their HIV status may reduce their high-risk sexual behaviors, and so reduce the risk of transmitting the virus to others. The results from a meta-analysis (Marks et al., 2005) demonstrated that the prevalence of high-risk sexual behavior was markedly lower in HIV-positive persons who were aware of their status than those who were unaware.

## **Chapter III**

### **METHODS AND PROCEDURES**

#### **1. Background**

The study was conducted to compare HIV-related knowledge, attitudes, and behavior among people aged 15-49 years between an African country with high HIV prevalence, Lesotho, and an African country with low HIV prevalence, Senegal. The study used secondary data from DHS, including the 2009 Lesotho DHS and the 2010-11 Senegal DHS.

#### **2. Demographic and Health Surveys**

The MEASURE DHS program was established by USAID in 1984. The program is implemented by Inner City Fund (ICF) International and a number of partner organizations through a contract with USAID. DHS surveys yield the nationally-representative household surveys that provide data for a wide range of monitoring and impact evaluation indicators in the areas of population, health, and nutrition among participating countries. There are two main types of DHS surveys. The first type is Standard DHS Surveys that are conducted about every five years with large sample sizes (ranging from 5,000 to 30,000 households). There are also Interim DHS Surveys that focus on the collection of information on key performance monitoring indicators but may

not include data for all impact evaluation measures. The surveys are conducted between rounds of DHS surveys and have shorter questionnaires with smaller sample sizes than DHS surveys. The DHS surveys consist of many different topics, including anemia, child health, domestic violence, education, family planning, female genital cutting, fertility and fertility preferences, gender/domestic violence, HIV-related knowledge, attitudes, and behavior, HIV prevalence, household and respondent characteristics, infant and child mortality, malaria, maternal health, maternal mortality, nutrition, tobacco use, unmet need, wealth, women's empowerment, and other modules (ICF International, 2012).

### **3. Sample Design**

#### **3.1. Lesotho**

According to the Lesotho 2009 DHS, the survey was conducted by the Ministry of Health and Social Welfare (MOHSW) using a representative sample of women and men in reproductive age, and designed to provide estimates of health and demographic indicators at the national level, for urban-rural areas, and for each of the ten districts of Butha-Buthe, Leribe, Berea, Maseru, Mafeteng, Mohale's Hoek, Quthing, Qacha's Nek, Mokhotlong, and Thaba-Tseka. A total of 400 clusters were selected by using probability proportional to size from a list of enumeration areas defined for the 2006 Lesotho Population and Housing Census, including 94 in the urban areas and 306 in the rural areas. A systematic sample of households was drawn from a listing of households in each of clusters for a total of 10,000 households, about 25 households on average per cluster. All women aged 15-49 years identified in the entire sample of households were eligible for individual interview. Half of the entire sample (5,000 households) was selected randomly, and in these households, all men aged 15-59 years were eligible for individual

interview. In the households where men were interviewed, all children under the age of 6 years were eligible for height, weight, and mid-upper arm circumference measurements as well as anemia testing. In the same households, women and men who were eligible for individual interview were also eligible for height, weight, and blood pressure measurements in addition to anemia and HIV testing. The survey used three types of questionnaires based on those developed for the MEASURE DHS programme, including the Household Questionnaire, and Male and Female Questionnaires. Besides the questionnaires, Lesotho DHS also included anemia and HIV testing (MOHSW and ICF Macro, 2010).

### **3.2. Senegal**

According to the Senegal 2010-11 DHS, the survey was conducted by the National Agency of Statistics and Demography (Agence Nationale de la Statistique et de la Démographie) using a representative sample of women aged 15-49 years and men aged 15-59 years. The sample was based on a stratified two-stage cluster design. In the first stage, enumeration areas were drawn from the 2002 General Census of Population and Housing. Probability proportional to size was used to select the clusters in each enumeration area. 391 clusters were selected, including 147 clusters in urban areas and 244 clusters in rural areas. In the second stage, a systematic sample of households was drawn from a listing of households in each of clusters, which consisted of 21 households on average per cluster. All women aged 15-49 years in the households were eligible for the individual interview. In each cluster, among the 21 households, 8 households were selected for conducting men interview. All the men aged 15-59 years in those households were eligible for the interview. All eligible men and women were also eligible for HIV



testing. Moreover, all the eligible men and women as well as all the children aged 6-59 months were eligible for anemia test. All eligible men and women and all the children under the age of 5 years were selected for height and weight measurements to determine the nutritional status. Additionally, children aged 6-59 months were also eligible for malaria screening. Three types of questionnaires, including the Household Questionnaire, and Male and Female Questionnaires, developed from the questionnaires in the MEASURE DHS programme were used in the survey (ANSD and ICF International, 2012).

In this study, the information on socio-demographic characteristics, and HIV-related knowledge, attitudes, and behavior both in Lesotho and Senegal were obtained from Male and Female Questionnaires. In addition, HIV status was based on the results of HIV blood testing.

#### **4. Study Population**

##### **4.1. Lesotho**

A total of 9,994 households were selected for the sample, of which 9,619 were found occupied during data collection. Of the existing households, 9,391 were successfully interviewed, yielding a household response rate of 98 percent. In these households, 7,786 women aged 15-49 years were identified as eligible for the individual interview. Interviews were completed with 98 percent of these women (7,624 women). Of the 3,493 eligible men identified in the sub-sample of households selected, 95 percent (3,317 men aged 15-59 years) were successfully interviewed. Overall, response rates were higher in rural areas than in urban areas (MOHSW and ICF Macro, 2010).

This study used only the data from men and women aged 15-49 years, so the sample sizes in Lesotho were 2989 for men and 7624 for women.

## **4.2. Senegal**

Among 8,212 household selected for the sample, 8,029 households occupied were identified during data collection. 98 percent (7,902 households) of the existing households was successfully completed the interview. Of 16,931 women aged 15-49 years within these households that were eligible for the interview, 15,688 women (92.7 percent) were interviewed. Within the eligible men aged 15-59 years (5,668), 87 percent (4,929 men) were completed the interview. Overall, response rates were higher in rural areas than in urban areas (ANSD and ICF International, 2012).

This study used only the data from men and women aged 15-49 years, so the sample sizes in Senegal were 4414 for men and 15688 for women.

## **5. Data Variables**

### **5.1. Independent Variables**

#### **5.1.1. Socio-Demographic Characteristics**

##### **Age**

The age of participants was identified by two questions: ‘in what month and year were you born?’ and ‘how old were you at your last birthday?’. The answers of these two questions were then compared and corrected if they were inconsistent. In the DHS data, the age was put into two variables: the current age of respondent and the age in 5-year groups. This study regrouped the age into four categories, ‘15-24’, ‘25-29’, ‘30-39’, and ‘40-49’.

## **Gender**

Men and women were interviewed with different sets of questionnaires. Most of questions were the same between men's questionnaire and women's questionnaire, except that women would be asked about the reproductive history and sections dealing with maternal and child health and maternal mortality. The data were also stored into different sets. However, this study used the variables (socio-demographic variables, and variables relating to HIV knowledge, attitudes, and behaviors) that were in common between male and female datasets, so they are able to be merged into just one data set by creating one more variable for Gender, which then categorized into 'Male' and 'Female'.

## **Residence**

The type of place of residence referred to the place of household or the place where the respondents were living. It was categorized into two groups, 'Urban' and 'Rural' areas.

## **Education**

The respondents were asked whether or not they had ever attended school. If they answered 'yes', they would be asked another question about what the highest level of school they attended. The answers were classified into four groups: 'No Education', 'Primary Education', 'Secondary Education', and 'Higher Education'.

## **Wealth Index**

The wealth index is a composite measure of a household's cumulative living standard. It is calculated using easy-to-collect data on a household's ownership of selected assets, such as televisions and bicycles; materials used for housing construction;

and types of water access and sanitation facilities. Generated with a statistical procedure known as principal components analysis, the wealth index places individual households on a continuous scale of relative wealth. DHS groups all interviewed households into five wealth quintiles, including 'Lowest', 'Second', 'Middle', 'Fourth', and 'Highest', to compare the influence of wealth on various population, health and nutrition indicators.

### **Marital Status**

The respondents were asked about their marital status, and the answers were grouped into six categories: 'Never married', 'Married', 'Living together', 'Widowed, Divorced', 'Not living together'. However, this study recoded them into three groups: 'Never married', 'Married/Living together', and 'Widowed/Divorced/Not living together'.

#### **5.1.2. Variables of HIV-related knowledge, attitudes, and sexual behavior**

Variables of HIV-related knowledge, attitudes, and sexual behavior in this study were selected and categorized based on the MEASURE DHS online tools for HIV/AIDS Survey Indicators Database. The HIV/AIDS Survey Indicator Database offers an internationally-accepted, consistent method for measuring factors related to HIV prevention across countries, such as prevention and treatment spending and policies, knowledge and availability of methods of prevention, and attitudes towards people with HIV. The indicators used in this database were drawn from guides from UNAIDS, the United Nation General Assembly Special Session on HIV/AIDS, the Millennium Development Goals, the President's Emergency Plan for AIDS Relief, and the Global Fund to Fight HIV/AIDS, Malaria and Tuberculosis.

## **HIV-related Knowledge**

### **i. HIV Prevention Methods**

#### **i.a One faithful, uninfected partner**

This variable was defined as ‘the percent of respondents who say that people can protect themselves from contracting HIV by having sex only with one faithful, uninfected partner’. The question was ‘can people reduce their chance of getting the AIDS virus by having just one uninfected sex partner who has no other sex partners?’. The answer ‘yes’ was coded 1, and ‘no’ was coded 0. The ‘don’t know’ category was put as missing value because the respondents answered ‘don’t know’, ‘not sure’, or ‘depends’. The respondents who answered ‘yes’ to the question were those who knew that people could reduce the risk of getting HIV by having only one faithful, uninfected partner.

#### **i.b Always use condom**

This variable was defined as ‘the percent of respondents who say that people can protect themselves from contracting HIV by using condoms’. The question was ‘can people reduce their chance of getting the AIDS virus by using a condom every time they have sex?’. The answer ‘yes’ was coded 1, and ‘no’ was coded 0. The ‘don’t know’ category was put as missing value. The respondents who answered ‘yes’ to the question were those who knew that people could reduce the risk of getting HIV by always using condom.

