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Assessment of Changes on HIV-Related Knowledge, Attitude, and Behavior and Its Impact on HIV Status in Ethiopia, 2005-2011

Filson Kelemewark

ABSTRACT

Background: In Ethiopia the first case of HIV infection was identified in 1984. Since then HIV/AIDS has created an enormous challenge to several communities, affecting the social and economic well-being of the entire nation. Realizing the enormous consequences of the epidemic, the Ethiopian government deployed tremendous efforts to create HIV awareness in order to bring changes in HIV-related behaviors to reduce the risk of HIV infection. Therefore, it is necessary to assess the role of HIV-related knowledge, attitude and behavior in HIV/AID prevention in Ethiopia.

AIM: The aim of the study was to assess the changes in HIV-related knowledge, attitude, and behavior between 2005 and 2011 and its impact on HIV status among Ethiopians.

METHODS: The study used a nationally representative sample from the cross sectional years of 2005 and 2011 Ethiopian Demographic and Health Survey (EDHS). Sample sizes of study population were 12,845 in 2005 and 28,532 in 2011. SAS-callable SUDAAN was used provide descriptive characteristics of socio-demographic characteristics and independent variable of HIV-related knowledge, attitude, and behavior. The binary and multivariable logistic regression analysis was conducted to assess changes in HIV-related knowledge, attitude, and behavior and, association between these factors and HIV status. For all results, statistical significant were determined if there were no overlap in the 95% CI of the percentages being compared.

RESULTS: There was no difference in correct comprehensive knowledge of HIV between 2005 and 2011. However, there was significant change in knowledge of Mother to Child transmission (MTCT) of HIV, accepting attitude towards people living with HIV (PLWH) and sexual behavior between 2005 and 2011. Respondents who had high level of knowledge of MTCT increased from 40.2% in 2005 to 71.0% in 2011. Likewise, respondents with high level of accepting attitude towards PLWH also increased from 3.9% to 10.8%. Besides, in 2011 fewer people had started sex before the age of 15 years old, and more people knew sources of condoms in comparison to 2005 However the percentage of people who had multiple sexual partners increased from 1.2% to 1.8% between 2005 and 2011 respectively. The study also found significantly protective association between HIV positive status and having low or medium level of knowledge of MTCT of HIV (OR 0.08 or 0.78) and accepting attitude towards people living with HIV (OR 0.12 or 0.48). In contrast, HIV infection was significantly associated with having multiple sexual partners (OR 4.49).

Conclusion: Efforts deployed by Ethiopian government and other international organizations in response to HIV/AIDS epidemics have had success in terms of improving MTCT knowledge of HIV, accepting attitude towards PLWH, knowledge of sources of condom and sexual debut between 2005 and 2011. Surprisingly, we did not find an evidence of high level of HIV knowledge to be protective against HIV infection in the current study. Therefore continuous intervention is recommended to seal the gap between knowledge and sexual practices that may influence safer sexual behavioral changes.

Key words: HIV/AIDS, Knowledge, Attitudes, Sexual behavior, MTCT, PLWH

Assessment of changes in HIV-related knowledge, attitude, and behavior and its impact on HIV status in Ethiopia, 2005-2011

by

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Author's Statement Page

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TABLE OF CONTENTS

List of Tables

Page

LIST OF FIGURES

Page

ABBREVIATIONS AND ACRONYMS

AIDS - Acquired Immunodeficiency Syndrome (AIDS)

HIV - Human Immunodeficiency Virus

STD - Sexual Transmitted disease

SPM - Strategic Plan for Management

PMTCT - Prevention of Mother to Child Transmission

PLWHA - Persons Living with HIV/AIDS

MTCT - Mother to Child Transmission

ART - Antiretroviral Therapy

CDC - Centers for Disease Control and Prevention

OR - Odds Ratio

CI - Confidence interval

VCT - Voluntary Counseling and Testing

DHS: - Demographic and Health Surveys

EMOH - Ethiopia Ministry of Health

UNAIDS - United Nation Joint Program on HIV/AIDS

USAID -United States Agency for International Development

WHO - World Health Organization

HAPCO - HIV/AIDS Prevention and Control Office

CHAPTER I

Introduction

1.1. Background

The Human Immunodeficiency Virus (HIV) is the causative agent that can lead to acquired immune deficiency syndrome (AIDS). Based on Baltimore classification method, HIV is classified under class VI in a member of Genus lentivirus (Tortora et al., 2007). The name 'lentivirus' means 'slow virus' because Viruses classified in this genus have characteristics of long period of incubation and long duration illness to produce any adverse effects in the body (Tortora et al., 2007). The main target of HIV is the infected person immune system. At the latest stage of HIV, the virus wearies down the immune system and opportunistic infection takes advantage of the weakened immune system and cause devastating illnesses (CDC, 2015).

The origin of HIV is still mysterious and disputed, though, some scientist believed it came from monkeys found in West Africa. Simian immunodeficiency viruses **(**SIV) is a virus that affects monkeys, and it bears a close resemblance with HIV (Sharp et al., 2011). Unlike HIV, SIV does not suppress the immune system of the monkeys, therefore scientist believed the people got exposed to the infected blood of the mutated form of SIV when they butchered and ate the monkeys as a traditional source of food (Sharp et al., 2011). The first case of HIV was identified in the Democratic Republic of the Congo in 1959, and the first case of AIDS was not well known till the 1980's when few homosexual men in Los Angeles suddenly presented to a hospital with rare opportunistic infections (CDC, 1981). At the same time, a group of men in New York and California presented with unusual aggressive Cancer knows as Kaposi's sarcoma. (Avert, 2016). Based on a short article published by the Centers for Disease Control's Morbidity and Mortality

Weekly Report (MMWR), these cases were mainly witnessed among gay men who were previously healthy and lived in Los Angeles (Avert, 2016). Then few other studies reported that this new disease was not only occurring among homosexual, but it is also occurring among heterosexual individuals involved in injection drug, and blood transfusions (Avert, 2016). By late 1981, there were 270 reported cases of severe immune deficiency among gay men in which 121 of them had died (Avert, 2016). During this time, many believed that a variety of drugs, poisons, and toxins was the cause to this new diseases. Some also believed it came from aliens who had landed on earth while others with fundamental evangelical beliefs thought that this was "God's curse on homosexuals" (James C, 2007). In June 1982, cases were reported among gay men in Southern California, and it was proposed that sexual intercourse is the cause of the immune deficiency therefore the syndrome was initially called gay-related immune deficiency or (GRID) (Avert, 2016). Later the disease was also reported in hemophiliacs and Haitians, which led most to believe that it had originated in Haiti. In September 1982, the CDC officially named it as Acquired Immune Deficiency Syndrome (AIDS). Thereafter, the number of new HIV cases started to increase rapidly across the USA and were quickly identified in Europe, Australia, New Zealand and Latin America (Avert, 2016). The main groups at risk in developed countries were gay men, hemophiliacs, blood transfusion recipients and intravenous drug users (Avert, 2016). Even though HIV has reached every corner of the globe, Sub-Saharan Africa account for nearly 71% of the total HIV/AIDS of the globe. However, there is a remarkable variation of HIV epidemic across sub-Saharan Africa. According to UNAIDS (2014) report, the prevalence of HIV is the highest in the countries of Swaziland (25.9%), Botswana (25.2%), Lesotho (23.6%), South Africa (18.9%), Zimbabwe (16.7%), Namibia (16.0%), and Zambia (12.4%). Such numbers are astronomical compared with most of the world. On the other hand, in some countries of East Africa, including

Kenya, Rwanda, Sudan, Tanzania, and Ethiopia, the prevalence of HIV has stabilized and declined. Although HIV prevalence in has fallen in Ethiopia, the epidemic continue to be a major challenge to the health and development of the entire nation. According to World Health Organization, high rate of poverty, economic disparity, social inequalities, cultural diversity, weak health infrastructure are some of the factors associated with the spread of the HIV infection in developing countries.

1.2. HIV transmission and prevention

The predominant transmission route of HIV are through unprotected sex with someone who is infected, direct blood contact through injection or transfusion of contaminated blood, and mother to child transmission (MTCT) during pregnancy, at birth and through breastfeeding (WHO, 2013). However, the main mode of transmission varies in different regions of the world. For instance, in developed countries homosexual sex and intravenous drug injection are the most common means of transmission of HIV/AIDS (CDC, 2015). In contrast, in many developing countries heterosexual contact is the main mode of transmission.

