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Factors Determining the Prevalence of HIV/AIDS in Ethiopia

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Abstract

This study was conducted in the aim to figure out the fueling factors of prevalence of HIV AIDS by comparing two different periods of 2005 and 2011, in Ethiopia. Ethiopian Demographic and Health Survey (EDHS) data of the cross sectional years of 2005 and 2011 was used. The data encompass male and female individual age groups of 15-59 and 15-49 respectively. The binary logistic regression model was employed and demographic, socioeconomic and cultural factors that are considered to have an impact on the prevalence of the epidemic were included in our analysis. The Result shows that demographic variables had a significant effect in the prevalence of HIV/AIDS in the year 2011 for all respondents. However, except for marital status of female individuals and age of the respondent of male individuals, all the demographic factors had insignificant effect in the year 2005. There was also a significant association between prevalence of HIV/AIDS and cultural variables in both cross sectional years for all individuals under study. Regarding socioeconomic factors education, wealth index, occupation, place of residence and sex of head of household had significant effect on the transmission of the epidemic in the year 2011 for both sexes. Unlike in 2011, in 2005 only place of residence, sex of head of household and frequency of listening radio had significant effect only for female individuals.

Key words : HIV/AIDS, EDHS, binary logistic regression, socioeconomic, cultural and demographic factors

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Acronym

AIDS- Acquired Immune Deficiency syndrome

ANC- Antenatal Care

CIA- Central Statistics Agency

EDHS - Ethiopia Demographic and Health Survey

HIV –Human Immune Virus

MOH -Ministry of Health

SNNP- Southern Nations and Nationalities Peoples

STD – Sexually Transmitted Disease

Abstract

This study was conducted in the aim to figure out the fueling factors of prevalence of HIV AIDS by comparing two different periods of 2005 and 2011, in Ethiopia. Ethiopian Demographic and Health Survey (EDHS) data of the cross sectional years of 2005 and 2011 was used. The data encompass male and female individual age groups of 15-59 and 15-49 respectively. The binary logistic regression model was employed and demographic, socioeconomic and cultural factors that are considered to have an impact on the prevalence of the epidemic were included in our analysis. The Result shows that demographic variables had a significant effect in the prevalence of HIV/AIDS in the year 2011 for all respondents. However, except for marital status of female individuals and age of the respondent of male individuals, all the demographic factors had insignificant effect in the year 2005. There was also a significant association between prevalence of HIV/AIDS and cultural variables in both cross sectional years for all individuals under study. Regarding socioeconomic factors education, wealth index, occupation, place of residence and sex of head of household had significant effect on the transmission of the epidemic in the year 2011 for both sexes. Unlike in 2011, in 2005 only place of residence, sex of head of household and frequency of listening radio had significant effect only for female individuals.

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Content

1.	Introduction.....	1
1.1.	Background of the study	1
1.2.	Aim and Scope:	5
1.3.	Research Questions:	5
1.4.	Outline of the thesis.....	5
2.	Background.....	7
2.1.	General setting.....	7
2.1.1	Demographic background of Ethiopia.....	7
2.1.2	Socioeconomic background of Ethiopia	8
2.1.3	Cultural background of Ethiopia.....	9
3.	Data sources and method of analysis	11
3.1.	Data sources	11
3.2.	Methodology	13
3.2.1	Statistical model.....	13
3.2.2	Logistic regression	13
3.2.2.1	Binary Logistic regression for continuous explanatory variables.....	13
3.2.2.2	Binary Logistic regression model for categorical predictors.....	14
3.2.3	Interpretation of the coefficients of Logistic regression model for categorical predictors.....	15
4.	Theoretical Discussion: Analytical frame work	17
4.1.	Previous research.....	21
4.1.1	Demographic factors	21
4.1.2	Socioeconomic factors	22
4.1.3	Cultural factors.....	24
5.	Hypothesis.....	26
6.	Definition of variables	27
6.1.	Dependent variable.....	27
6.2.	Independent variables.....	27
7.	Result	29
8.	Discussion.....	33
9.	Conclusion	35
	Reference	36
	Annex.....	39

List of tables

Table 1 Prevalence rate by martial status and for both years in DHS reports.....	4
Table 2 HIV prevalence by education attainment for the two cross sectional year	4
Table 3 school attainment by place of residence and sex for both years (2005 and 2011)	8
Table 4 independent variables with their label and category	28
Table 5 demographic model 2011 regression result	29
Table 6 demographic model 2005 regression result	29
Table 7 cultural model 2011 regression result	30
Table 8 cultural model 2005 regression result	30
Table 9 Socioeconomic model 2011 regression result	31
Table 10 Socioeconomic model 2005 regression result	32

1. Introduction

1.1. Background of the study

AIDS is a global epidemic which is caused by the virus called human immunodeficiency virus (HIV). It will affect the immune system of the body of human beings. The epidemic was firstly recognized in the year 1980. Since then about 20 million people died and 38 million people are estimated living with HIV in the world (MOH, 2005). The rate of infection of the epidemic is still increasing in many countries of the world and it is distributed unevenly.