#### **i.c Knowledge of HIV prevention methods – Composite of two components**

This variable was defined as ‘the percent of respondents who say that people can protect themselves from contracting HIV by using condoms and having sex only with one faithful, uninfected partner’. The variable would use the two questions about HIV

prevention methods, ‘can people reduce their chance of getting the AIDS virus by having just one uninfected sex partner who has no other sex partners?’, and ‘can people reduce their chance of getting the AIDS virus by using a condom every time they have sex?’. The answer ‘yes’ was scored 1, and ‘no’ was scored 0. The scores would be combined from the two components and put into two groups: ‘Score 2’ meaning that the respondents knew well about HIV prevention methods, and ‘Score <2’ meaning that the respondents knew just one correct method or did not know any correct methods.

## **ii. Beliefs about HIV**

### **ii.a A healthy looking person can have HIV**

This variable was defined as ‘the percent of respondents who say that a healthy-looking person can have HIV’. The question was ‘is it possible for a healthy-looking person to have the AIDS virus?’. The answer ‘yes’ was coded 1, and ‘no’ was coded 0. The ‘don’t know’ category was put as missing value. The respondents who answered ‘yes’ to the question were those who knew that a healthy looking person could have HIV.

### **ii.b Can NOT get HIV from mosquito bites**

This variable was defined as ‘the percent of respondents who reject the misconception that HIV can be transmitted by mosquito bites’. The question was ‘can people get the AIDS virus from mosquito bites?’. The answer ‘yes’ was coded 1, and ‘no’ was coded 0. The ‘don’t know’ category was put as missing value. The respondents who answered ‘no’ to the question were those who knew that HIV could not be transmitted by mosquito bites.

### **ii.c Can NOT get HIV by sharing food**

This variable was defined as ‘the percent of respondents who reject the misconception that a person can become infected by sharing food with a person who has HIV’. The question was ‘can people get the AIDS virus by sharing food with a person who has AIDS?’. The answer ‘yes’ was coded 1, and ‘no’ was coded 0. The ‘don’t know’ category was put as missing value. The respondents who answered ‘no’ to the question were those who knew that HIV could not be transmitted by sharing food with a person having HIV.

### **ii.d Can NOT get HIV by supernatural means**

This variable was defined as ‘the percent of respondents who reject the misconception that HIV can be transmitted by supernatural means’. The question was ‘can people get the AIDS virus because of witchcraft or other supernatural means?’. The answer ‘yes’ was coded 1, and ‘no’ was coded 0. The ‘don’t know’ category was put as missing value. The respondents who answered ‘no’ to the question were those who knew that HIV could not be transmitted by supernatural means.

### **iii. Comprehensive correct knowledge about HIV**

This variable was defined as ‘the percent of respondents who correctly identify the two major ways of preventing the sexual transmission of HIV (using condoms and limiting sex to one faithful, uninfected partner), who reject the two most common local misconceptions about HIV transmission (mosquito bites and sharing food), and who know that a healthy-looking person can have HIV’. The questions included 1. ‘can people reduce their chance of getting the AIDS virus by having just one uninfected sex partner who has no other sex partners?’; 2. ‘can people reduce their chance of getting the AIDS

virus by using a condom every time they have sex?'; 3. 'can people get the AIDS virus from mosquito bites?'; 4. 'can people get the AIDS virus by sharing food with a person who has AIDS?'; 5. 'is it possible for a healthy-looking person to have the AIDS virus?'. For the first, second, and fifth questions, the answer 'yes' was given 1 score, and the answer 'no' was 0. For the third and fourth questions, the answers were recoded, and scored 1 if 'no', 0 if 'yes'. Then, the scores would be summed up from the five components, and set into two categories: 'Score 5', meaning the persons had a comprehensive correct knowledge about HIV, and 'Score <5', meaning the persons did not have a comprehensive correct knowledge about HIV.

#### **iv. Mother-To-Child Transmission of HIV**

##### **iv.a Knowledge of MTCT of HIV - During pregnancy**

This variable was defined as 'the percent of respondents who report that HIV can be transmitted from mother to child during pregnancy'. The question was 'can the virus that causes AIDS be transmitted from a mother to her baby during pregnancy?'. The answer 'yes' was coded 1, and 'no' was coded 0. The 'don't know' category was put as missing value. The respondents who answered 'yes' to the question were those who knew that the child could get HIV from the mother during pregnancy.

##### **iv.b Knowledge of MTCT of HIV - During delivery**

This variable was defined as 'the percent of respondents who report that HIV can be transmitted from mother to child during delivery'. The question was 'can the virus that causes AIDS be transmitted from a mother to her baby during delivery?'. The answer 'yes' was coded 1, and 'no' was coded 0. The 'don't know' category was put as missing



value. The respondents who answered ‘yes’ to the question were those who knew that the child could get HIV from the mother during delivery.

#### **iv.c Knowledge of MTCT of HIV - Through breastfeeding**

This variable was defined as ‘the percent of respondents who report that HIV can be transmitted from mother to child through breastfeeding’. The question was ‘can the virus that causes AIDS be transmitted from a mother to her baby through breastfeeding?’. The answer ‘yes’ was coded 1, and ‘no’ was coded 0. The ‘don’t know’ category was put as missing value. The respondents who answered ‘yes’ to the question were those who knew that the child could get HIV from the mother through breastfeeding.

#### **iv.d Knowledge of MTCT of HIV - pregnancy, delivery, and breastfeeding**

This variable was defined as ‘the percent of respondents who report that HIV can be transmitted from mother to child during pregnancy, delivery, and through breastfeeding’. The question was ‘can the virus that causes AIDS be transmitted from a mother to her baby during pregnancy? during delivery? through breastfeeding?’. The answer ‘yes’ was scored 1, and ‘no’ was scored 0. The variable would combine all the scores from the three questions. The ‘Score 3’ meant that the persons had good knowledge about MTCT of HIV, and ‘Score <3’ meant that the persons did not know all the routes of MTCT of HIV.

#### **iv.e Knowledge of Prevention of MTCT of HIV**

This variable was defined as ‘the percent of respondents who report that MTCT of HIV can be prevented through ART during pregnancy and avoiding breastfeeding’. Two questions were used for this variable: ‘are there any special drugs that a doctor or a nurse

can give to a woman infected with the AIDS virus to reduce the risk of transmission to the baby?', and 'can the virus that causes AIDS be transmitted from a mother to her baby through breastfeeding?'. The answer 'yes' was scored 1, and 'no' was scored 0. The scores from the two questions would be summed up. The 'Score 2' meant that the persons knew the means to prevent MTCT of HIV, and 'Score <2' meant that the persons did not know all the means to prevent MTCT of HIV.

### **HIV-related Attitudes**

#### **i. Stigma and Discrimination associated with HIV**

##### **i.a Buy fresh vegetables**

This variable was defined as 'the percent of respondents who say they would buy fresh vegetables from a vendor whom they knew was HIV positive'. The question was 'would you buy fresh vegetables from a shopkeeper or vendor if you knew that this person had the AIDS virus?'. The answer 'yes' was coded 1, and 'no' was coded 0. The 'don't know' category was put as missing value. The respondents who answered 'yes' to the question were those who accepted to buy fresh vegetables from a vendor with HIV.

##### **i.b NO secretive**

This variable was defined as 'the percent of respondents who say that they would not want to keep the HIV-positive status of a family member a secret'. The question was 'if a member of your family got infected with the AIDS virus, would you want it to remain a secret or not?'. The answer 'yes' was coded 1, and 'no' was coded 0. The 'don't know' category was put as missing value. The respondents who answered 'no' to the question were those who would not want to keep secret about family member's HIV status.

### **i.c Willing to care**

This variable was defined as ‘the percent of respondents saying that they would be willing to care for a family member who became sick with HIV’. The question was ‘If a member of your family became sick with AIDS, would you be willing to care for her or him in your own household?’. The answer ‘yes’ was coded 1, and ‘no’ was coded 0. The ‘don’t know’ category was put as missing value. The respondents who answered ‘yes’ to the question were those who would take care of a family member with HIV.

### **i.d A female teacher allowed to teach**

This variable was defined as ‘the percent of respondents who say that a female teacher who is HIV positive but not sick should be allowed to continue teaching in school’. The question was ‘In your opinion, if a female teacher has the AIDS virus but is not sick, should she be allowed to continue teaching in the school?’. The answer ‘yes’ was coded 1, and ‘no’ was coded 0. The ‘don’t know’ category was put as missing value. The respondents who answered ‘yes’ to the question were those who agreed that a female teacher who was HIV positive but not sick should be allowed to continue teaching in school.

### **i.e Accepting all attitudes - Composite of 4 components**

This variable was defined as ‘the percent of respondents expressing accepting attitudes towards people with HIV’. It included four component questions: 1. ‘if a member of your family became sick with AIDS, would you be willing to care for her or him in your own household?’, 2. ‘would you buy fresh vegetables from a shopkeeper or vendor if you knew that this person had the AIDS virus?’, 3. ‘in your opinion, if a female teacher has the AIDS virus but is not sick, should she be allowed to continue teaching in

the school?', 4. 'if a member of your family got infected with the AIDS virus, would you want it to remain a secret or not?'. For the first, second, and third questions, the answer 'yes' was given 1 score, and the answer 'no' was 0. For the fourth question, the answers were recoded, and scored 1 if 'no', 0 if 'yes'. Then, the scores would be summed up from the four components, and set into two categories, 'Score 4', meaning that the respondents accepted all four attitudes towards people living with HIV, and 'Score <4', meaning that the respondents did not accept all four attitudes towards people living with HIV.

## **ii. Attitudes towards negotiating safer sex**

### **ii.a Refuse to have sex**

This variable was defined as 'the percent of respondents who believe that, if the husband has a STD, a wife can refuse to have sex with him'. The question was 'if a wife knows her husband has a disease that she can get during sexual intercourse, is she justified in refusing to have sex with him'. The answer 'yes' was coded 1, and 'no' was coded 0. The 'don't know' category was put as missing value. The respondents who answered 'yes' to the question were those who agreed that a woman had a right to refuse to have sex with her husband if he had a STD.

### **ii.b Ask husband to use condom**

This variable was defined as 'the percent of respondents who believe that, if the husband has a STD, a wife can propose condom use'. The question was 'if a wife knows her husband has a disease that she can get during sexual intercourse, is she justified in asking that they use a condom when they have sex?'. The answer 'yes' was coded 1, and 'no' was coded 0. The 'don't know' category was put as missing value. The respondents

who answered ‘yes’ to the question were those who agreed that a woman had a right to ask her husband to use condom if he had a STD.