There are four stages of HIV infection, which includes acute, clinical latency, symptomatic and chronic (AIDS). During acute stage of HIV infection, the body produces large amount of virus within 2 to 4 weeks after a person is infected. In this early stage, infected individuals may exhibit flu-like symptoms, such as fever, headache, and rash (Avert, 2015). If an HIV antibody test is done during this stage it may not be positive. The second stage of HIV infection is clinical latency in which the virus still continues to multiply, but at a very low level. During this stage, patients are free from major symptoms (Avert, 2015). Despite this, patients are extremely infectious. If proper treatment is provided during this period, patients may live with clinical latency

for several decades (an average of ten years). However without proper treatment, some people may progress to symptomatic stage in which HIV damages body's immune system within three years (Avert, 2015). As a result, the immune system will continue to worsen and progress to the last stage of chronic AIDS (Avert, 2015). During this stage, the infected person immune system is badly damaged therefore vulnerable to severe opportunistic infections such as Pneumonia, Tuberculosis, Non Hodgkin's Lymphoma and many others. These opportunistic infections will become more serious and will eventually lead to death (Avert, 2015).

Despite intensive researches that started from the discovery of the virus, a safe and effective vaccine has not yet been developed. This is mainly due on the challenges in developing vaccine that is safe, effective and durable (CDC, 2015). Therefore prevention is mainly through basic safety measures as practicing safe sex, sterile syringe use and screening blood for transfusion. Currently, there is no adequate treatment that exists for the eradication of the AIDS virus from those already infected with HIV. However, several antiretroviral drugs are available to reduce the viral load in the blood. It is very challenging to make effective drugs that cure AIDS disease. This is because viruses belong to retroviruses that mutates quickly; therefore there is a high chance that it will become resistant to the drug (CDC, 2016). For this reason, HAART (Highly Active Antiretroviral Therapy) is recommended by Doctors, which require taking a combination of three or more antiretroviral drug (CDC, 2016). HAART transformed AIDS into a chronic disease of HIV infection, however it has not reduced new cases of HIV infection. If patients fail to take their medications on schedule every day, HIV may become resistant to one combination of HAART (CDC, 2016).

1.3. Research Question

Several studies have assessed HIV-related knowledge, attitudes and behavior; for higher rates HIV transmission rates in developing countries have been attributed to a wide range of behavioral risk factors. The risk factors may be different depending on the social and cultural contexts of each population. Different interventions may work in different societies. In Ethiopia, several programs have been rolled out in the past decade by government, not-for-profit organizations and businesses to increase HIV-related knowledge, attitude and behaviors with the hope that it will help reduce the HIV prevalence. To date, there has not been a population based study using a nationally representative data to examine whether or not HIV-related knowledge, attitude and behaviors relates to HIV status in the Ethiopian society. The objectives of this study therefore were:

1. To assess the changes in the HIV-related knowledge, attitude, and behavior in Ethiopia to evaluate the impact of public health measures undertaken by the Ethiopian government, and other collaborating organizations.
2. To assess the association between the HIV-related knowledge, attitude and behavior and HIV status.

CHAPTER II

LITERATURE REVIEW

2.1 The HIV epidemic

2.1.1 Global Epidemic of HIV

HIV/AIDS is a major public health concern that has threatened the very existence of human race by claiming more lives than the black plague, World War I, and World War II (Avert 2008). It is the first disease to be labeled as a global security threat by the United Nations Security Council (Hunter et al., 2003). The HIV pandemic has spread quickly along international transportation routes, through large towns and rural villages, between sexual partners and among family members. It has affected households, communities, and development and economic growth of nations all over the world (Joint United Nations Programme on HIV/AIDS, 2015). Now, 35 years after AIDS was first recognized, HIV epidemics still requires continued global focus and investment. At this point in time, there is no country in the world without HIV cases (WHO, 1995). Based on the latest estimates from UNAIDS globally, approximately 38.1 million people have become infected with HIV and 25.3 million people have lost their life to AIDS-related illnesses since 2000. In 2014, an estimated of 36.9 million people were living with HIV and 2 million new HIV infections were reported (UNAID, 2015). In the same year, 1.2 million people died from AIDS-related illness. Overall, the number of new HIV infections has declined by 35% since 2000. Similarly, the number of AIDS-related deaths has declined by 42% since 2004 (UNAIDS, 2015). Though the number of incidence and the mortality of AIDS have declined in the past several years, the global prevalence of HIV has scaled up to 0.8% since 2001 (UNAIDS, 2015).

Even though the incidence of HIV pandemic has declined, the trend is not uniform across the globe. For instance, highest declined in the incidence of HIV have been observed in the

Caribbean (42%) and Sub-Saharan Africa (25%) regions. On the other hand, the incidence of HIV increased by 35% in the Middle east and North Africa (UNAIDS, 2012). The rate of infections has been stable in Western, Central, Eastern Europe, Central Asia and North America. The overall reduction of incidence of HIV infections and mortality of AIDS due in part to the worldwide distribution of ART and the increasing number of people receiving HIV treatment that is 13.6 million as of 2014 (UNAIDS, 2014).

The HIV epidemic is influenced by the specific social economic, and political realities of the communities affected. Taking these different conditions activists, epidemiologists, healthcare workers, and others have learnt that AIDS pandemic is not a uniform event, but it is a dynamic complex epidemics. Therefore the response from government, community members, health care infrastructure, and the international community

2.1.2. HIV in Sub-Saharan Africa

Although all parts of the world are affected by the HIV epidemic, Sub-Saharan Africa bears the heaviest burden. The impact of the disease has been mainly seen through the escalating morbidity and mortality that disproportionately affects sub-Saharan African countries. According to the UNAID report, about 90% of the countries which are located in SSA are harshly affected by the epidemic. Therefore adult HIV prevalence is 9.0% while it is only 1.2% worldwide (UNAID, 2012). Though the region accounts only for 10% of the world population, it is home for 71% of the global total HIV infection people (Avert, 2013). In 2013, an estimated of 24.7 million people were living with HIV (UNAIDS, 2013). In the same year, there were 1.5 million new HIV infections and 1.1million AIDS-related deaths. Overall HIV/AIDS accounts for about

approximately 90% of all infections in the region of Sub-Saharan Africa. As result, major consequences such as family disruption, socioeconomic damage, a decrease in life expectancy, a secondary epidemic of tuberculosis (TB), and a dramatic increase in the number of orphans have been observed (UNAIDS, 2013). In response to these serious challenges, the global health, multilateral and bilateral initiatives, and leading government have mounted significant efforts. As a result, progress in HIV prevention and response has been archived. According to UNAIDS report, the number of people who are newly infected with HIV have declined from 3.4 million to 2.1 million between 2001 and 2013. Likewise, the numbers of AIDS related deaths have declined by 35% since 2005 (UNAID, 2014). Despite this considerable progress, the number of people living with HIV has risen by 12% in the region. This number is partly due to the availability of ART. Young people, particularly women age group 15-24 years, are among the vast majority of new HIV infections. Based on UNAIDS report, women accounts for more than one in four new HIV infections in Sub-Saharan Africa. The HIV epidemic is not evenly distributed across the region. According to (UNAIDS, 2014) report, countries with prevalence rates of over 20 % are Lesotho, Swaziland, Botswana, Namibia, Zambia, and Zimbabwe. Botswana, Lesotho, Swaziland, and Zimbabwe have prevalence rates above 30%. The Northern parts of the region such as Mozambique, Malawi, Burundi, Rwanda, Kenya, Tanzania, and Ethiopia all have adult prevalence rates in the 6-15 % range (UNAIDS, 2014). Among all the sub-Saharan Africa countries, South Africa is the most affected region with 5.8 million people living with HIV, and 270,000 HIV related deaths recorded in 2011 (UNAIDS, 2014). There is little or no data available to report the HIV prevalence in countries like Somalia, Eritrea, Djibouti, and Sudan.

2.1.3. HIV in Ethiopia

Ethiopia is a nation that has experienced a severe and devastating epidemic of HIV infection and AIDS. According to the Ethiopian Ministry of Health report, the first case of HIV infection was identified in 1984, and the first hospitalized AIDS patient was reported in 1986 (EMOH, 2000). Thereafter, HIV/AIDS has become a major public health concern in the country, and AIDS become the leading cause of morbidity and mortality among adults in Ethiopia. According to the Ethiopian Ministry of Health, the prime mode of transmission is through heterosexual intercourse which accounts for 87% of infections and 10% of infections occurs due to mother to child transmission. In addition, the use of unsafe sharp and skin piercing instruments play a significant role in HIV transmission in the rural areas (EMOH, 2000). The epidemic is amplified by the country's major development challenges such as poverty, illiteracy, wide spread commercial sex worker, gender disparity food shortages, expanding urbanization, increased mobility due to labor migration, and other socio-economic factors. The spread of HIV/AIDS started spread widely in major areas located along major roads and commercial routes. The epidemics of HIV/AIDS affects individuals in the most productive groups, hence it has created severe economic impacts in the country (EMOH, 2000). The number of orphans increased due to AIDS, and the burden of their cares on grandparents, older siblings, and the community at large. The continued need for health care services have placed a significant burden on resources in the already inadequate health services (EMOH, 2000).