It is a major development concern in many countries and is destroying the lives and livelihoods of many people around the world. In spite of increased funding, political commitment and progress in expanding access to HIV treatment, the AIDS epidemic continues against the global response. The epidemic remains extremely dynamic. It is expanding fast and also changing its character as the virus exploits new opportunities for transmission. Hence, the number of people living with HIV/AIDS is growing substantially from year to year.

Since HIV/AIDS was acknowledged as a human being problem, the health researchers have been conducting different research in order to tackle or control the epidemic by developing medicine or vaccine. However, due to the very unique nature of the virus they could not succeed in developing a medicine or vaccine that totally cures or protects from the disease. The antiretroviral medicines which are available currently, at best can diminish the infection rate. i.e they are not able to cure people who are infected by this epidemic. More than this, the price of such medicines has been a major problem especially for developing countries (UNAIDS, 2004).

Various ways have been pointed out regarding how the epidemic has transmitted from one individual to another. However, there are common modes of transmission of HIV; the main mode of transmission is also different in different regions of the world. For example, in developed countries homosexual sex and intravenous drug injection are usually considered to be the means of transmission of HIV/AIDS, on the other hand, in developing countries heterosexual contact is the main mode of transmission.

Almost all countries worldwide are affected by the HIV epidemic. No region of the world has been spared. Although the epidemic is global, there is a remarkable regional variation in its distribution. Some regions are highly affected by the epidemic as compared to other regions. Sub-Saharan Africa (SSA) is one of the hot spots where HIV AIDS is widely spread and it is more hard hit by the consequences of epidemic than other parts of the world. It is the region where the highest number of victims of HIV/AIDS is found. Among all the people who are infected by diseases all over the world, about 68% (22.5 million) are living in this region (UNAIDS, 2010). According to the United Nation classification of 'generalized epidemic' about 90% of the countries which are located in SSA are severely affected by the epidemic. This epidemic has remained the major cause of death in this region. Although the region accounts only for 10% of the world population, it comprises almost 25.8 million of the victims of HIV/AIDS in the world. In 2005 an estimated 3.2 million people in the region became newly infected, while 2.4 million died of AIDS. Among the younger generation (15-24 years) the percentage of HIV infected women and men account for 4.6% and 1.7%, respectively (UNAIDS, 2005). There were 2.7 million new HIV infections in 2010. HIV AIDS accounts for about approximately 90% of all infection.

Ethiopia is one of the sub-Saharan Africa countries which is hard hit by the HIV pandemic and a large number of infected people have been living with HIV. Ethiopia accounts for a big share in the number of cases at worldwide as well as at the regional levels.

Following the first detection of the virus in 1984, AIDS cases were reported in 1986 in the country. In Ethiopia the estimated prevalence rate of HIV/AIDS among different survey has got different estimates. For example, the estimate of prevalence rate from EDHS's in 2005 shows that 1.4% in country level 6% in urban and 0.7% in rural areas (Central Statistical Agency, 2005)(EDHS 2005). Federal ministry of health of Ethiopia (FMOH) database of ANC survey for the same year shows that the estimated prevalence rate was 3.5%, 10.5% and 1.9% in country, urban and rural areas of respectively. By harmonizing the above two figures, the FMOH estimates a single figure that is reached to consensus on different international organizations which work on HIV. According to this report the rate of prevalence in the year 2005 was 2.1%, 7.7% and 0.9% in country, urban and rural areas respectively.

In Ethiopia the general trend of the prevalence rate varies across in each year and in each region. A trend analysis carried out for the country from 1982-2011 shows a continuous gradual rise of HIV/AIDS prevalence rate until the late 1990's and then a steady decline in the years after 2000. The national adult HIV prevalence rate was estimated at 0.2% in 1985 increasing to 3.2% in 1995 and reduced to 1.4% in 2005. However, according to 2011 EDHS report, in the year 2011 the prevalence rate shows a very slight increase as compared to the 2005 prevalence rate. According to this the prevalence rate of women and men of individuals in the age group 15-49 was 1.5%. and a very recent reports revealed that, currently the prevalence rate was estimated to be 1.9% and 1% for women and men respectively (Central Statistical Agency, 2011).