### **ii.c Husband has other women**

This variable was defined as ‘the percent of respondents who believe that, if the husband has other women, a wife can refuse to have sex with him’. The question was ‘is a wife justified in refusing to have sex with her husband when she knows he has sex with other women?’. The answer ‘yes’ was coded 1, and ‘no’ was coded 0. The ‘don’t know’ category was put as missing value. The respondents who answered ‘yes’ to the question were those who agreed that a woman had a right to refuse to have sex with her husband if he had other women.

### **ii.d Negotiate safer sex with husband**

This variable was defined as ‘the percent of respondents who believe that, if her husband has an STD, a wife can either refuse to have sex with him or propose condom use’. Two questions, ‘if a wife knows her husband has a disease that she can get during sexual intercourse, is she justified in refusing to have sex with him’ and ‘if a wife knows her husband has a disease that she can get during sexual intercourse, is she justified in asking that they use a condom when they have sex?’, were used for this variable. The answer ‘yes’ was given 1 score, and ‘no’ 0 score. The new variable that had the two components were created with two categories, ‘Score 0’ meaning that the respondents did not think a woman should have the right to negotiate safer sex with her husband, and ‘Score  $\geq 1$ ’ meaning that they accepted that a woman could ask her husband to either use condom or refuse to have sex with him if he had a STD.

### **iii. Adult support of education on condom use for youth**

This variable was defined as ‘the percentage of adults over the age of 18 years who are in favor of young people aged 12-14 years being educated about using a condom to prevent HIV’. The question was ‘should children aged 12-14 years be taught about using a condom to avoid getting AIDS?’. The answer ‘yes’ was coded 1, and ‘no’ was coded 0. The ‘don’t know’ category was put as missing value. The respondents who answered ‘yes’ to the question were those who agreed that condom education should have been provided to children aged 12-14 years.

## **Sexual Behavior**

### **i. First sex intercourse**

#### **i.a Median age at first intercourse**

This variable was defined as ‘the age by which one half of people have had penetrative sex (median age)’. The question was ‘how old were you when you had sexual intercourse for the very first time?’. The age was recorded as numeric. In this variable, the median age would be calculated. The mean age was not used because mean is sensitive to extreme values and to the ranges of ages of the persons included in the survey (Irala et al., 2011). Those who answered ‘have never had sex’ and ‘having sex at first union’ would not be included since they did not specify the age.

#### **i.a Sex before the age of 15 years**

This variable was defined as ‘the percentage of people who have had sex before the age of 15 years’. The age of first sex intercourse would be grouped into two categories: <15 and  $\geq 15$ . For those who answered ‘have never had sex’ were classified

into the group of  $\geq 15$ , while those who said ‘having sex at first union’ without specifying the age would be excluded.

## **ii. Sexual partnerships**

### **ii.a Multiple sex partners**

This variable was defined as ‘the percentage of women and men aged 15-49 years who have had sexual intercourse with more than one partners in the last 12 months’. The question was ‘in total, with how many different people have you had sexual intercourse in the last 12 months?’. The answers were recorded as numeric variable, which were then recoded in this study into categorical variable with two groups: having more than one partners, and having one or no partner. Those who had more than one partners were considered as having higher risk sex.

### **ii.b Condom use with the most recent partner**

This variable was defined as ‘the percent of respondent who use condom with the most recent partner every time they have sex in the last 12 months’. The question was ‘was a condom used every time you had sexual intercourse with your most recent partner in the last 12 months?’. The answer ‘yes’ was coded 1, and ‘no’ was coded 0. The ‘don’t know’ category was put as missing value. The respondents who answered ‘yes’ to the question were those who always used condom during sexual intercourse with their last partner in the last 12 months.

## **iii. Commercial sex**

The questions about commercial sex were only included in male questionnaire.

### **iii.a Paid for sex in the last 12 months**

This variable was defined as ‘the percent of male respondents reporting sex with a sex worker in the last 12 months’. The question was ‘in the last 12 months, did you pay anyone in exchange for having sexual intercourse?’. The answer ‘yes’ was coded 1, and ‘no’ was coded 0. The ‘don’t know’ category was put as missing value. The respondents who answered ‘yes’ to the question were those who paid for sex in the last 12 months.

### **iii.b Condom use every time paid for sex**

This variable was defined as ‘the percent of male respondents reporting condom use every time they had sex with a sex worker in the last 12 months’. The question was ‘was a condom used during sexual intercourse every time you paid someone in exchange for having sexual intercourse in the last 12 months?’. The answer ‘yes’ was coded 1, and ‘no’ was coded 0. The ‘don’t know’ category was put as missing value. The respondents who answered ‘yes’ to the question were those who always used condom when paying for sex in the last 12 months.

## **Other HIV-related factors**

### **i. Had any STD in the last 12 months**

This variable was defined as ‘the percent of respondents reported symptoms of STDs in the last 12 months’. The question was ‘during the last 12 months, have you had a disease which you got through sexual contact?’. The answer ‘yes’ was coded 1, and ‘no’ was coded 0. The ‘don’t know’ category was put as missing value. The respondents who answered ‘yes’ to the question were those who had any STD in the last 12 months.



## **ii. Receive the most recent HIV test results**

This variable was defined as ‘the percent of people aged 15-49 years receiving the most recent HIV test results’. The question was ‘did you get the results of the most recent HIV test?’. The answer ‘yes’ was coded 1, and ‘no’ was coded 0. The ‘don’t know’ category was put as missing value. The respondents who answered ‘yes’ to the question were those who received the most recent HIV test results.

## **5.2. Dependent Variable**

### **HIV Status**

Respondents’ HIV status was identified by the result of blood test for HIV. Before collecting the sample, HIV consent statement explained the objective of the test and how the sample would be collected; informed prospective subjects and/or their caretakers that the testing process was anonymous and so their result would not be available to them; advised them of the availability of free voluntary counseling and testing services; and requested permission for the test to be carried out. At least three blood spots from a finger prick on a special filter paper card were collected, and then a unique random identification number (bar code) of each individual was labeled on the paper card, the questionnaire, a field tracking form. The results of blood testing were entered in a separated data file. The result could be linked in the data to other information about the subject, but persons could not be identified. There were three categories of HIV status: ‘HIV negative’, ‘HIV positive’, and ‘HIV2 positive’. Due to a very small number, ‘HIV2 positive’ was recoded to ‘HIV positive’. Thus, this study would have only two categories, ‘HIV negative’ and ‘HIV positive’.

## 6. Statistical Analysis

This study used the Statistical Package for Social Scientists (SPSS) version 20 as the software program to manage and analyze the DHS data. For the descriptive analysis, cross tabulation was used to provide the descriptive characteristics of all independent and dependent variables, and to calculate the chi-square tests with p-value to compare the statistical significance of each variable between Lesotho and Senegal.

Binary logistic regression would be used for univariate and multivariate analysis to analyze the associations between selected variables of HIV-related knowledge, attitudes, and behavior and HIV status, and between these selected variables and countries. The selected variables of HIV-related knowledge, attitudes, and behavior included ‘knowledge of HIV prevention methods’, ‘comprehensive correct knowledge’, ‘knowledge of MTCT – pregnancy, delivery, and breastfeeding’, ‘knowledge of prevention of MTCT’, ‘accepting all attitudes’, ‘negotiate safer sex’, ‘condom education for youth’, ‘sex before the age of 15 years’, ‘multiple sex partners’, ‘condom use with the most recent partner’, ‘paid for sex in the last 12 months’, ‘condom use every time paid for sex’, ‘had any STD in the last 12 months’, and ‘receive the most recent HIV test results’, for both countries. Odds ratios and 95 percent of confidence interval would be calculated to see their associations and to compare between the countries.

For all types of analysis, the study used .05 of significance level.

## **Chapter IV**

### **RESULTS**

#### **1. Descriptive Analysis**

The total study population was 10,613 in Lesotho and 20,102 in Senegal.

##### **1.1. Socio-Demographic Characteristics**

Table 1.1 describes the socio-demographic characteristics including age, gender, residence, education, wealth index, and marital status among people aged 15-49 years between Lesotho in 2009 and Senegal in 2010-11. The distributions of age, gender, type of place of residence, educational levels, wealth index quintiles, and marital status were significantly different between Lesotho and Senegal (p-values <.001). However, in both countries, people in the age group of 15-24 years represented almost half of the population (Lesotho 45.8%, Senegal 44.4%), and women accounted for more than 70 percent of the whole population. Moreover, the two countries had more respondents in rural areas than in urban areas. While the highest proportion of people among educational levels in Lesotho was those with primary education (50.5%), most people in Senegal (57.5%) had never attended school. Additionally, more people in Lesotho had secondary and higher education than those in Senegal. For the wealth index, compared to Senegal, Lesotho had lower proportions of people in the Lowest, Second and Middle wealth

quintiles, and higher proportions of people in the Fourth, and Highest wealth quintiles. Besides, both countries had highest proportion of people who were married or living together among all marital status (Lesotho 49.7%, Senegal 62.1%).

**Table 1.1: Socio-demographic characteristics of people aged 15-49 years between Lesotho (2009) and Senegal (2010-11)**

	Lesotho		Senegal		p-value
<b>Age</b>	N	(%)	N	(%)	
15-24	4865	(45.8)	8921	(44.4)	<.001*
25-29	1665	(15.7)	3342	(16.6)	
30-39	2367	(22.3)	4830	(24.0)	
40-49	1716	(16.2)	3009	(15.0)	
<b>Gender</b>					
Men	2989	(28.2)	4414	(22.0)	<.001*
Women	7624	(71.8)	15688	(78.0)	
<b>Residence</b>					
Urban	2653	(25.0)	8077	(40.2)	<.001*
Rural	7960	(75.0)	12025	(59.8)	
<b>Education</b>					
No education	507	(4.8)	11550	(57.5)	<.001*
Primary	5359	(50.5)	4304	(21.4)	
Secondary	4232	(39.9)	3991	(19.9)	
Higher	515	(4.9)	257	(1.3)	
<b>Wealth Index</b>					
Lowest	2102	(19.8)	4740	(23.6)	<.001*
Second	2056	(19.4)	4520	(22.5)	
Middle	2023	(19.1)	4633	(23.0)	
Fourth	2175	(20.5)	3513	(17.5)	
Highest	2257	(21.3)	2696	(13.4)	
<b>Marital Status</b>					
Never married	4236	(39.9)	6862	(34.1)	<.001*
Married/Live together	5276	(49.7)	12475	(62.1)	
Widowed/Divorced/ Not living together	1101	(10.4)	765	(3.8)	
<i>Total</i>	<i>10613</i>	<i>(100)</i>	<i>20102</i>	<i>(100)</i>	

\* *p-value* <.05

## 1.2. HIV Prevalence

Table 1.2 demonstrates the prevalence of HIV among people aged 15-49 years between Lesotho in 2009 and Senegal in 2010-11. The prevalence of HIV status between the two countries was significantly different ( $p$ -value  $<.001$ ). The data indicates that Lesotho had higher prevalence of HIV (22.2%) than Senegal (0.9%).