Confronted by the HIV epidemic and its consequences, the government of Ethiopia has deployed tremendous efforts to improve HIV awareness following the enactment of the National HIV/AIDS Policy in 1998. The National HIV/AIDS Prevention and Control Council declared national HIV emergency in 2001 (EMOH, 2000), and it has promoted prevention methods, risk

reduction and behavioral change within the population. Efforts were also taken to collect epidemiological data and many studies from the late 1980 and 1990s reported prevalence data and risk factors in a number of high-risk groups. According to Ethiopia HIV/AIDS Prevention & Control Office (HAPCO) in 1984 5,565 military people were recruited to conduct the first sero-survey at a national scale (Berhane et al., 2008). Initially, the epidemic was localized in urban areas among certain occupational groups. In 1996, the first systematic national report indicated the progressive rise of HIV prevalence from 1% in 1983 to an estimated 5.2%, which represented a generalized epidemic.

In 1989 Antenatal clinic (ANC) based sentinel surveillance system was established and became the main source of information about HIV. The data were collected based on unlinked anonymous tested of left-over blood in selected (sentinel) ANC sites using World Health Organization (WHO)/Joint United Nations Programme on AIDS (UNAIDS) guidelines. By 2005, ANC were expanded to a total of 82 (38 urban and 44 rural (Berhane et al., 2008).

The Ministry of health, in collaboration with the WHO's global program for AIDS, have made efforts specifically on condom promotion, surveillance, education, stigma-reduction programs, patient care and expansion of HIV testing laboratories. In 2000, the government of Ethiopia was approved to Multi-Sector AIDS Project (Ethiopia MAP) and received a credit of $59.7 million to develop a participatory, decentralized and community-driven response to HIV/AIDS. This plan encompassed establishing AIDS Councils and HIV/AIDS Prevention and Control Offices (HAPCOs) at federal, regional and woreda levels. Prevention, care and support were mainly given through the community level interventions. The decentralized system of support has contributed to care for orphans and people bedridden by AIDS, community awareness and direct responses, and provided drugs for opportunistic infections (Marelize et al., 2007). The Ethiopian MAP

intervention funded activities involved in changing attitude towards people living with HIV. In January 2005, The Federal Democratic Republic of Ethiopia (FDRE) launched the Strategic plan for Intensifying Multi-Sectoral HIV/AIDS response, SPM I (2004-2008), along with Social Mobilization Strategic Document costed as US $11 million (HAPCO, 2005).This plan is based on guiding principles including multi-sectionalism, empowerment, shared sense of urgency, gender sensitivity, involvement of PLHA, result oriented interventions and best use of resources in terms of allocation, harmonization, efficiency and accountability (HAPCO, 2004).Strategic priorities were aimed at establishment of AIDS resource centers, implementation of a Health Extension Program, Expansion of PMTCT, and establishing resources centers for you and youth clubs. The community-based approach program trained 25,000 health extension workers and assigned them to a health post providing outreach services to households in 12,500 rural kebeles (UNAIDS, 2006). In addition, several guideline and manuals such as Guidelines on PMTCT, home based care and support, mainstreaming HIV/AIDS in Government institutions were developed and made operational. In order to promote workplace interventions and advocate for mainstreaming HIV/AIDS in respective institution, HIV/AIDS task forces/focal persons were set in the 28 federal government agencies and 125 regional government bureaus(UNAIDS, 2006) . According to MOH, 286 millions of condoms were distributed during 2004-2008. Government owned health facilities have played a significant role in condom promotion and served as important outlets for distribution. In 2005, Free ART program were launched to improve the quality of people living with HIV. In addition, Numerous International agencies and organizations have worked with Ethiopian government to fight HIV/AIDS epidemics. Numerous donors fund HIV/AIDS activities in Ethiopia. The Global Fund to Fight AIDS, TB & Malaria has approved a grant of US$139.4 million to address HIV/AIDS in the country (UNAIDS, 2006). In addition, A number of

multilateral, bilateral and private external support agencies have also engaged in by sponsoring drams, short messages and panel discussions, which were transmitted to the public in different languages using electronic and print media at both national and local levels. Several HIV/AIDS prevention clubs have been engaged in mass media, campaigns, school-based AIDS education and peer education programs, which intend to bring changes in knowledge and behavior that reduce the risk of HIV exposure and infection (UNAIDS, 2006). Moreover many AIDS Resource Centers have provided services such as reading, Internet, printing and distribution of posters, which mostly used by young adults. In 2005, the number of Voluntary Counseling and Testing (VCT) were 658 compared to 248 in 2004 (UNAIDS, 2006). As a result the number of people who got VCT services increased from 41,387 clients to 367,006. The PMTCT guideline has been revised in 2005, and the total numbers of PMTCT clients were 130,230 compared to 47,890 in 2004 (UNAIDS, 2006). In addition, home care provider has been assisted with protective material and sanitary equipment by NGOs and other implementing agencies.

2.1.4. Region and Country profiles

Ethiopia is a landlocked country located in Northeast Africa which is also known as the horn of Africa.The country is bordered by Eritrea to the north and northeast, Djibouti and Somalia to the east, Sudan to the west and Kenya to the south. Vast highland complex of mountain dominates the country. Based on these diverse altitude, there are three different climate zones, kola (Tropical zone), Woina dega (Sub-tropical zone), and Dega (cool zone). The landscape is composed of a high central plateau, with some mountains reaching more than 13,000ft. The highest point of Ethiopia is Ras Dejen which is 14,928 ft. tall and the lowest point of the country is the Afar depression at -410ft, one of the hottest place on earth. The Great Rift Valley divides the landscape and runs to north-east to south west, from Eritrea to northern Kenya. Ethiopia plateau is

home to several rivers therefore called “The water tower of Eastern Africa”. One of the largest lake in Ethiopia is called Lake Tana which is also the source of Blue Nile River that flows through Sudan, where it merges into the Great Nile River (CIA, 2016).

Based on the most recent United Nation census, as of 2015, the population was estimated to be 98.9 million making the country the second most populous nation in Africa next to Nigeria. According to WHO, 84% of the population still live in rural regions. The capital city of Ethiopia is called Addis Ababa, which has a population of 3.4 million people. Ethiopia’s population is highly diverse comprising 80 different ethnic groups and 200 dialects are spoken throughout the country. The predominant ethnic groups are the Oromo, Amhara, Tigreans and Somali. Amharic is the official national language of Ethiopia. English is the most widely spoken foreign language as it taught in secondary schools. The main religions are Orthodox (43.5%), Islam (33.9%), Protestant (18.6%), Catholic (0.7%), and other (0.7%). However, Ethiopia is a predominantly Christian country and the majority of Christians are Orthodox Tewahedo Christians.

Ethiopia is one of the poorest nations in the world. The country’s per capita income was estimated at $567 USD (World Bank, 2014). According to the Ethiopia Demographics profile of 2014, the average life expectancy at birth was 60.75 years (58.43years for male and 63.15 years for female).

Even though Ethiopia has one of the world’s highest maternal mortality ratios, the number has decreased from 675 maternal deaths per 100,000 live births in 2005 to 350 maternal deaths per 100,000 live births in 2010.Similarly, the infant mortality rate has decreased by 23%, from 77 to 59 per 1000 live births. (WHO/UNAIDS, 2005).

Figure 1. Map of Ethiopia. Source: World Health Organization, 2012.

2.2. Risk Factors of HIV

2.2.1. HIV-related knowledge

HIV-related knowledge plays a key role in HIV prevention and in generating significant, continuous reductions in HIV incidence in diverse settings. UNAIDS 2010 Report on the global AIDS epidemic confirmed that increased knowledge of HIV is clearly linked with the decline in new HIV infections over the past 10 years. According to DHS proper knowledge of HIV prevention method is 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. Comprehensive correct knowledge about HIV is composed of variables that includes knowing two ways of preventing the sexual transmission of HIV (using condoms and limiting sex to one faithful, uninfected partner), correctly reject the two most common local misconceptions of HIV transmission (mosquito bites, sharing food), and know that a healthy-looking person can have the HIV virus. Comprehensive correct knowledge also includes correct knowledge prevention of mother to child transmission (through breastfeeding and anti-retroviral therapy during pregnancy). Increasing knowledge of HIV can be a powerful means of promoting positive attitudes and building safe practices among population. Study that has been conducted in Nigeria found that knowledge about the transmission of HIV.