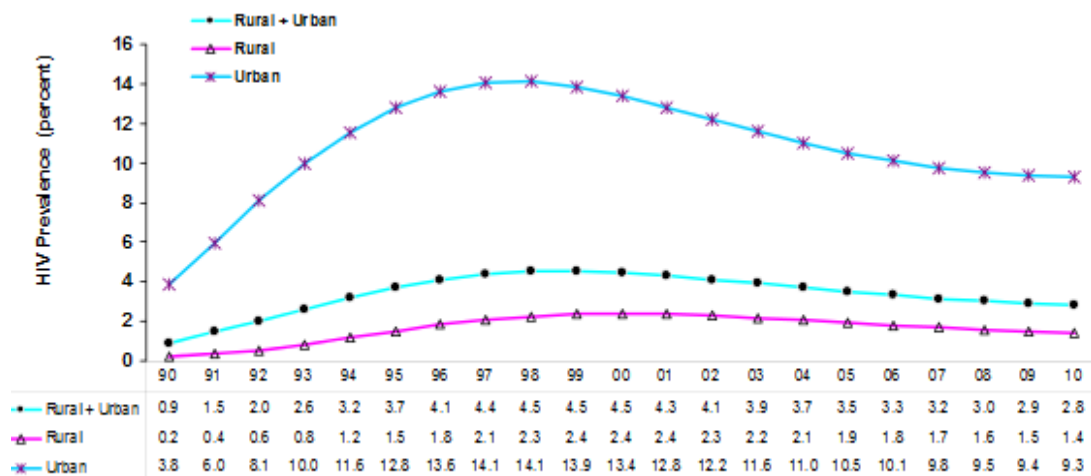
Due to the existing socio-cultural diversity of Ethiopia, the pattern and distribution of HIV in the country varies widely. Some regions are more highly affected than others. Recent reports indicate that there is a large discrepancy in HIV prevalence across region of the country and place of residence. According to 2011 Ethiopia Demographic and Health Survey (Central Statistical Agency, 2011), the prevalence rate of HIV/AIDS ranges from the highest prevalence rate 6.5% (Gambella region) to the lowest level of 0.9% in South Nation Nationality People (SNNP) region. There is an also significant discrepancy among place of residence. For example, currently the prevalence rates of women who live in urban areas are 6.5 times higher than the women who are living in rural areas (Central Statistical Agency, 2011).

The Trend and pattern of Prevalence of HIV/AIDS in Ethiopia

In Ethiopia, the first HIV cases were identified in the year 1984, and it was reported in 1986(HAPCO, 2005)¹. Since after the epidemic was identified, many people have been reported affected by the epidemic. Following this, some governmental organizations have been established in the aim of combating the epidemic. A National HIV/AIDS taskforce was the first organization which was established in the year 1985, and following this in the year 1987 the second HIV/AIDS prevention organization called the National AIDS Control Program (NACP) was established at a Department level in the Ministry of Health of Ethiopia. The first HIV/AIDS surveillance activities began in 1989 and were focused on surveying the fueling factors that promote the prevalence of HIV/ AIDS at country level. In the year 2002, the HIV/AIDS Prevention and Control Office (HAPCO) was established in an organized way. This council has developed a 5 years strategic plan in prevention and control of the epidemic in selected parts of the country and achieved a significant change in combating the epidemic

¹ HIV/AIDS Prevention and Control Coordination Office of Ethiopia

at a national level. However, the trend of the epidemic still has inconsistent patterns in various periods and places of residence (see the fig below).



Year and Estimated HIV Prevalence Values in Percent

Figure 1 Estimated and Projected HIV Prevalence By Year Adult Population 15-49, Urban, Rural, and Ethiopia, 1990-2010. Source: adapted from FOMH data base.

Although the current HIV/AIDS surveys in general indicate that the prevalence rate is stabilizing, the improvements that have been achieved so far were not sufficient to maintain the desired goal. The trend of the prevalence of the epidemic has varied significantly from year to year. Starting from the year 1990 to 1996 the prevalence rate shows a rapid growth and reached its peak point in urban, rural and a country level. The rural epidemic peaked in the year 1999-2001, and the prevalence rate was estimated to be 1.5 percent during this period and the trend showed a stabilized trend following the peak. Similarly the urban and country level prevalence rates showed a rapid growth in the years between 1990-1996 and 1990-1998 respectively. The highest prevalence rate was estimated to be about 13 and 2.9 percent at urban and country level respectively during this period. Following this peak the prevalence rate of the epidemic shows a gradual decline in urban regions and at country level. The prevalence rate stabilized between the years 1998-2000 and then a gradual decline was manifested following the stabilized trend.