**Table 1.2: HIV prevalence of people aged 15-49 years between Lesotho (2009) and Senegal (2010-11)**

HIV Status	Lesotho		Senegal		p-value
	N	(%)	N	(%)	
HIV negative	5152	(77.8)	9378	(99.1)	$<.001^*$
HIV positive	1469	(22.2)	84	(0.9)	
<i>Total</i>	<i>6621</i>	<i>(100)</i>	<i>9462</i>	<i>(100)</i>	

\*  $p$ -value .05

## 1.3. HIV-related Knowledge, Attitudes, and Behavior

### 1.3.1. HIV-related Knowledge

Table 1.3.1 presents the descriptive characteristics of HIV-related knowledge among people aged 15-49 years between Lesotho in 2009 and Senegal in 2010. For HIV prevention methods, Lesotho had lower percentage of respondents who said that people could protect themselves from contracting HIV by having sex only with one faithful, uninfected partner (91.6%), but higher percentage of respondents who said that people could protect themselves from contracting HIV by using condoms (90.9%), compared to Senegal (93.9%, 86.6%, respectively), with significant differences ( $p$ -values  $<.001$ ). However, the percent of respondents who knew both HIV prevention methods (using condoms and having sex only with one faithful, uninfected partner) in Lesotho (85.4%) was significantly higher than that in Senegal (83.3%).

For beliefs about HIV, 88.6 percent of Basotho people said that a healthy-looking person could have the AIDS virus, which were significantly higher than the percent of Senegalese people who said so (78.2%). Only 58.1 percent of people in Lesotho and 55.6 percent of people in Senegal believed that they could not get HIV from mosquito bites, but the difference between the countries was statistically significant (p-value <.001). Lesotho had significant lower percentage of respondents who knew that HIV could not be transmitted by sharing food with a person who has AIDS (80.2%), and who rejected that they could get HIV by supernatural means (93.9%) than Senegal (82.8%, 96.4%, respectively).

Basotho people had a better comprehensive correct knowledge of HIV/AIDS with score 5 (42.4%) than Senegal (39.1%), and the difference was statistically significant (p-value <.001).

Regarding MTCT of HIV, Basotho people knew significantly better than Senegalese people. There were about 86 percent of people in Lesotho who knew that HIV could be transmitted during pregnancy and delivery, while about 78 percent of people in Senegal realized about these. Moreover, up to 90 percent of Basotho people, but only 71 percent of Senegalese people, knew that HIV could be transmitted through breastfeeding. Lesotho had about 76 percent of people who knew all the three methods of MTCT, which were higher than Senegal (62.6%). Likewise, Lesotho had higher percentage of respondents who knew that MTCT could be prevented by ART and by avoiding breastfeeding (86.1%), compared to Senegal (63.8%).

**Table 1.3.1: Descriptive characteristics of HIV-related knowledge among people aged 15-49 years between Lesotho (2009) and Senegal (2010-11)**

	Lesotho		Senegal		p-value
	N	(%)	N	(%)	
<b>1. HIV Prevention Methods</b>					
One faithful, uninfected partner	8877	(91.6)	16968	(93.9)	<.001*
Always use condom	8788	(90.9)	13839	(86.6)	<.001*
Knowledge of HIV prevention methods (Score 2) <sup>a</sup>	8064	(85.4)	13126	(83.3)	<.001*
<b>2. Beliefs about HIV</b>					
A healthy looking person can have HIV	8641	(88.6)	13203	(78.2)	<.001*
Can NOT get HIV from mosquito bites	4984	(58.1)	9335	(55.6)	<.001*
Can NOT get HIV by sharing food	7576	(80.2)	14505	(82.8)	<.001*
Can NOT get HIV by supernatural means	8769	(93.9)	17034	(96.4)	<.001*
<b>3. Comprehensive Correct Knowledge about HIV</b>					
Comprehensive Correct Knowledge (Score 5) <sup>b</sup>	3337	(42.4)	5323	(39.1)	<.001*
<b>4. Mother-To-Child Transmission of HIV</b>					
MTCT during pregnancy	7930	(86.3)	12675	(77.8)	<.001*
MTCT during delivery	7477	(86.6)	12272	(78.1)	<.001*
MTCT through breastfeeding	8187	(90.4)	11041	(71.0)	<.001*
MTCT: pregnancy, delivery, and breastfeeding (Score 3)	6125	(75.9)	9172	(62.6)	<.001*
Prevention of MTCT (Score 2) <sup>c</sup>	6750	(86.1)	6909	(63.8)	<.001*

\* p-value <.05; MTCT: mother-to-child-transmission

<sup>a</sup> one faithful, uninfected partner + always use condom

<sup>b</sup> one faithful, uninfected partner + always use condom+ a healthy looking person can have HIV + cannot get HIV from mosquito bites + cannot get HIV by sharing food

<sup>c</sup> MTCT can be prevented by antiretroviral therapy + avoid breastfeeding

### 1.3.2. HIV-related Attitudes

**Table 1.3.2: Descriptive characteristics of HIV-related attitudes among people aged 15-49 years between Lesotho (2009) and Senegal (2010-11)**

	Lesotho		Senegal		p-value
	N	(%)	N	(%)	
<b><i>1. Stigma and discrimination associated with HIV</i></b>					
Buy fresh vegetables	7474	(74.9)	7711	(41.0)	<.001*
NO secretive	5795	(59.8)	3787	(20.3)	<.001*
Willing to care	9054	(92.6)	15489	(83.7)	<.001*
A female teacher allowed to teach	7806	(78.8)	9951	(54.4)	<.001*
Accepting all attitudes (Score 4) <sup>a</sup>	3800	(41.1)	619	(3.5)	<.001*
<b><i>2. Attitudes towards negotiating safer sex</i></b>					
Refuse to have sex <sup>+</sup>	1557	(53.6)	3402	(82.4)	<.001*
Ask husband to use condom	9277	(89.9)	15356	(82.8)	<.001*
Husband has other women	7492	(70.1)	12937	(65.4)	<.001*
Negotiate safer sex with husband (Score $\geq 1$ ) <sup>b,+</sup>	2591	(89.7)	3402	(82.4)	<.001*
<b><i>3. Adult (18-49 years old) support of education on condom use for youth (12-14 years old)</i></b>					
Condom education	5827	(69.8)	6996	(46.0)	<.001*

\* *p-value* <.05

<sup>a</sup> *buy fresh vegetables + no secretive + willing to care + a female teacher allowed to teach*

<sup>b</sup> *either refuse to have sex or ask husband to use condom*

<sup>+</sup> *Men only, female data is unavailable*

Table 1.3.2 demonstrates the descriptive characteristic of HIV-related attitudes among people aged 15-49 years between Lesotho in 2009 and Senegal in 2010-11. For stigma and discrimination associated with HIV, overall, people in Lesotho had more positive attitudes toward people living with HIV than those in Senegal. The percentages of people in Lesotho, who would buy vegetables from a vendor with HIV, who did not



want to keep secret about their family member status of HIV positive, who were willing to care for a family member with AIDS, and who agreed that a female teacher with HIV positive, but not sick, should be allowed to continue teaching at school were significantly higher than those in Senegal (p-values  $<.001$ ). About 41 percent of Basotho people accepted all the four attitudes above, while only 3.5 percent of Senegalese people accepting these attitudes.

For attitudes toward negotiating safer sex, a greater percentage of Senegalese men (82.4%) agreed that wife was justified to refuse having sex with husband if he had a STD than Basotho men (53.6%), and the difference was statistically significant (p-value  $<.001$ ). The proportion of people in Lesotho who agreed that wife could ask husband to use condom if he had a STD in Lesotho (89.9%) was significantly higher than that in Senegal (82.8%). Likewise, higher percentage of people in Lesotho (70.1%) agreed that wife was justified to refuse having sex if the husband had sex with other women than in Senegal (65.4%) with a significant difference (p-value  $<.001$ ). The percent of people who agreed with women's ability to negotiate safer sex with husband was significantly higher among Basotho men (89.7%) than Senegalese men (82.4%).

About 70 percent of Basotho adults aged 18-49 years supported condom education among youth aged 12-14 years, while there was only 46 percent of Senegalese adults supporting condom education.

### **1.3.3. Sexual Behavior**

Table 1.3.3 displays descriptive characteristics of sexual behavior among people aged 15-49 years between Lesotho in 2009 and Senegal in 2010-11. For the first

intercourse, the median age was the same for Lesotho and Senegal (17 years). About 9 percent of people in both countries had sex before the age of 15 years.

For sexual partnerships, the percentage of people who had more than one partners in the last 12 months in Lesotho (11.0%) was higher than that in Senegal (2.7%) with a significant difference (p-value <.001). By contrast, there was a significantly lower proportion of Basotho people who used condom every time having sex with the most recent partner in the last 12 months (65.4%), compared to Senegalese people (84.3%).

Regarding commercial sex, the percentage of Basotho men who paid for sex in the last 12 months (3.2%) and who used condom every time paid for sex (92.7%) were significantly greater than Senegalese men (1.8%, 65.5%, respectively).