2.2.2. HIV-related attitude

The United Nations defined HIV-related stigma as the process of devaluing those either living or associated with HIV (UNAIDS). HIV/AIDS related stigma and discrimination have been a barriers to achieving effective HIV/AIDS prevention, treatment, care and support. Stigma is associated with HIV since it is only transmitted through sex, which is considered a taboo subject in some culture (AVERT - Stigma, discrimination and attitudes to HIV & AIDS, n.d.). People living with HIV/AIDS often face discrimination and are sometimes neglected because of hostile attitudes. A Study shows that participants who experienced high level of stigma were over four times likely to report poor access to care (AVERT - Stigma, discrimination and attitudes to HIV & AIDS, n.d.). This fear and discrimination prevent individual from seeking help and medical care. People with HIV/AIDS often viewed as shameful and the disease is perceived to be a result of personal irresponsibility. This type of attitude fuel prejudice against those living with HIV/AIDS and it encourages societies to point out finger instead of caring or looking after those who are infected. Stigma differs depending on the dominant transmission routes in a country or region. For example in Sub-Saharan Africa, the dominant route of transmission is through heterosexual sex, therefore HIV-related stigma is this region is mainly focused on infidelity and sex workers. According to DHS, HIV related attitude comprised of four accepting attitudes toward people living with HIV and adult support of youth education on condom use. Accepting attitudes towards people with HIV were assessed by the number of respondents who report an accepting or supportive attitude on all four component questions: 1) would be willing to care for a family member who became sick with the AIDS virus; 2) would buy fresh vegetables from a vendor whom they knew was HIV+; 3) female teacher who is HIV+ but not sick should be allowed to continue teaching in school; 4) would not want to keep the HIV+ status of a family member a secret. It is highly recommended to successfully address HIV stigma not only people with HIV are

treated fairly, but also to enhance individuals confidence to test for HIV, and to talk about HIV-related risks and HIV status with others. The national Policy on HIV/AIDS stated that stigma is one of the key challenges in the prevention and control of the epidemic. Therefore focusing on educating individuals about accepting HIV related attitude is crucial first steps in fighting the epidemic.

2.2.3. Sexual behavior

Sexual risk behaviors place individuals at risk for HIV infection and other sexually transmitted diseases (STDs). The most common sexual risk factors are early sexual debut, multiple sex partnerships, unprotected intercourses, commercial sex and anal sex (UNAIDS). According to the HIV/AIDS Survey Indicators Database early sexual debut and multiple sex partnerships are some of the indicators of sexual behavior. Early sexual debut is defined as 'Percentage of young people age 15-24 who have had sex before the age of 15'.

Studies in Kenya and South Africa suggest that early initiators are less likely to know how to prevent STIs, including HIV, or to be able to negotiate condom use than are those who delay sexual intercourse. Likewise, Study in South Africa found significant association between early sexual debut and HIV Audrey et al., 2009). People who started sex at early age may have a longer duration of sexual activity compared to later initiators, therefore potentially exposed to unwanted pregnancies and STD's, mainly HIV infection.

In addition, the number of sexual partners plays an important role in HIV transmission (Vieira, Cheng, Harper, & Senna, 2009). People who started having sex at early age are more likely to have sex with multiple sex partners. Several studies have shown that having unprotected sex with multiple partners increase risk of becoming infected with HIV and other Sexually Transmitted

Infections (STIs) among youths. Study in Malawi demonstrated that young people who have multiple sexual partner are less likely to use a condom, thereby putting themselves at increased risk for HIV and STIs (Parazzini et al., 1995). Many other studies have shown that compared to women, men are more likely to have involved in multiple sex partners with groups of people such as strangers, bar attendants and commercial sex workers.

CHAPTER III

METHODS AND PROCEDURES

3.1 Data sources

The data source for this thesis is the 2005 and 2011 Ethiopia Demographic and Health Survey (EDHS). The survey was conducted under the guidance of the Ministry of Health, Ethiopia (MOH) and was implemented by the Central Statistics Authority (CSA). The 2005 and 2011 EDHS sample were selected based on a stratified two-stage cluster population using the 1994 and 2007 population and housing census as a sampling frame respectively.

The EDHS surveys are nationally representative household-based surveys, implemented to obtain detailed information related to the various health indicators, including knowledge, attitudes, and behaviors related to HIV/AIDS.

The 2005 and 2011 EDHS sample were selected from the list of census enumerations areas (EAs). In the first stage, samples of 540 EAs were selected in 2005 and 624 EAs in 2011. The sample households were selected systematically from the list of households in each cluster for participation in the survey. From the first cluster of 2005 and 2011, a representative household of 14,500 and 17,817 were selected in the second stage respectively.

Three types of questionnaire were used including the household questionnaire, women's and men's questionnaire in order to address the objective of the study. Women's and men's questionnaire were aimed to collect information on women aged 15-49 and men aged 15-59 regarding their demographic, socioeconomic and cultural status as well as to obtain voluntary consent to give blood samples for HIV testing at an individual level. Dried Blood Sample (DBS)

was collected from the eligible respondents and tested by the Ethiopian Health and Nutrition Research Institute (EHNRI).

3.2 Study design

A cross sectional study was conducted to assess the changes in HIV-related knowledge attitude and behavior among Ethiopians between 2005 and 2011 time frame and to also examine their relationship with HIV status. The Standard Demographic and Health Surveys (DHS) Phase VI data for Ethiopia was used.

3.3 Study population and sample size

Ethiopian Demographic and Health Survey (EDHS) data for the years 2005 and 2011 were used for the analysis. The 2005 EDHS collected information 6,812 women and 6,033 men. Likewise, the 2011 survey collected information from 16,517 women and 13,015 men. The study samples were systematically selected from the list of households in each cluster for participation in the survey. The data comprise males aged 15-59 and females aged 15-49.who had data on HIV testing. The surveys also collected data on knowledge, behavior, social, and demographic indicators using informed consent interviews.

3.4 Dependent variable

The dependent variable in this study is HIV status of individuals participated in the study.

3.5 Independent variable

Independent variables in this study included socio-demographic characteristics including (age, gender, place of residence, education, wealth index and marital status) and HIV-related knowledge attitude and behavior. An internationally accepted HIV/AIDS Survey Indicators Database from the MEASURE DHS online tool was used to select variables of HIV-related knowledge, attitude, and behavior. The HIV/AIDS Survey Indicator Database is a comprehensive source of information on HIV/AIDS, which uses consistent method for measuring factors related to effective monitoring of national HIV/AIDS prevention programs. The indicators used in this database were identified to monitor the goals set at UN General Assembly Special Session on HIV/AIDS, the Millennium Development Goals, and strategic goals of the President's Emergency Plan for AIDS Relief.

3.5.1 HIV-related knowledge

Based on the DHS question, knowledge of prevention method was defined as 'The percent of respondents who, in response to a prompted question, say that people can protect themselves from contracting HIV by using condoms or having sex only with one faithful, uninfected partner'. The question regarding condom use was ''can people reduce their chance of getting the AIDS virus by using a condom every time they have sex?' The question regarding having one faithful, uninfected partner was 'can people reduce their chance of getting the AIDS virus by having just one uninfected sex partner who has no other sex partners?' Subjects answering, "Yes" to both questions were scored 3, representing high level of knowledge of prevention Methods. Subjects answering, "Yes" to at least one of the two questions were scored 2, representing medium level

of knowledge of prevention. Subjects answering, "No" to both questions were scored 1, representing low level of knowledge of HIV prevention Methods.

3.5.2 Comprehensive Correct knowledge of HIV

Comprehensive correct knowledge of HIV is a composite of five variables including correct knowledge of prevention methods (using condoms or having sex only with one faithful, uninfected partner), two most common misconceptions about HIV/AIDS transmission (mosquito bites, sharing food) and correct knowledge that a healthy looking person can have HIV. Misconception about HIV/AIDS transmission via mosquito bites was defined as 'The percent of respondents who reject the misconception that HIV/AIDS can be transmitted by mosquito bites' Misconception about HIV/AIDS transmission by sharing food 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 AIDS'. Misconception about a healthy looking person can have HIV was defined as 'The percent of respondents who say that a healthy-looking person can have the AIDS virus'. Subjects answering, "Yes" to four or five questions were scored 3, representing high level of correct comprehensive knowledge about HIV infection. Subjects answering, "Yes" to two or three questions were scored 2, representing medium level of correct comprehensive knowledge about HIV infection. Subjects answering "No" to all five questions or "Yes" to only one questions were scored 1, representing low level of correct comprehensive knowledge about HIV infection.

3.5.3 Knowledge of Mother to Child Transmission (MTCT)

This variable determines subject knowledge of methods to prevent the transmission of HIV from mother to child. Two questions were asked for this variable. The first question was 'can the virus that causes AIDS be transmitted from a mother to her baby through breastfeeding?' Subjects were also asked that if they are aware that risk of MTCT can be reduced by taking antiretroviral drug during pregnancy. Subjects who correctly answered for both questions were scored 2, representing correct knowledge of prevention of MTCT of HIV.

3.5.4 HIV-related attitude

This variable is defined as 'The percent of respondents expressing accepting attitudes towards people with HIV'. Accepting attitudes are comprised of four questions about people with HIV. These questions were are you willing to care for a family member with HIV or AIDS, would you buy fresh vegetables from shopkeeper who has HIV, a female teacher with HIV who is not sick should be allowed to continue teaching, and would not want to keep secret that a family member is HIV-positive. Subjects answering, "Yes" to four or three questions were scored 3, representing high level of correct full accepting attitude. Subjects answering, "Yes" to two questions were scored 2, representing medium level of correct full accepting attitude. Subjects answering "No" to all four questions or "Yes" to only one questions were scored 1, representing low level of correct full accepting attitude

3.5.5 Sexual Behavior

Variables used to represent individual sexual behavior are early sexual debut and multiple sex partners. Early sexual debut was defined as 'Percentage of young people age 15-24 who have had sex before the age of 15'. Multiple sexual partnerships was defined as 'The percent of young people (aged 15-24) who have had sex with more than one partner in the last 12 months'. Respondents were asked how many different people they had sexual intercourse in the last 12 months.

3.6 Statistical Analysis

Data was analyzed using SAS-callable SUDAAN software. Variables of interest were selected from three different EDHS files (HIV, male and female) and merged using respondents 'Cluster number', 'household number' and 'Line number'. In the descriptive analysis, frequency procedure was used to provide the descriptive characteristics of independent and dependent variables and to assess changes between 2005 and 2011. The binary and multivariable logistics regression analysis was conducted to assess association between HIV-related knowledge, attitude and behavior. Odds ratios and 95% confidence interval were computed to determine the association between the HIV status and HIV-related knowledge, attitudes, and behavior. For all results, statistical significant were determined if there were no overlap in the 95% CI of the percentage being compared.

CHAPTER IV

RESULTS

4.1 Socio-demographic characteristics

Table 1.1 the total study population in 2005 was 12,845 with 6,033 (47.2%) men and 6,812 (52.8) women. The total population in 2011 was 28,532 with 13,015 (45.7%) men and 15,517 (54.3%) women. The socio-demographic characteristics including age, gender, residence, marital status, education and wealth index in the two rounds of EDHS survey of 2005 and 2011 were presented in table 4.1. There was a statistically significant difference in residence status (urban 16.3% and 21.8%). Likewise, primary level education level was also statistically different (29.7% and 44.3%) between 2005 and 2011 respectively. The remaining other socio-demographic characteristics were not different between 2005 and 2011. The majority of the study participants were aged 15-24 in both 2005 (41.2% and 2011 (40.0%). Women also represent slightly more than half of the population (52.8% in 2005 and 54.31% in 2011). Similarly, in 2005 and 2011, rural residents represented more than half of the population (83.6%, and 78.1%, respectively). Individuals who are married or living with a partner represented more than half of the population 60.5% in 2005 and 2011 60.6% in 2011.

Table 4.1: Socio-demographic characteristics of study population, Ethiopia, 2005 and 2011

	2005 (N=12,845) Percent , (95%CI)	2011 (28,532) Percent, (95%CI)
Age		
15-24	41.2 (40.1-42.3)	40.0 (39.2-40.9)
25-29	14.9 (14.1-15.7)	17.7 (17.1-18.4)
30-39	23.6 (22.7-24.6)	23.2 (22.5-24.0)
40+	20.1 (19.2-21.0)	18.8 (18.2-19.5)
Gender		
Male	47.2 (46.0-48.3)	45.7 (44.8-46.5)
Female	52.8 (51.6-53.9)	54.3 (53.4-55.1)
Residence		
Urban	16.3 (15.7-16.9)	21.8 (21.4-22.2)
Rural	83.6 (83.0-84.2)	78.1 (77.7-78.5)
Marital Status		
Married/With partner	60.5 (59.4-61.6)	60.6 (59.7-61.3)
Never in union	32.2 (31.2-33.2)	32.3 (31.6-33.1)
Widowed/Divorced	7.2 (6.6-7.8)	7.05 (6.6-7.4)
Education		
No educ./Preschool	54.8 (53.7-55.8)	42.7 (42.0-43.5)
Primary	29.7 (28.7-30.7)	44.3 (43.5-45.1)
Secondary	13.5 (12.8-14.2)	7.7 (7.3-8.1)
Higher	5.1 (4.8-5.5)	5.1 (4.81-5.5)
Wealth Index		
Poor	37.9 (36.9-39.0)	36.4 (35.7-37.1)
Middle	18.4 (17.5-19.3)	19.2 (18.6-19.8)
Rich	43.6 (42.5-44.6)	44.2 (43.6-44.9)

CI: Confidence Interval

4.2 HIV Prevalence

Table 2 presents the prevalence of HIV between 2005, 2011 and combined years among Ethiopian population. Based on the result, the prevalence of HIV was slightly higher in 2011 (1.42%) than in 2005 (1.33%) but was not significantly different

Table 4.2: HIV prevalence among Ethiopian population between 2005 and 2011

Year	HIV status	
	Positive	
	Percent (%)	(95% CI)
2005	1.3	(1.1-1.6)
2011	1.4	(1.2-1.6)
Combined	1.4	(1.2-1.6)

CI: Confidence Interval

4.3 HIV-related Knowledge, Attitudes and Behavior

The distribution of the independent variables of HIV-related knowledge, attitude, and behavior between 2005 and 2011 are presented on table 4.3 between 2005 and 2011. The percentage of people who had medium level of knowledge of MTCT of HIV decreased significantly between 2005 and 2011 (from 56.7%, 95% CI: 55.2-58.1 to 26.5%, 95% CI: 25.6-27.5 respectively). Whereas, those with high level of knowledge of MTCT of HIV significantly increased from 40.2% (95% CI: 38.8-41.7) in 2005 to 71.0% (95% CI: 70.1-72.0) in 2011. Regarding full accepting attitude, people in 2011 had more accepting attitude than those in 2005. The percentage of people with medium level of accepting attitude increased significantly from 50.5% (95% CI: 49.2-51.7) to 67.2%, (95% CI: 66.4-68.0) respectively. Likewise, the percentage of people who had high level of accepting attitude increased from 3.9% (95% CI: 3.5-4.4) in 2005 to 10.8% (95% CI: 10.2-11.3) in 2011. Regarding sexual behavior, people who started sex before the age of 15 decreased significantly 6.4% (, 95% CI: 5.9-7.0) to 3.1% (95% CI: 2.8-3.4) between 2005 and 2011 respectively. Similarly, those who had knowledge of sources of condom also increased significantly from 39.6% (, 95% CI: 38.6-40.7) to 53.5% (95% CI: 52.7-54.3) respectively. In contrast, the percentage of people who had multiple sexual partners increased significantly from 1.2% (95% CI: 1.0-1.5) in 2005 to 1.8% (95% CI: 1.6-2.1) in 2011.

Table 4.3: Descriptive characteristics of HIV-related knowledge, attitude and behavior, Ethiopia, 2005 and 2011

Characteristics	2005 N (%)		2011 N (%)	
Knowledge of HIV Prevention Methods				
HIV prevention methods				
Low	8.6	(7.8-9.4)	6.6	(6.2-7.1)
Medium	24.6	(23.4-25.8)	24.9	(24.1-25.7)
High	66.7	(65.4-68.0)	68.44	(67.5-69.3)
Comprehensive correct Knowledge				
Low	10.2	(9.3-11.2)	8.8	(8.3-9.4)
Medium	69.8	(68.3-71.3)	70.4	(69.5-71.3)
High	19.8	(18.6-21.1)	20.6	(19.8-21.5)
Knowledge of MTCT transmission				
Low	3.01	(2.52-3.59)	2.32	(2.0-2.6)
Medium	56.7	(55.2-58.1)	26.58	(25.6-27.5)
High	40.2	(38.8-41.7)	71.0	(70.1-72.0)
HIV-related attitude				
Accepting attitude				
Low	45.5	(44.2-46.7)	22.0	(21.2-22.6)
Medium	50.5	(49.2-51.7)	67.2	(66.4-68.0)
High	4.0	(3.5-4.4)	10.8	(10.2-11.3)
Sexual Behavior				
Age at first sex				
<15	6.4	(5.9-7.0)	3.1	(2.8-3.4)
>15	93.5	(92.9-94.0)	96.8	(96.5-97.1)
Know source for condom				
Yes	39.6	(38.6-40.7)	53.5	(52.7-54.3)
No	60.3	(59.2-61.3)	46.4	(45.6-47.2)
Multiple sex partner, including spouse				
Yes	1.2	(1.0-1.5)	1.8	(1.6-2.1)
No	98.7	(98.4-98.9)	98.1	(97.8-98.3)

Knowledge of prevention methods: Two out of two = high; One out of two = medium**;** Zero out two = low
Comprehensive correct knowledge: Four or five out of five = high; Two or three out of five = medium; Zero or one out of five = low
Knowledge of MTC: Two of two= high; One out of two =medium; Zero out of two = low
Full accepting attitude: Four out of four = high**;** Two or three out of four = medium; Zero or one out of four = low

4.4 Distribution of socio-demographic characteristics by HIV status

The distribution of selected socio-demographics characteristics by HIV status in the combined years of 2005 and 2011 is presented on Table 4.4. There was higher percentage of HIV positive individuals in 30-39 age group (2.6%, 95% CI 2.1-3.1) compare to individuals in age group 25-29 (1.9% 95%CI 1.4-2.4), but the difference was not statistically significant. The prevalence of HIV was significantly higher among females (1.7%, 95%CI 1.5-2.0) than male (0.9%, 95%CI 0.7-1.1). Moreover, a greater proportion of urban residents were HIV positive (4.5%, 95%CI 3.8-5.2) compared to rural residents (0.6%, 95%CI 0.5-0.7). Additionally, HIV prevalence was significantly higher among widowed/divorced participants (6.3%, 95%CI 5.2-7.8) compared to married/with partner (1.3%, 95%CI 1.1-1.6) and never in union participants (0.3% 95% CI 0.2-.05). Furthermore, HIV prevalence was significantly higher among those with secondary level of education (3.2%, 95%CI 2.5-4.2) than those with primary (1.4%, 95%CI 1.1-1.7), and also those with higher (1.3, 95%CI 0.9-2.0) education level. For the wealth index, HIV prevalence was statistically significantly higher among rich people (2.5%, 95%CI 2.2-2.9) than poor people (0.4%, 95%CI 0.3-0.5).