**Table 1.3.3: Descriptive characteristics of sexual behavior among people aged 15-49 years between Lesotho (2009) and Senegal (2010-11)**

	Lesotho		Senegal		
<b><i>1. First sex intercourse</i></b>					
Median age at first intercourse	17 years		17 years		
	<b>N</b>	<b>(%)</b>	<b>N</b>	<b>(%)</b>	<b>p-value</b>
Sex before the age of 15 years	927	(9.1)	1242	(9.3)	.675
<b><i>2. Sexual Partnerships</i></b>					
Multiple sex partners (>1)	1153	(11.0)	536	(2.7)	<.001*
Condom use with the most recent partner	1873	(65.4)	847	(84.3)	<.001*
<b><i>3. Commercial Sex</i></b>					
Paid for sex in the last 12 months <sup>+</sup>	70	(3.2)	43	(1.8)	.003*
Condom use every time paid for sex <sup>+</sup>	38	(92.7)	19	(65.5)	.004*

\* p-value <.05

<sup>+</sup> Men only, female data is unavailable.

### 1.3.4. Other HIV-related factors

Table 1.3.4 shows the descriptive characteristics of other HIV-related factors among people aged 15-49 years between Lesotho in 2009 and Senegal in 2010-11. Only 3.3 percent of Basotho people reported having any STD in the last 12 months, but Senegalese people had even lower percentage (1.0%) with a significant difference between the two countries (p-value <.001).

For HIV testing, in both countries, more than 90 percent of people received the most recent HIV test results. However, the proportion of people receiving the most recent HIV test results in Lesotho (95.2%) was significantly greater than in Senegal (91.4%).

**Table 1.3.4: Descriptive characteristics of other HIV-related factors among people aged 15-49 years between Lesotho (2009) and Senegal (2010-11)**

	Lesotho		Senegal		p-value
	N	(%)	N	(%)	
<b><i>1. Sexually Transmitted Diseases</i></b>					
Had any STD in the last 12 months	349	(3.3)	209	(1.0)	<.001*
<b><i>2. HIV Testing</i></b>					
Receive the most recent HIV test results	6038	(95.2)	4837	(91.4)	<.001*

\* p-value <.05

## **2. Logistic Regression Analysis**

### **2.1. Associations between HIV Status and HIV-related Knowledge, Attitudes, and Behavior**

#### **2.1.1. Univariate Analysis**

Table 2.1.1 is the results of univariate analysis that show the associations between HIV status and selected variables of HIV-related knowledge, attitudes, and behavior in Lesotho and Senegal.

In Lesotho, among all the selected variables, nine variables showed the significant associations. Those who had knowledge of HIV prevention methods (OR 1.267, p-value .009), knowledge of MTCT (OR 1.281, p-value .002), and knowledge of prevention of MTCT (OR 1.281, p-value .014); supported for condom education for youth (OR 1.318, p-value <.001); had more than one sex partners in the last 12 months (OR 1.313, p-value .001); paid for sex in the last 12 months (OR 1.767, p-value .038); and had any STD in the last 12 months (OR 2.629, p-value <.001) were more likely to be HIV-positive people. On the other hand, people who had sex before the age of 15 years (OR .741, p-value .005), and received the most recent HIV test results (OR .650, p-value .006) were less likely to be HIV-infected persons.

In Senegal, only three variables had significant associations. People who had more than one sex partners in the last 12 months (OR 2.516, p-value .010), had any STD in the last 12 months (OR 5.274, p-value .001), and had sex before the age of 15 years (OR 3.113, p-value .001) were more likely to be people with HIV positive.

**Table 2.1.1: Univariate analysis of associations between HIV status and selected variables of HIV-related knowledge, attitudes, and behavior in Lesotho (2009) and Senegal (2010-11)**

	Lesotho			Senegal		
	OR	p-value	%95 CI	OR	p-value	%95 CI
Knowledge of HIV prevention methods (Score 2)	1.267	.009*	1.062-1.511	.704	.232	.395-1.252
Comprehensive Correct Knowledge (Score 5)	.962	.582	.838-1.105	.693	.196	.397-1.209
Knowledge of MTCT: pregnancy, delivery, breastfeeding (Score 3)	1.281	.002*	1.094-1.500	.940	.803	.578-1.528
Knowledge of prevention of MTCT (Score 2)	1.281	.014*	1.052-1.560	1.113	.719	.621-1.995
Accepting all attitudes (Score 4)	1.029	.658	.906-1.168	.365	.317	.051-2.631
Negotiate safer sex (Score $\geq 1$ ) <sup>+</sup>	.879	.428	.638-1.210	1.008	.989	.342-2.972
Condom education for youth	1.318	<.001*	1.147-1.513	.690	.124	.431-1.107
Sex before the age of 15 years	.741	.005*	.601-.914	3.113	.001*	1.548-6.262
Multiple sex partners (>1)	1.313	.001*	1.117-1.545	2.516	.010*	1.251-5.056
Condom use with the most recent partner	.928	.485	.754-1.144	1.090	.937	.130-9.150
Paid for sex in the last 12 months <sup>+</sup>	1.767	.038*	1.033-3.021	a		
Condom use every time paid for sex <sup>+</sup>	.261	.292	.021-3.178	a		
Had any STD in the last 12 months	2.629	<.001*	2.004-3.450	5.274	.001*	1.891-14.713
Receive the most recent HIV test results	.650	.006*	.478-.884	2.470	.377	.332-18.343

\* *p*-value <.05; MTCT: mother-to-child-transmission; STD: Sexually Transmitted Disease; <sup>+</sup> men only, female data is not available; <sup>a</sup> no data for respondents with HIV positive in this variable

### **2.1.2. Multivariate Analysis**

Table 2.1.2 presents the multivariate analysis of the associations between HIV status and selected variables of HIV-related knowledge, attitudes, and behavior controlled for age, gender, residence, education, wealth index and marital status in Lesotho and Senegal.

In Lesotho, after adjusting for socio-demographic characteristics, four variables showed the significant associations. It was more likely that people who supported condom education for youth (OR 1.359, p-value <.001), had more than one sex partners (OR 1.445, p-value <.001), and had any STD in the last 12 months (OR 1.969, p-value <.001), and less likely that those who received the most recent HIV test results (OR .651, p-value .011) to be HIV-infected people.

In Senegal, the three variables that showed significant associations in univariate analysis, two were still significant after controlled for socio-demographic characteristics. People who had more than one partners (OR 2.697, p-value .019), and had any STD in the last 12 months (OR 3.989, p-value .011) were more likely to be infected with HIV.

**Table 2.1.2: Multivariate analysis of associations between HIV status and selected variables of HIV-related knowledge, attitudes, and behavior controlled for socio-demographic characteristics (Age, Gender, Residence, Education, Wealth Index, and Marital Status) in Lesotho (2009) and Senegal (2010-11)**

	Lesotho			Senegal		
	OR	p-value	%95 CI	OR	p-value	%95 CI
Knowledge of HIV prevention methods (Score 2)	1.093	.373	(.899-1.329)	.780	.405	(.434-1.401)
Comprehensive Correct Knowledge (Score 5)	.971	.721	(.827-1.140)	.835	.548	(.463-1.504)
Knowledge of MTCT: pregnancy, delivery, breastfeeding (Score 3)	1.021	.753	(.864-1.223)	.779	.322	(.476-1.276)
Knowledge of prevention of MTCT (Score 2)	1.040	.724	(.837-1.292)	.852	.602	(.468-1.553)
Accepting all attitudes (Score 4)	.939	.385	(.814-1.083)	.422	.395	(.058-3.080)
Negotiate safer sex (Score $\geq 1$ ) <sup>+</sup>	.862	.204	(.685-1.084)	.859	.788	(.283-2.602)
Condom education for youth	1.359	<.001*	(1.172-1.577)	.807	.385	(.498-1.308)
Sex before the age of 15 years	1.092	.462	(.863-1.382)	1.941	.080	(.924-4.077)
Multiple sex partners (>1)	1.445	<.001*	(1.205-1.733)	2.697	.019*	(1.177-6.176)
Condom use with the most recent partner	.996	.977	(.785-1.265)	.775	.845	(.060-9.951)
Paid for sex in the last 12 months <sup>+</sup>	1.653	.110	(.892-3.065)	a		
Condom use every time paid for sex <sup>+</sup>	b			a		
Had any STD in the last 12 months	1.969	<.001*	(1.467-2.644)	3.989	.011*	(1.375-11.575)
Receive the most recent HIV test results	.651	.011*	(.467-.908)	3.025	.294	(.383-23.924)

\* *p*-value <.05; MTCT: mother-to-child-transmission; STD: Sexually Transmitted Disease; <sup>+</sup> men only, female data is not available; <sup>a</sup> no data for respondents with HIV positive in this variable; <sup>b</sup> no data for respondents in some categories of demographic and socioeconomic variables

## **2.2. Associations between Countries and HIV-related Knowledge, Attitudes, and Behaviors**

### **2.2.1. Univariate Analysis**

Table 2.2.1 presents the univariate analysis of associations between countries and selected variables of HIV-related knowledge, attitudes, and behavior. Among 14 variables, there was only one variable ‘having sex before the age of 15 years’ that the association was not statistically significant (p-value .675), but all other variables were found with significant associations (p-values <.05). Compared to Senegal, people in Lesotho were more likely to have better knowledge of HIV prevention methods (OR 1.176), comprehensive correct knowledge (OR 1.147), knowledge of MTCT (OR 1.881), and knowledge of prevention of MTCT (OR 3.503); to accept all components of HIV-related attitudes (OR 19.297), agree with women’s ability to negotiate safer sex with husband (OR 1.873), and support condom education among young people aged 12-14 years (OR 2.714); to have more than one sex partners in the last 12 months (OR 4.509), to pay for sex in the last 12 months (OR 1.774), to use condom every time paid for sex in the last 12 months (OR 6.667), to have any STD in the last 12 months (OR 3.239), and to receive the most recent HIV test results (OR 1.872). On the other hand, they were less likely to use condom with the most recent partner in the last 12 months (OR .352).