Table 4.4: Cross tabulations of HIV positive status with selected sociodemographic characteristics, Ethiopia, combined (2005 and 2011) years.

Participant characteristics	HIV Status
	HIV-Positive Percent, (95%CI)
Age	
15-24	0.4 (0.3-0.5)
25-29	1.9 (1.4-2.4)
30-39	2.6 (2.1-3.1)
40+	1.4 (1.1-1.8)
Gender	
Male	0.9 (0.7-1.1)
Female	1.7 (1.5-2.0)
Residence	
Urban	4.5 (3.8-5.2)
Rural	0.6 (0.5-0.7)
Marital Status	
Married/With partner	1.3 (1.1-1.6)
Never in union	0.3 (0.2-0.5)
Widowed/Divorced	6.3 (5.2-7.8)
Education	
No educ./Preschool	1.0 (0.8-1.2)
Primary	1.4 (1.1-1.7)
Secondary	3.2 (2.5-4.2)
Higher	1.3 (0.9-2.0)
Wealth Index	
Poor	0.4 (0.3-0.5)
Middle	0.6 (0.4-0.9)
Rich	2.5 (2.2-2.9)

CI: Confidence Interval

4.5. Distribution of HIV related knowledge, attitude and behavior by HIV status

The distribution of selected independent variables (HIV-related knowledge, attitude and behavior) by HIV status for the combined years of (2005 and 2011) is presented on Table 4.5. The prevalence of HIV positive was higher among participants who had high knowledge of HIV prevention methods (1.7%) compared to participants with low level of knowledge (0.8%). However the difference was not statistically different. Likewise, the prevalence of HIV was significantly higher among adults who had high comprehensive correct knowledge (1.7%, 1.2-2.3) than low level of comprehensive correct knowledge (1.2%, 0.5-2.4). Moreover, the prevalence of HIV was significantly higher among adults who had high level of full accepting attitude (4.3%, 3.3-5.6) than adults who had medium (1.5% 1.3-1.8) and low (0.4% 0.2-0.6) level of accepting attitude towards PLHA. Concerning the sexual behavior, the prevalence of HIV was higher among participants who had started sex before the age of 15 (2.3%, 1.9-2.5) than adults who had sex after the age of 15 (1.3%, 1.2-1.5). However the difference was not statistically significant. In contrast, there was a significantly higher percentage of adults with HIV positive status who had knowledge of sources of condoms (2.2%, 1.9-2.5). Likewise, higher HIV positive status were reported among participants who had multiple sexual partners (3.4% 1.8-6.0) compared to those who had not have multiple sex partners (1.3 1.1-1.5). The difference was statistically different.

Table 4.5: Cross tabulations of HIV status and HIV-related knowledge, attitude and behavior, Ethiopia, combined (2005 and 2011) years.

Characteristics	HIV status	
	HIV positive	(%, 95%CI)
Knowledge of HIV Prevention Methods		
HIV prevention methods		
Low	0.8	(0.4-1.4)
Medium	1.4	(1.0-1.9)
High	1.7	(1.5-2.0)
Comprehensive correct Knowledge		
Low		
Medium	1.2	(0.5-2.4)
High	1.7	(1.4-2.0)
	1.7	(1.2-2.3)
Knowledge of MTCT transmission		
Low		
Medium	0.1	(0.0-0.6)
High	0.9	(0.6-1.3)
	2.3	(2.0-2.7)
HIV-related attitude		
Accepting attitude		
Low	0.4	(0.2-0.6)
Medium	1.5	(1.3-1.8)
High	4.3	(3.3-5.8)
Sexual Behavior		
Age at first sex		
<15 age	2.3	(1.3-3.9)
>15 age	1.3	(1.2-1.5)
Source for condoms		
Yes	2.2	(1.9-2.5)
No	0.5	(0.4-0.7)
Multiple sex partner, including spouse		
Yes	3.4	(1.8-6.0)
No	1.3	(1.1-1.5)

Knowledge of prevention methods: Two out of two = high; One out of two = medium**;** Zero out two = low
Comprehensive correct knowledge: Four or five out of five = high; Two or three out of five = medium; Zero or one out of five = low
Knowledge of MTC: Two of two= high; One out of two =medium; Zero out of two = low
Full accepting attitude: Four out of four = high**;** Two or three out of four = medium; Zero or one out of four = low

4.6. HIV-related knowledge, attitude and behavior

4.6.1. HIV-related knowledge

Represents multivariate analysis of change in association between HIV status and selected variables (HIV-related knowledge, attitude and behavior) between 2005 and 2011. All selected variable were not significantly associated with HIV-positive status between 2005 and 2011 even after adjusting all socio-demographic characteristics and other independent variables. After adjusting for all socio-demographic characteristics, compared to high level of HIV prevention methods, adults with low level had 0.55 odds (95% CI: 0.22-1.49) of being HIV positive in 2005 and 0.41 odds (95% CI: 0.18-0.93) of being HIV positive in 2011. Adults with medium level of HIV prevention methods had 0.47 odds (95% CI: 0.26-0.87) and 0.95 odds (0.64-1.41) of being HIV positive in 2005 and 2011 respectively.

Likewise, after adjusting for all variables, compared to high level of comprehensive correct knowledge the odds of being HIV positive among adults with low level of comprehensive knowledge (OR= 0.37; 95% CI: 0.19-0.69) and 0.84 odds (95%CI: 0.27-2.57) of being HIV positive in 2011. Similarly, the odds of being HIV positive among people who had medium level of comprehensive correct knowledge were 0.47 (95% CI: 0.26-0.87) times less likely in 2005 and 0.75 (95% CI: 0.44-1.27) times less likely in 2011 compared to the odds of people who had high level of comprehensive correct knowledge.

Moreover, compared to high level of knowledge of mother to child transmission (MTCT), adults with low level had 0.19 odds (95% CI: 0.02-1.61) of being HIV positive in 2005 and 0.03 odds (95% CI: 0.004-0.25) of being HIV positive in 2011. Adults with medium level of MTCT had 0.48 odds (95% CI: 0.23-1.02) and 0.94 odds (95% CI: 0.44-1.97) of being HIV positive in 2005 and 2011 respectively.

Table 4.6.1: Crude and Multivariable analysis of associations between HIV positive status and selected variables of HIV-related knowledge between 2005 and 2011.

Characteristics	2005 OR, (95%CI)			2011 OR, (95%CI)		
	Crude	**Adjusted for Demographics**	**Adjusted for Demo+KAB**	**Crude**	**Adjusted for Demographics**	**Adjusted for Demo+KAB**
Knowledge of HIV Prevention Methods						
Low	0.58, (0.22-1.49)	0.55, (0.18-1.59)	0.09, (0.01-1.13)	0.36, (0.16-0.79)	0.41, (0.18-0.93)	0.30, (0.07-1.14)
Medium	0.38, (0.21-0.69)	0.47, (0.26-0.87)	0.38, (0.18-0.84)	0.96, (0.64-1.44)	0.95, (0.644-1.41)	0.94, (0.44-1.97)
High	Referent	ref	ref	ref	ref	ref
Comprehensive correct Knowledge						
Low	0.65, (0.22-1.96)	0.49, (0.15-1.63)	0.37, (0.19-0.69)	0.69, (0.25-1.87)	0.76, (0.29-1.98)	0.84, (0.27-2.57)
Medium	1.04, (0.56-1.91)	0.80, (0.44-1.44)	0.47, (0.26-0.87)	0.97, (0.63-1.51)	0.78, (0.49-1.26)	0.75, (0.44-1.27)
High	Referent	ref	ref	ref	ref	ref
Knowledge of MTCT transmission						
Low	0.06, (0.01-0.44)	0.14, (0.02-1.01)	0.19, (0.02-1.61)	0.07, (0.01-0.37)	0.13, (0.02-0.73)	0.03, (0.004-0.25)
Medium	0.39, (0.24-0.65)	0.66, (0.37-1.17)	0.48, (0.23-1.02)	0.38, (0.21-0.69)	0.70, (0.37-1.34)	0.94, (0.44-1.97)
High	Referent	ref	ref	ref	ref	ref

Knowledge of prevention methods: Two out of two = high; One out of two = medium**;** Zero out two = low
Comprehensive correct knowledge: Four or five out of five = high; Two or three out of five = medium; Zero or one out of five = low
Knowledge of MTC: Two of two= high; One out of two =medium; Zero out of two = low
CI: Confidence Interval

4.6.2. HIV-related Attitude

In the same manner after adjusting for all variables, the odds of becoming HIV positive was 0.16 times (95% CI: 0.04-0.67) in 2005 and 0.15 times (95% CI: 0.05-0.49) less likely in 2011 among people who had low level of full accepting attitude compared to those who had high level. In contrast, in 2005, the odds of people who becoming HIV positive were 1.46 (95% CI: 0.57-3.77) times greater among people who had medium level of full accepting attitude than people who had higher level of full accepting attitude. However in 2011, the odds of becoming HIV positive among people who had medium level of full accepting attitude was 0.42 (95% CI: 0.26-0.65) times less likely than the odds of becoming HIV among those who had high level of full accepting attitude.