**Table 2.2.1: Univariate analysis of associations between countries and selected variables of HIV-related knowledge, attitudes, and behavior**

	Lesotho			Senegal
	OR	p-value	%95 CI	
Knowledge of HIV prevention methods (Score 2)	1.176	<.001*	(1.095 – 1.262)	Reference
Comprehensive Correct Knowledge (Score 5)	1.147	<.001*	(1.084 – 1.213)	Reference
Knowledge of MTCT: pregnancy, delivery, breastfeeding (Score 3)	1.881	<.001*	(1.770 – 2.000)	Reference
Knowledge of prevention of MTCT (Score 2)	3.503	<.001*	(3.250 – 3.775)	Reference
Accepting all attitudes (Score 4)	19.297	<.001*	(17.632 – 21.120)	Reference
Negotiate safer sex (Score $\geq 1$ ) <sup>+</sup>	1.873	<.001*	(1.621 – 2.164)	Reference
Condom education for youth	2.714	<.001*	(2.565 – 2.872)	Reference
Sex before the age of 15 years	.981	.675	(.897 – 1.073)	Reference
Multiple sex partners (>1)	4.509	<.001*	(4.058 – 5.010)	Reference
Condom use with the most recent partner	.352	<.001*	(.292 – .424)	Reference
Paid for sex in the last 12 months <sup>+</sup>	1.774	.003*	(1.208 – 2.605)	Reference
Condom use every time paid for sex <sup>+</sup>	6.667	.008*	(1.639 – 27.111)	Reference
Had any STD in the last 12 months	3.239	<.001*	(2.725 – 3.851)	Reference
Receive the most recent HIV test results	1.872	<.001*	(1.612 – 2.175)	Reference

\* *p*-value <.05; MTCT: mother-to-child-transmission; STD: Sexually Transmitted Disease; <sup>+</sup> men only, female data is not available

### **2.2.2. Multivariate Analysis**

Table 2.2.2 demonstrates multivariate analysis of associations between countries and selected variables of HIV-related knowledge, attitudes, and behavior controlled for age, gender, residence, education, wealth index, and marital status. After adjusted for socio-demographic characteristics, compared to Senegal, people in Lesotho were still more likely to have better knowledge of MTCT (OR 1.991) and of prevention of MTCT (OR 3.811), accept all four components of HIV-related attitudes (OR 15.247), agree about women's ability to negotiate safer sex (OR 1.652), support condom use for young people aged 12-14 years (OR 2.172), have more than one sex partners in the last 12 months (OR 4.039), pay for sex in the last 12 months (OR 2.015), have any STD in the last 12 months (OR 2.966), and receive the most recent HIV test results (OR 1.963); but still less likely to use condom with the most recent partner in the last 12 months (OR .300). By contrast, after adjustment, the association between countries and knowledge of HIV prevention methods became not significant, while the association between countries and comprehensive knowledge about HIV showed opposite result that Basotho people were less likely to have comprehensive correct knowledge than Senegalese people (OR .804). Additionally, the association between countries and having sex before the age of 15 years became significantly positive (OR 1.372). These results suggested the confounding of socio-demographic characteristics on these associations.

**Table 2.2.2: Multivariate analysis of associations between countries and selected variables of HIV-related knowledge, attitudes, and behavior controlled for socio-demographic characteristics (Age, Gender, Residence, Education, Wealth Index, and Marital Status)**

	Lesotho			Senegal
	OR	p-value	%95 CI	
Knowledge of HIV prevention methods (Score 2)	.999	.986	(.914 – 1.093)	Reference
Comprehensive Correct Knowledge (Score 5)	.804	<.001*	(.748 – .865)	Reference
Knowledge of MTCT: pregnancy, delivery, breastfeeding (Score 3)	1.991	<.001*	(1.849 – 2.143)	Reference
Knowledge of prevention of MTCT (Score 2)	3.811	<.001*	(3.483 – 4.171)	Reference
Accepting all attitudes (Score 4)	15.247	<.001*	(13.663 – 17.015)	Reference
Negotiate safer sex (Score $\geq 1$ ) <sup>+</sup>	1.652	<.001*	(1.403 – 1.946)	Reference
Condom education for youth	2.172	<.001*	(2.024 – 2.331)	Reference
Sex before the age of 15 years	1.372	<.001*	(1.218 – 1.545)	Reference
Multiple sex partners (>1)	4.039	<.001*	(3.542 – 4.605)	Reference
Condom use with the most recent partner	.300	<.001*	(.238 – .377)	Reference
Paid for sex in the last 12 months <sup>+</sup>	2.015	.002*	(1.285 – 3.158)	Reference
Condom use every time paid for sex <sup>+</sup>	b			Reference
Had any STD in the last 12 months	2.966	<.001*	(2.345 – 3.753)	Reference
Receive the most recent HIV test results	1.963	<.001*	(1.628 – 2.366)	Reference

\* *p*-value <.05; MTCT: mother-to-child-transmission; STD: Sexually Transmitted Disease; <sup>+</sup> men only, female data is not available; <sup>b</sup> no data for respondents in some categories of demographic and socioeconomic variables

## Chapter V

### DISCUSSION AND CONCLUSION

#### 1. Discussion

##### 1.1. Associations between HIV status and HIV-related knowledge, attitudes, and behavior

###### HIV-related knowledge

Results from multivariate analysis found no significant associations between HIV status and all selected variables of HIV-related knowledge including knowledge of HIV prevention methods, comprehensive correct knowledge, knowledge of MTCT, and knowledge of prevention of MTCT, in Lesotho and Senegal. These results seem to be inconsistent with previous studies that showed association between HIV knowledge and decline in HIV incidence and prevalence (UNAIDS, 2010). However, it can be understood that although HIV knowledge is important for people to know how to prevent themselves from being infected with HIV, it does not necessarily mean that people with good knowledge about HIV would always change their behaviors. Lindan and his colleagues (1991) demonstrated that 96-98 percent of Rwandan women could correctly identify the three primary routes of HIV infection, but only 16 percent of them reported taking any action to avoid AIDS in the previous year. Nevertheless, we still think that

knowledge about HIV is important. In this study, knowledge may not directly influence HIV prevalence, but it may modify sexual behavior, which is the main factor for HIV prevention. We believe that before people decide to change to any proper behavior, they need to know correct information first. Another possible explanation is that these results may also be affected by awareness of HIV status that cannot be identified in this dataset because people who are aware of their HIV status may receive some counseling that could increase their knowledge about HIV, so it could lead to no association between HIV status and HIV knowledge.

### **HIV-related attitudes**

In both countries, people's attitudes toward HIV and women's ability to negotiate safer sex did not significantly associated with HIV status. We believe that people's attitudes toward HIV do not directly pose any risk of HIV infection to the people themselves, but negative attitudes toward HIV are the barrier to HIV prevention, and they also limit people living with HIV to access to health care services (Sayles et al., 2009; UNAIDS, 2012). Attitudes toward women's ability to negotiate safer sex are actually an important factor for HIV infection, especially for female sex workers. However, in this study, it may be because the data did not focus on sex workers, but the relationship between general couples, significant association between this variable and HIV status was not found.

In Lesotho, adult support of condom education for youth positively associated with HIV status. However, this association was not found in Senegal. We believe that this association could be confounded by cultural and religious factors, but we were unable to

address these factors because in the data from Lesotho and Senegal the ways they classified religions were different.

### **Sexual behavior**

In both countries, from multivariate analysis, having sex before the age of 15 years had an increased odds of HIV infection, but the association was not statistically significant. The result may have been affected by the exclusion of the answer 'at first union' since the number of people who simply mentioned having first sex at first union without specifying the age were quite large, 345 in Lesotho and 6714 in Senegal.

In Lesotho and Senegal, the data suggested that having more than one sexual partners increased the risk of HIV infection. This result is consistent with previous studies (CDC, 2007; Meekers, 2009; Case et al., 2012). Having more than one sexual partners was 1.4 times in Lesotho and 2.7 times in Senegal increased risk of being infected with HIV.

About condom use with the most recent partner, paid for sex in the last 12 months and condom use every time paid for sex in the last 12 months, their associations with HIV status were not statistically significant. This may be because of a large number of missing data. Out of 10,613 respondents in Lesotho, the number of valid data for the three variables were only 2865, 2214, 41, respectively; and out of 20,102 respondents in Senegal, the number of valid data were only 1005, 2379, 29, respectively.

### **Other HIV-related factors**

We also found consistent result regarding the association between having any STD in the last 12 months and HIV status (Wasserheit, 1992; CDC, 1998; Wasserheit,

1999). People who had any STD in the last 12 months were about 2 times in Lesotho and 4 times in Senegal more likely to be infected with HIV.

The data also indicated that receiving the most recent HIV test results had protective association with HIV infection in Lesotho. The result was expected because increased diagnosis of HIV could help to reduce HIV cases. Increasing HIV testing coverage is one of the efforts that countries with HIV epidemic try to achieve (UNAIDS, 2012). However, this association was not significantly found in Senegal. This may be because Senegal is a country with concentrated HIV epidemic where HIV prevalence is concentrated in specific groups of population. Thus, HIV testing might not influence much on general population.

## **1.2. Associations between countries and HIV-related knowledge, attitudes, and behavior**

In this study, Lesotho was found with 22.2 percent of HIV prevalence, while the prevalence in Senegal was only 0.9 percent. With such a high prevalence, Basotho people were expected to be less likely to have better HIV-related knowledge, positive HIV-related attitudes, and safer sexual behavior, compared to Senegalese people. However, not all the characteristics were found similarly to the expectations.

As expected, compared to Senegal, people in Lesotho were less likely to have better comprehensive correct knowledge, and use condom with the most recent partner. However, Basotho people were 1.4 times more likely to have sex before the age of 15 years, about 4 times more likely to have more than one sex partners, about 2 times more likely to pay for sex in the last 12 months, and about 3 times more likely to have any STD in the last 12 months than Senegalese people.

On the other hand, there were some unexpected results. Compared to Senegal, people in Lesotho were about 2 times more likely to have better knowledge of MTCT, about 4 times more likely to have better knowledge of prevention of MTCT, 15 times more likely to accept HIV-related attitudes, 1.6 times more likely to agree with women's ability to negotiate safer sex, about 2 times more likely to support condom education for youth, and about 2 times more likely to receive the most recent HIV test results. No difference was found between the two countries for knowledge of HIV prevention methods.

It can be noticed from these results that overall, people in Lesotho seemed to have better knowledge relating to MTCT, more positive HIV-related attitudes, but more risky sexual behavior than those in Senegal. Regarding MTCT of HIV, it could be because Lesotho had higher rate of pregnant women living with HIV who received antiretroviral drugs. According to WHO (2008), in 2007, about 33 percent of pregnant women living with HIV in Lesotho received ART, while there was only 6 percent in Senegal. Pregnant women living with HIV who received ART were likely to know more about MTCT of HIV, so higher percentage of pregnant women living with HIV who received ART could result in better knowledge of MTCT and its prevention. For HIV-related attitudes, Lesotho is a country with generalized HIV epidemic where HIV infection occurs in general population, while Senegal is a country with concentrated HIV epidemic where HIV infection occurs more often in specific populations, not general population. Thus, it is likely that there are higher stigma and discrimination about HIV among general people in Senegal than in Lesotho. Relating to sexual behavior, as discussed in the previous



section, it is a main factor for HIV infection. Because Senegalese people tend to have safer sexual behavior, HIV prevalence in Senegal is much lower than Lesotho.

## **2. Strength and Limitations**

### **Strength**

The data used in this study were nationally representative with large sample sizes from both countries, Lesotho and Senegal. Therefore, the results were able to generalize to the whole population in both countries.

### **Limitations**

This study also consists of some limitations. First, due to the nature of a cross sectional study, causality could not be analyzed. Thus, the study could only look for associations, not causes and effects. Second, there was a potential for recall bias because the data were self-reported. Third, even though the whole sample sizes of the data from Lesotho and Senegal were large, a few variables also had large missing data, which affected the results of analysis.

## **3. Conclusion**

In conclusion, the study suggested that in Lesotho and Senegal, HIV status was not significantly associated with knowledge of HIV prevention methods, comprehensive correct knowledge, knowledge of MTCT, knowledge of prevention of MTCT, accepting all HIV-related attitudes, women ability to negotiate safer sex, having sex before the age of 15 years, condom use with the most recent partner, paid for sex, and condom use every time paid for sex in the last 12 months. While HIV status was positively associated with condom education for youth, and negatively associated with receiving the most recent

HIV test results in Lesotho, these significant associations were not found in Senegal. Nevertheless, in both countries, having more than one sex partners and having STD in the last 12 months showed an increased risk of HIV infection.

Compared to Senegal, people in Lesotho were less likely to have better comprehensive correct knowledge about HIV, and use condom with the most recent partner, but more likely to have better knowledge of MTCT of HIV and its prevention, accept HIV-related attitudes, agree with women's ability to negotiate safer sex, support condom education for youth, have sex before the age of 15 years, have more than one sex partners, pay for sex in the last 12 months, have any STD in the last 12 months, and receive the most recent HIV test results. Knowledge of HIV prevention methods in Lesotho did not differ from Senegal.

Continued intervention research is warranted as there are clear patterns of risk between Lesotho and Senegal that highlight opportunities for more tailored prevention efforts surrounding HIV knowledge, attitudes, and sexual risk-taking behavior.

## **References**

- Agence Nationale de la Statistique et de la Démographie (ANSD) [Sénégal], and ICF International. (2012). *Enquête Démographique et de Santé à Indicateurs Multiples au Sénégal (EDS-MICS) 2010-2011*. Calverton, Maryland, USA: ANSD and ICF International.
- Auvert, B., Taljaard, D., Lagarde, E., Sobngwi-Tambekou, J., Sitta, M., & Puren, A. (2005). Randomized, controlled intervention trial of male circumcision for reduction of HIV infection risk: The ANRS 1265 trial. *Plos Medicine*, 2(11), 1112-1122.
- Bailey, R., Moses, S., Parker, C., Agot, K., Maclean, I., Krieger, J., & ... Ndinya-Achola, J. (2007). Male circumcision for HIV prevention in young men in Kisumu, Kenya: a randomised controlled trial. *Lancet*, 369(9562), 643-656.
- Ban, K.M., (2008). The stigma factor. *The Washington Times*. Retrieved from <http://www.washingtontimes.com/news/2008/aug/06/the-stigma-factor/>.
- Baral, S., Beyrer, C., Muessig, K., Poteat, T., Wirtz, A., Decker, M., & ... Kerrigan, D. (2012). Burden of HIV among female sex workers in low-income and middle-income countries: a systematic review and meta-analysis. *Lancet Infectious Diseases*, 12(7), 538-549. doi:10.1016/S1473-3099(12)70065-8
- Beyrer, C. C., Baral, S. D., Griensven, F., Goodreau, S. M., Chariyalertsak, S. S., Wirtz, A. L., & Brookmeyer, R. R. (2012). Global epidemiology of HIV infection in men who have sex with men. *Lancet (British Edition)*, 379(9839), 367-377. doi:10.1016/S0140-6736(12)60821-6

- Beyrer, C., Baral, S., Walker, D., Wirtz, A., Johns, B., & Sifakis, F. (2010). The expanding epidemics of HIV type 1 among men who have sex with men in low- and middle-income countries: diversity and consistency. *Epidemiologic Reviews*, 32(1), 137-151. doi:10.1093/epirev/mxq011
- Biswas, M. (2012). AIDS epidemic worldwide and the millennium development strategies: A light for lives. *HIV & AIDS Review*, 11(4), 87. doi:10.1016/j.hivar.2012.08.004
- Case, K. K., Ghys, P. D., Gouws, E., Eaton, J. W., Borquez, A., Stover, J., & ... Hallett, T. B. (2012). Understanding the modes of transmission model of new HIV infection and its use in prevention planning. *Bulletin Of The World Health Organization*, 90(11), 831-838a. doi:10.2471/BLT.12.102574
- Centers for Disease Control and Prevention. (1981). Kaposi's sarcoma and pneumocystis pneumonia among homosexual men-New York and California. *Morbidity and Mortality Weekly Report*, 30, 305-308. Retrieved from <http://www.cdc.gov/hiv/resources/reports/mmwr/pdf/mmwr04jul81.pdf>.
- Centers for Disease Control and Prevention. (1998). HIV prevention through early detection and treatment of other sexually transmitted diseases - United States. *Morbidity and Mortality Weekly Report*, 47(RR-12), 1-24.
- Centers for Disease Control and Prevention. (2007). *HIV and AIDS: Are you at risk?*. Retrieved from <http://www.cdc.gov/hiv/resources/brochures/at-risk.htm>.
- Centers for Disease Control and Prevention. (2010). Prevalence and awareness of HIV infection among men who have sex with men – 21 cities, United States, 2008. *Morbidity and Mortality Weekly Report*, 59, 1201-1207.

- Centers for Disease Control and Prevention. (2012). *Basic Information about HIV and AIDS*. Retrieved from <http://www.cdc.gov/hiv/topics/basic/index.htm>.
- Chen, L., Jha, P., Stirling, B., Sgaier, S., Daid, T., Kaul, R., & Nagelkerke, N. (2007). Sexual Risk Factors for HIV Infection in Early and Advanced HIV Epidemics in Sub-Saharan Africa: Systematic Overview of 68 Epidemiological Studies. *Plos One*, 2(10), e1001. doi:10.1371/journal.pone.0001001
- Cohen, M., Chen, Y., McCauley, M., Gamble, T., Hosseinipour, M., Kumarasamy, N., & ... Fleming, T. (2011). Prevention of HIV-1 infection with early antiretroviral therapy. *The New England Journal Of Medicine*, 365(6), 493-505. doi:10.1056/NEJMoa1105243
- Fleming, D., & Wasserheit, J. (1999). From epidemiological synergy to public health policy and practice: the contribution of other sexually transmitted diseases to sexual transmission of HIV infection. *Sexually Transmitted Infections*, 75(1), 3-17.
- Gray, R., Kigozi, G., Serwadda, D., Makumbi, F., Watya, S., Nalugoda, F., & ... Wawer, M. (2007). Male circumcision for HIV prevention in men in Rakai, Uganda: a randomised trial. *Lancet*, 369(9562), 657-666.
- Gregson, S., Garnett, G. P., Nyamukapa, C. A., Hallett, T. B., Mason, P. R., Chandiwana, S. K., & Anderson, R. M. (2006). HIV Decline Associated with Behavior Change in Eastern Zimbabwe. *Science*, (5761), 664. doi:10.2307/3843513
- Hallett, T., Aberle-Grasse, J., Bello, G., Boulos, L., Cayemittes, M., Cheluget, B., & ... Walker, N. (2006). Declines in HIV prevalence can be associated with changing sexual behaviour in Uganda, urban Kenya, Zimbabwe, and urban Haiti. *Sexually Transmitted Infections*, 82 Suppl 1i1-i8.

- Hankins, C. A., & Zalduondo, B. (2010). Combination prevention: a deeper understanding of effective HIV prevention. *Aids*, 24S70-S80.  
doi:10.1097/01.aids.0000390709.04255.fd
- Holzemer, W.L., Makoae, L.N., Greeff, M., Dlamini, P.S., Kohi, T.W., Chirwa, M.L., & ... Uys, Y.R. (2009). Measuring HIV stigma for PLHAs and nurses over time in five African countries. *SAHARA J.*, 6(2), 76-82.
- ICF International. (2012). *Survey Organization Manual for MEASURE DHS*. Calverton, Maryland: ICF International.
- International Labor Organization and the Global Network of people living with HIV. (2012). *Sigma and discrimination at work: findings from the People Living with HIV Stigma Index*. Amsterdam: Global Network of People Living with HIV.  
Retrieved from  
[http://www.gnpplus.net/images/stories/Rights\\_and\\_stigma/SI\\_WorkBriefing\\_Online.pdf](http://www.gnpplus.net/images/stories/Rights_and_stigma/SI_WorkBriefing_Online.pdf).
- Irala, J., Osorio, A., Carlos, S., Ruiz-Canela, M., & López-del Burgo, C. (2011). Mean Age of First Sex: Do They Know What We Mean?. *Archives Of Sexual Behavior*, 40(5), 853-855. doi:10.1007/s10508-011-9779-4
- Joint United Nation Programme on HIV/AIDS. (2006). *International Guidelines on HIV/AIDS and Human Rights*. Retrieved from  
[http://www.unaids.org/en/media/unaids/contentassets/dataimport/publications/irc-pub07/jc1252-internguidelines\\_en.pdf](http://www.unaids.org/en/media/unaids/contentassets/dataimport/publications/irc-pub07/jc1252-internguidelines_en.pdf).