Table 4.6.2: Crude and Multivariable analysis of associations between HIV positive status and selected variables of HIV-related attitudes, between 2005 and 2011

Characteristics	**2005 OR, (95%CI)**			**2011 OR, (95%CI)**		
	Crude	**Adjusted for Demographics**	**Adjusted for Demo+KAB**	**Crude**	**Adjusted for Demographics**	**Adjusted for Demo+KAB**
HIV-related attitude						
Accepting attitude						
Low	0.16, (0.07-0.37)	0.38, (0.15-0.96)	0.16, (0.04-0.67)	0.08, (0.04-0.16)	0.16, (0.07-0.33)	0.15, (0.05-0.49)
Medium	1.00, (0.56-1.82)	1.44, (0.73-2.83)	1.46, (0.57-3.77)	0.27, (0.19-0.38)	0.38, (0.26-0.55)	0.42, (0.26-0.65)
High	Referent	Ref	Ref	Ref	Ref	Ref

Full accepting attitude: Four out of four = high**;** Two or three out of four = medium; Zero or one out of four = low
CI: Confidence Interval

4.6.3. Sexual Behavior

Concerning the sexual behavior, crude analysis shows that the odds of being HIV positive among adults who had sex before the age of 15 were 1.12 (95% CI: 0.0.47-2.65) greater times in 2005 and 1.37 (95% CI: 0.65-2.89) greater times in 2011 compared to the odds of those who had sex after the age of 15 years old. However after adjusting for socio-demographic characteristics, in 2005 people who had sex before the age of 15 years old were 0.78 (95% CI: 0.33-1.86) less likely to become HIV positive, whereas in 2011 they were 1.37 (95% CI: 0.65-2.89) more likely to become HIV positive. Likewise, after adjusting for all selected variables people in 2005 were 0.45 (95% CI: 0.07-2.57) less likely to become HIV positive, whereas people in 2011 were 1.51 (95% CI: 0.58-3.93) greater times to become HIV positive.

Furthermore, people who had no knowledge of any sources of condoms were 3.62 in 2005 and 1.98 greater times in 2011 to become HIV positive compared to those who had knowledge of any sources of condoms. Moreover, among those who had multiples sex partners, the odds of becoming HIV positive were 10.52 in 2005 and 3.58 greater times in 2011 compared to those who had no multiple sex partners.

Table 4.6.3: Crude and Multivariable analysis of associations between HIV positive status and selected variables of sexual behavior between 2005 and 2011

CI: Confidence Interval

Characteristics	**2005 OR, (95%CI)**			**2011 OR, (95%CI)**		
	Crude	**Adjusted for Demographics**	**Adjusted for Demo+KAB**	**Crude**	**Adjusted for Demographics**	**Adjusted for Demo+KAB**
Sexual Behavior						
Age at first sex						
<15	1.12, (0.47-2.65)	0.78, (0.33-1.86)	0.45, (0.07-2.57)	2.22, (1.08-4.55)	1.37, (0.65-2.89)	1.5, (0.58-3.93)
>15	Referent	Ref	Ref	Ref	Ref	Ref
Knowledge of source of condoms						
No	0.17, (0.11-0.29)	0.26, (0.14-0.48)	3.62, (1.18-11.03)	0.29, (0.20-0.42)	0.42, (0.27-0.62)	1.98, (0.93-4.26)
Yes	Referent	Ref	Ref	Ref	Ref	Ref
Multiple sex partner, including spouse						
Yes	3.19, (1.17-8.74)	5.07, (1.60-16.05)	10.52, (2.91-37.98)	2.42, (1.14-5.14)	2.44, (0.99-5.96)	3.58, (1.23-10.47)
No	Referent	Ref	Ref	Ref	Ref	Ref

4.7 Multivariable analysis of associations between HIV positive status and HIV-related knowledge, attitudes, and behavior for combined years.

Table 4.7 presents results of crude and adjusted analysis of association between HIV positive status and HIV related knowledge, attitude and behavior for the combined years. HIV positive status was significantly associated with low and medium level of knowledge of MTCT transmission, full accepting attitudes and multiple sex partners. Compared to adults who had high level of comprehensive correct knowledge, those who had low and medium level of comprehensive correct knowledge had lower odds of being HIV positive (adjusted OR=0.71, aOR=0.69 respectively). Regarding knowledge of MTCT transmission, adults with low and medium level of knowledge (ad OR= 0.08, 95% CI: 0.02-0.43 and aOR= 0.78, 95% CI: 0.44-1.36) had lower odds of being HIV positive compared to those who had high level of knowledge of MTCT transmission knowledge. Moreover, Compared to adults who had high level full accepting attitude, those who had low and medium level of full accepting attitude had significantly lower odds of being HIV positive (aOR=0.12 95%CI: 0.04-0.30; aOR=0.48 95%CI: 0.32-0.71 respectively). In addition, adults who had no knowledge of sources of condom had 0.41 odds (95% CI: 0.22-0.77) of being HIV positive compared to those who had knowledge of sources of condom. In contrast, adults who had sex before the age of 15 were 1.19 (95% CI: 0.49-2.87) greater times to become HIV positive compared to adults who had sex after the age of 15. However the association was not statistically significant. Moreover, people who had multiple sexual partners (OR 4.49, 95% CI: 1.91-10.57) were more likely to become HIV positive.

Table 4.7: Multivariable analysis of associations between HIV positive status and HIV-related knowledge, attitudes, and behavior for combined years, DHS, Ethiopia, 2005 and 2011.

Characteristics	Odds Ratio	
	Crude	**Adjusted**
Knowledge of HIV Prevention Methods		
Comprehensive correct Knowledge		
Low	0.68 (0.31-1.51)	0.71 (0.27-1.84)
Medium	0.98 (0.68-1.42)	0.69 (0.45-1.06)
High	Referent	Ref
Knowledge of MTCT transmission		
Low	0.10 (0.01-0.25)	0.08 (0.02-0.43)
Medium	0.44 (0.28-0.60)	0.78 (0.44-1.36)
High	Reference	Ref
HIV-related attitude		
Full accepting attitude		
Low	0.09 (0.05-0.15)	0.12 (0.04-0.30)
Medium	0.34 (0.25-0.47)	0.48 (0.32-0.71)
High	Referent	Ref
Sexual Behavior		
Age at first sex		
<15	1.72 (0.97-3.04)	1.19 (0.49-2.87)
>15	Referent	Ref
Knowledge of a source of condoms		
Yes	Referent	Ref
No	0.26 (0.19-0.34)	0.41 (0.22-0.77)
Multiple sex partner, including spouse		
Yes	2.58 (1.39-4.79)	4.49 (1.91-10.57)
No	Referent	Ref
Calendar year		
2005	0.94 (0.73-1.20)	1.79 (1.15-2.78)
2011	Referent	Ref

Knowledge of prevention methods: Two out of two = high; One out of two = medium**;** Zero out two = low
Comprehensive correct knowledge: Four or five out of five = high; Two or three out of five = medium; Zero or one out of five = low
Knowledge of MTC: Two of two= high; One out of two =medium; Zero out of two = low
Full accepting attitude: Four out of four = high**;** Two or three out of four = medium; Zero or one out of four = low
NB: Adjusted for all socio-demographic characteristics and variables of KAB
DHS: Demographic Health Survey
CI: Confidence Interval

CHAPTER V

DISCUSSION AND CONCLUSION

5.1 Discussion

HIV/AIDS epidemic is a serious health problem in Ethiopia. Even though, there are many other killer diseases, HIV is considered one of the most fearful diseases in Ethiopia due to the incurable nature of the disease, the stigma and its relation with sex and death. The epidemics of HIV/AIDS strike individuals in the productive sectors such as agriculture and industry, thereby affecting the social and economic wellbeing of the entire nation.

Realizing the enormous consequences of the epidemic, in 2005 the government of Ethiopia launched the strategic plan for intensifying Multi-Sectorial HIV/AIDS response (2004-2008), along with Social Mobilization Strategic Document. This response was focused on community mobilization and empowerment through health extension workers, rural teachers, traditional organizations, youth and farmers associations in order to bring social transformation and increase demand for utilization of HIV/AIDS services; thereby improve HIV-related knowledge, attitude and behavior among the Ethiopian population. The strategic plan also aimed in increasing condom promotion and creating several guidelines and manuals such as guidelines on preventing mother to child transmission of HIV (PMTCT). In addition, The Ministry of health, in collaboration with the WHO's global program for AIDS, have made efforts specifically on condom promotion, surveillance, education, stigma-reduction programs, patient care and expansion of HIV testing laboratories.

Considering all the efforts taken towards the HIV/AIDS epidemic by Ethiopian government and other collaborating organizations, it is expected to see a change in HIV-related knowledge, attitude, and behavior among the population of Ethiopia. Therefore in this study, we assessed HIV-related knowledge, attitude and behaviors and its impact on HIV status using two rounds of nationally representative population based surveys conducted in Ethiopia in 2005 and 2011. This assessment is critically vital to policy makers, health officials and other collaborating international organizations to determine the effectiveness of interventions that have been implemented towards the prevention of HIV/AIDS epidemics. It will also provide essential information in what ways the interventions could be improved.

Based on the descriptive analysis of HIV-related knowledge, attitude, and behavior, we found that there was no difference among people who had low, medium and high level of knowledge of HIV prevention methods and comprehensive correct knowledge between 2005 and 2011. In contrast, however in 2011, there was a significant improvement in knowledge of MTCT of HIV and accepting attitude towards PLWHA when compared to 2005. This result is encouraging. In the past, a number of PMTCT guidelines and stigma reduction programs have been implemented through the Intensifying Strategic plan by the Ethiopian Ministry of Health (EMOH). Although, we could not draw a causal relationship between the programs implemented and the increase in knowledge in PMTCT in this study, these programs may remotely be connected to the increase in PMTCT knowledge. We therefore recommend a continuation of interventions applied regarding knowledge of MTCT and attitude towards PLWHA.

Regarding sexual behavior, in 2011, there was significantly lower percentage of people who started sex before the age of 15 (3.1%) as compared to 2005 (6.4%). This is an encouraging finding which should be strengthened by establishing more educational intervention programs that

shape sexual behavior and reduce the risk of HIV exposure and infection. In addition, our finding showed that more people knew sources of condom (53.5%) in 2011 compared to (39.6%) in 2005. However, despite this finding, a study conducted in Ethiopia by Shiferaw et al., 2011) showed that only a third of those who were engaged in sexual intercourse used condoms. Shiferaw and colleagues noted that despite having knowledge of sources of condoms, sexually active youths feel shy to buy condoms from shops due to religious and socio-cultural norms. Taking all these into account, besides increasing the number of condom distribution in the social market, we suggest installing condoms vending machines inside places like public or private businesses, colleges, universities, hotels and bars restrooms. Therefore, it can be easily accessible, and no one can be identified as using them. However, careful consideration must be taken to the fact that vending machine is not widely used in all regions of Ethiopia. Urban regions are more familiar to vending machines than rural areas, therefore we suggest to install condom vending machines in urban regions targeting areas where population at higher risk. A similar strategy has been implemented in India in 2005, and the public dispensed a total of 4.43 million condoms. This methods was found to be an extremely effective way of increasing condom distribution.

In terms of having multiple sexual partners, even though in 2011, there was a slightly more people who reported that they had multiple sexual partners compared with 2005 (1.2% versus 1.8%), the percentage of respondents were very few in both years. This response variation could be due to respondents underreporting the number of sex partners, because respondents did not wish to report behaviors that may be deemed undesirable in the Ethiopian society. This result is consistent with a study conducted in Rwanda by (Etienne et al., 2015), which also found that only 5% of men in 2005 and 7% in 2010 reported having two or more sexual partners. They also stated that their result could be due to an under-reporting of sexual behavior. Another study done by

(Kajubi, 2011) in Rwanda, found similar results concluding that having multiple sexual partners is a stigmatized behavior leading to under reporting specially by women. Both Ethiopia and Rwanda are extremely conservative and religious countries where open discussion about sex-related topic is very uncommon.

Furthermore, our findings from the multivariable analysis of the combined year showed a significant association between HIV positive status and low or medium level of knowledge of MTCT. Respondents with high knowledge of MTCT of HIV were at higher risk of HIV infection compared to those with low or medium knowledge of MTCT. Amy Medley et al (2004) published a paper which focuses on disclosure of HIV status of women attending antenatal clinic and implications on MTCT. Since women have difficulty of disclosing their HIV status to their partners due to lack of support, their participation in PMTCT programs would be compromised. These women have high knowledge as they would participate in counseling programs but they are at higher risk for infection as they won't voluntarily test or disclose positive results. This result suggests that gaps exist within the PMTCT program guideline and actual practice. Similarly, those who had high level of correct compressive knowledge of HIV were at higher risk of HIV infection. However the association was not statistically significant.

Overall, the result indicated protective association of HIV infection with low level of comprehensive correct knowledge and MTCT knowledge of HIV. Therefore people who had high knowledge of MTCT of HIV were at risk of HIV infection. Our finding seem to contradict the behavior change model which postulates that better knowledge leads to better action. Surprisingly, our finding is an evident that knowledge doesn't always turn into action. In other words, people may have high level of knowledge about HIV, but it doesn't necessarily mean that they always translate it into action. Previous study conducted in Ethiopia by (Gelaw & Gelaw, 2013), showed

that regardless of high level of knowledge about HIV prevention methods, 51.7% of respondents reported that sexual pleasure is reduced when using condom, therefore they are more likely to have sex without condom. Another study conducted in Rwanda also revealed that though 96-98% of women had correct knowledge of three primary routes of HIV infection, only 16% of them have reported taking preventive action. This implies that just knowing about HIV prevention methods is not enough to get people to take preventive action. Nonetheless, we believe knowledge about HIV is very important as it has a potential to influence sexual behavior, which plays an important role in HIV prevention strategies. Therefore we suggest programs and interventions must focus on bridging the gap between knowledge and action. It is highly important to implement interventions that consider social norms, cultural and religious views that may infuse meaning into individual behavior.

Studies show that HIV positive people are more likely to have better knowledge about HIV because they are more likely to receive counseling by health professionals. Hence it may lead to no association between HIV status and HIV knowledge.

In terms of attitude, there is a significant association with HIV status in the combined years. The result indicated that positive accepting attitude towards PLWHA had protective association with HIV positive status. Our finding is quite understandable since people attitude towards PLWHA may not have a direct impact on their HIV status. However, their attitude can be a major barrier towards effort that promotes equal opportunities to people living with HIV.

Concerning sexual behavior, those who had no knowledge of sources of condom were less likely to become HIV positive compared to those who had knowledge of sources of condom. One possible reason for this may be that people who do not know sources of condom are more likely

to abstain themselves from engaging in risky sexual practices. Moreover, there is a significant association between HIV positive status and having multiple sexual partners. The result indicated that having multiple sexual partners had an increased odds (4.49) of HIV infection. This result is consistent with previous studies conducted in Zambia by (Elizabeth et al., 2009). In their study, they found that having multiple sexual partners were significantly associated with HIV infection (Adjusted OR= 1.8; 95% CI, 1.3–2.5). Another study conducted in 2011 by the Ethiopia Demographic and Health Survey (EDHS) showed that among women who had multiple sexual partners, 53% did not use condom. As a result, they were predisposed for HIV infection.

5.2 Strength and Limitations

5.2.1 Strength

In this study, data were collected from nationally representative population based surveys which included large sample size in both years. With the study also accounting for the survey design variables, the results is a representative of the general population.

5.2.2 Limitations

This is a cross-sectional study; therefore causality could not be determined between HIV positive status and HIV-related knowledge, attitude and behavior. The study could only possible to determine associations. Moreover, the data were collected based on self-report, which could potential lead to recall bias.

5.3 Conclusion

Indeed, efforts deployed by the government of Ethiopia and other collaborating organizations have had a fair amount of success in terms of improving knowledge of MTCT, accepting attitude towards PLWHA, sexual debut and knowledge of sources of condom. Therefore interventions applied through education, community mobilization and empowerment to promote stigma reduction, utilization of HIV testing and counseling centers must continue. However there was no difference in knowledge of correct comprehensive knowledge between 2005 and 2011. Moreover the number of people who had multiple sexual partners significantly increased in 2011 compared to 2005. This result indicates that, future interventions must emphasize on the role of cultural, family, ethical and religious factors in the prevention of HIV/AIDS epidemics.

On the other hand, our study revealed protective association of HIV positive status and HIV-related knowledge including comprehensive correct knowledge and MTCT knowledge of HIV. This implies that focusing only on increasing HIV-knowledge is not sufficient by itself, therefore policy makers and public health officials who make decision on strategies and intervention in relation to HIV prevention must also focus on bridging the gap between knowledge and action. Therefore we suggest further studies needs to be done to provide more information on other elements that may influence safer sexual behavioral changes and practices.

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