- Joint United Nation Programme on HIV/AIDS (UNAIDS). (2012). *Global Report: UNAIDS report on the global AIDS epidemic 2012*. Retrieved from [http://www.unaids.org/en/media/unaids/contentassets/documents/epidemiology/2012/gr2012/20121120\\_UNAIDS\\_Global\\_Report\\_2012\\_en.pdf](http://www.unaids.org/en/media/unaids/contentassets/documents/epidemiology/2012/gr2012/20121120_UNAIDS_Global_Report_2012_en.pdf).
- Joint United Nation Programme on HIV/AIDS (UNAIDS). (2012). *Lesotho*. Retrieved from <http://www.unaids.org/en/regionscountries/countries/lesotho/>.
- Joint United Nation Programme on HIV/AIDS (UNAIDS). (2012). *Senegal*. Retrieved from <http://www.unaids.org/en/regionscountries/countries/senegal/>.
- Joint United Nation Programme on HIV/AIDS (UNAIDS). (2012). *Women out loud: How women living with HIV will help the world end AIDS*. Retrieved from [http://www.unaids.org/en/media/unaids/contentassets/documents/unaidspublication/2012/20121211\\_Women\\_Out\\_Loud\\_en.pdf](http://www.unaids.org/en/media/unaids/contentassets/documents/unaidspublication/2012/20121211_Women_Out_Loud_en.pdf).
- Khobotlo, M., Tshello, R., Nkonyana, J., Ramoseme, M., Khobotle, M., Chitoshia, A., & ... Fraser, N. (2009). Lesotho HIV Prevention Response and Modes of Transmission Analysis. *Lesotho HIV Prevention Response And Modes Of Transmission Analysis*, 121.
- Marks, G., Crepaz, N., Senterfitt, J., & Janssen, R. (2005). Meta-analysis of high-risk sexual behavior in persons aware and unaware they are infected with HIV in the United States - Implications for HIV prevention programs. *Aids-Journal Of Acquired Immune Deficiency Syndromes*, 39(4), 446-453.
- Maticka-Tyndale, E. (2012). Condoms in sub-Saharan Africa. *Sex Health*, 9(1), 59-72. doi:10.1071/SH11033

- MEASURE DHS. *HIV/AIDS Survey Indicators Database*. Retrieved from [http://hivdata.measuredhs.com/ind\\_tbl.cfm](http://hivdata.measuredhs.com/ind_tbl.cfm).
- Meekers, D. (2009). Multiple sex partners and perceived risk of HIV infection in Zambia: attitudinal determinants and gender differences. *AIDS Care*, 21(10), 1211-1221. doi:10.1080/109540120902730047
- Ministry of Health and Social Welfare (MOHSW) [Lesotho] and ICF Macro. (2010). *Lesotho Demographic and Health Survey 2009*. Maseru, Lesotho: MOHSW and ICF Macro.
- National Institute of Allergy and Infectious Diseases. (1999). *NIAID-Supported Scientists Discover Origin of HIV-1*. Retrieved from <http://www.niaid.nih.gov/news/newsreleases/1999/Pages/hivorigin.aspx>.
- National Institute of Allergy and Infectious Diseases. (2012). *HIV vaccines*. Retrieved from <http://www.niaid.nih.gov/topics/hivaids/research/vaccines/Pages/default.aspx>.
- Pettifor, A.E., van der Straten, A., Dunbar, M.S., Shiboski, S.C., & Padian, N.S. (2004). Early age of first sex: a risk factor for HIV infection among women in Zimbabwe. *AIDS*, 18(10), 1435-1442.
- Pettifor, A., O'Brien, K., Macphail, C., Miller, W.C., & Rees, H. (2009). Early coital debut and associated HIV risk factors among young women and men in South Africa. *Int Perspect Sex Reprod Health*, 35(2), 82-90. doi:10.1363/ifpp.35.082.09
- Pinkerton, S.D., & Abramson, P.R. (1997). Effectiveness of condoms in preventing HIV transmission. *Social Science & Medicine*, 44(9), 1303-1312.
- Quinn, T.C. (2006). Sexual Transmission of HIV infection. *Medscape*. Retrieved from <http://www.medscape.org/viewarticle/525165>.



- Ray, S., & Maposhere, C. (2001). Male and Female Condom Use by Sex Workers in Zimbabwe: Acceptability and Obstacles. *RHM Journal*, 97-108.
- Sayles, J., Wong, M., Kinsler, J., Martins, D., & Cunningham, W. (2009). The Association of Stigma with Self-Reported Access to Medical Care and Antiretroviral Therapy Adherence in Persons Living with HIV/AIDS. *Journal Of General Internal Medicine*, 24(10), 1101-1108.
- Stockl, H., Kalra, N., Jacobi, J., & Watts, C. (2013). Is early sexual debut a risk factor for HIV infection among women in sub-Saharan Africa? A systematic review. *Am J Reprod Immunol*, 69, 27-40. doi:10.1111/aji.12043
- Patrick S., S., Osamah, H., Valerie, D., Jennifer E., G., Joseph, P., Caroline, S., & ... Kevin A., F. (2009). Reemergence of the HIV Epidemic Among Men Who Have Sex With Men in North America, Western Europe, and Australia, 1996–2005. *Annals Of Epidemiology*, 19, 423-431. doi:10.1016/j.annepidem.2009.03.004
- Timothy B., H., Simon, G., Owen, M., Elizabeth, G., & Geoff P., G. (2009). Assessing evidence for behaviour change affecting the course of HIV epidemics: A new mathematical modelling approach and application to data from Zimbabwe. *Epidemics*, 1108-1117. doi:10.1016/j.epidem.2009.03.001
- Tomaszewski, E.P. (2012). *Human Right Update: Understanding HIV/AIDS Stigma and Discrimination*. USA: Human Rights and International Affairs Division, National Association of Social Workers. Retrieved from [http://www.socialworkers.org/practice/hiv\\_aids/AIDS\\_Day2012.pdf](http://www.socialworkers.org/practice/hiv_aids/AIDS_Day2012.pdf).

UNAIDS/WHO Working Group on Global HIV/AIDS and STI Surveillance. (2009).

*UNAIDS/WHO Epidemiological Fact Sheets on HIV and AIDS, Lesotho, 2008*

*Update*. Retrieved from

[http://apps.who.int/globalatlas/predefinedReports/EFS2008/full/EFS2008\\_LS.pdf](http://apps.who.int/globalatlas/predefinedReports/EFS2008/full/EFS2008_LS.pdf).

UNAIDS/WHO Working Group on Global HIV/AIDS and STI Surveillance. (2009).

*UNAIDS/WHO Epidemiological Fact Sheets on HIV and AIDS, Senegal, 2008*

*Update*. Retrieved from

[http://apps.who.int/globalatlas/predefinedReports/EFS2008/full/EFS2008\\_SN.pdf](http://apps.who.int/globalatlas/predefinedReports/EFS2008/full/EFS2008_SN.pdf).

United Nation. (2011). HIV/AIDS in the context of other global challenges: Special report for the UN high-level meeting on AIDS. Berlin, Germany: UN. Retrieved from <http://www.global2015.net/file/global2015hiv.pdf>.

United Nation Population Fund. (2008). Inter-Agency Task Team on HIV and Young People: Guidance Brief. Retrieved from

[http://www.who.int/maternal\\_child\\_adolescent/documents/cah\\_iatt\\_infnotes\\_2008\\_56\\_en.pdf](http://www.who.int/maternal_child_adolescent/documents/cah_iatt_infnotes_2008_56_en.pdf).

United States Agency International Development (USAID). (2010). *HIV/AIDS Health*

*Profile: East Africa*. Retrieved from

[http://transition.usaid.gov/our\\_work/global\\_health/aids/Countries/africa/eastafrica.pdf](http://transition.usaid.gov/our_work/global_health/aids/Countries/africa/eastafrica.pdf).

United States Agency International Development (USAID). (2010). *Lesotho HIV/AIDS*

*Health Profile*. Retrieved from

[http://transition.usaid.gov/our\\_work/global\\_health/aids/Countries/africa/lesotho\\_profile.pdf](http://transition.usaid.gov/our_work/global_health/aids/Countries/africa/lesotho_profile.pdf).

- United States Agency International Development (USAID). (2010). *Senegal HIV/AIDS Health Profile*. Retrieved from [http://transition.usaid.gov/our\\_work/global\\_health/aids/Countries/africa/senegal.html](http://transition.usaid.gov/our_work/global_health/aids/Countries/africa/senegal.html).
- United States Agency International Development (USAID). (2011). *HIV/AIDS Health Profile: Southern Africa*. Retrieved from [http://transition.usaid.gov/our\\_work/global\\_health/aids/Countries/africa/southernafrica\\_profile.pdf](http://transition.usaid.gov/our_work/global_health/aids/Countries/africa/southernafrica_profile.pdf).
- United States Agency International Development (USAID). (2011). *HIV/AIDS Health Profile: West Africa*. Retrieved from [http://transition.usaid.gov/our\\_work/global\\_health/aids/Countries/africa/westafrica.pdf](http://transition.usaid.gov/our_work/global_health/aids/Countries/africa/westafrica.pdf).
- Wasserheit, J.N. (1992). Epidemiologic synergy: Interrelationships between human immunodeficiency virus infection and other sexually transmitted diseases. *Sexually Transmitted Diseases*, 9, 61-77.
- Weller, S., & Davis, K. (2002). The effectiveness of condoms in reducing heterosexual HIV transmission of HIV. *Family Planning Perspectives*, 31(6), 272-279.
- World Bank. (2012). *Lesotho*. Retrieved from <http://www.worldbank.org/en/country/lesotho/overview>.
- World Bank. (2012). *Senegal*. Retrieved from <http://www.worldbank.org/en/country/senegal/overview>.

World Health Organization (1999). Programming for Adolescent Health and Development. Geneva, World Health Organization. *WHO Technical Report Series No. 886*.

World Health Organization. (2012). *Guidance on couples HIV testing and counselling, including antiretroviral therapy for treatment and prevention in serodiscordant couples: recommendations for a public health approach*. Retrieved from <http://www.who.int/hiv/topics/vct/en>.

World Health Organization in the African Region. (2012). *Acquired Immune Deficiency Syndrome*. Retrieved from <http://www.afro.who.int/en/clusters-a-programmes/dpc/acquired-immune-deficiency-syndrome.html>.

World Health Organization (WHO). (2013). *Health topics: HIV/AIDS*. Retrieved from [http://www.who.int/topics/hiv\\_aids/en/](http://www.who.int/topics/hiv_aids/en/).

World Health Organization (WHO). (2013). *HIV/AIDS: Male Circumcision for HIV Prevention*. Retrieved from <http://www.who.int/hiv/topics/malecircumcision/en/index.html>.

World Health Organization (WHO). (2013). *Initiative for Vaccine Research: Sexually Transmitted Diseases, HIV/AIDS*. Retrieved from [http://www.who.int/vaccine\\_research/diseases/soa\\_std/en/index4.html](http://www.who.int/vaccine_research/diseases/soa_std/en/index4.html).