There is also a significant discrepancy of HIV prevalence across cross sectional years and between various demographic backgrounds of the individuals under consideration. For example, in the year 2005, the HIV/AIDS prevalence rate in Ethiopia was 0.9% among men 1.9% among women and 1.4% as a whole at country level. Although the prevalence rate of the epidemic in the year 2011 seems to be stable (1.5%) as compared to the cross sectional year of 2005, the prevalence rate of HIV/AIDS among women (1.9%) was almost twice the prevalence rate among men (1%). When we consider the prevalence rate of HIV/AIDS among various age groups in the years 2005 and 2011, the prevalence rate was high in the age group 35-39 for women and 40-44 for men respectively in the year 2005. However, in the 2011 EDHS report the prevalence rate was highest among women age 30-34 and men age 35-39.

There was also dramatic variation among place of residence and marital status. In the year 2011, the prevalence rate of HIV/AIDS in urban and rural areas of Ethiopia is estimated to be 4.2 and 0.6 respectively. Similarly, notable variation of HIV prevalence was revealed among in urban and rural areas in the year 2005. According to this the prevalence rate of the epidemic in urban areas (5.5%) was more than 7.8 times than that of rural areas of Ethiopia (0.7%). Survey results also show that HIV estimates vary by marital status. For example

according to the Ethiopian Demography and Health Survey (EDHS), 2005 (Central Statistical Agency, 2005) and EDHS, 2011 (Central Statistical Agency, 2011), reports that the prevalence rate was significantly higher among divorced/separated and widowed individuals as compared to married and single individuals. Based on these reports the prevalence rate was 0.2 for never married men and 0.5 for never married women and it was 14.5 % among widowed women and 12 % among widowed men respectively in the year 2011. Similarly, according to 2005 report the prevalence rate among divorced/separated individuals (8.4%) was 16.8 times higher than that of never married individuals (0.5%). (See table below).

Marital status	2005		2011		Total	
	Percentage of Women (HIVpositive)	Percentage of men (HIVpositive)	Percentage of women (HIV positive)	Percentage of men HIV positive	2005	2011
Never married	0.7	0.3	0.5	0.2	0.5	0.3
Married	1.6	1.3	1.5	1.3	1.5	1.5
Divorced/separated	8.1	8.7	5.0	5.9	8.4	5.2
Widowed	5.6	1.9	12.0	14.5	3.7	12.2

Table 1 Prevalence rate by marital status and for both years in DHS reports

The prevalence of HIV/AIDS also varies among individuals who have different educational attainments. Education may influence the prevalence of the epidemic through building of awareness and easier and more rapid access to information. On the other hand, more educated individuals are more prone to movement from place to place looking for and changing of jobs, particularly to urban regions. This will increase the probability of individuals staying outside home for several weeks or months, and this will in turn to lead them to new sexual relationships with various partners and will ultimately increase their vulnerability to HIV. Therefore, various patterns have been revealed on the prevalence of the epidemic and level of education depending of the place where individuals resided and the stage of the epidemic as well. The stage of the epidemic will affect more educated individuals either negatively or positively accordingly. (For more detail on the relation between the stage of epidemic and educational status see the theory and literature part of this paper.)

In Ethiopia, in general terms the prevalence rate of HIV/AIDS increases with increasing educational attainment. The rate of infection is markedly higher among individuals who enrolled in tertiary and secondary schools as compared to those who have low educational attainment. (See the table below!)

The prevalence rate of HIV/AIDS by educational level among men and women and total, in the cross sectional years of 2011 and 2005. (Source EDHS 2011 and 2005.)

education	2005		2011		total	
	Percentage of women (HIVpositive)	percentage of men (HIVpositive)	percentage of Women (HIVpositive)	percentage of men ((HIVpositive)	2005	2011
No education	1.0	0.8	1.3	0.8	0.9	1.1
Primary	2.5	0.5	2.2	0.9	1.3	1.5
Secondary/higher	5.5	2.0	4.3	2.1	3.4	3.1

Table 2 HIV prevalence by education attainment for the two cross sectional year

1.2. Aim and Scope:

There are a number of reasons why HIV in Africa, especially sub-Saharan Africa countries, becomes such a serious problem. The government of Ethiopia and other concerned bodies have been doing many assignments in prevention and controlling of the prevalence of HIV/AIDS since 1984. However, due to the wide range difference and diversity of social groups of the country together with some cultural and socioeconomic factors and other hindrance like budget shortage, the effort of prevention and controlling of the epidemic couldn't go far as expected. Therefore, the prevalence rate of the epidemic remains high in the country, particularly in urban areas. Hence, the main aim of the paper will revolve around figuring out which factors are responsible for the high prevalence of the epidemic in the country. Based on these facts, the main aims of the paper are stated below:

- a) Identify and explore demographic, socioeconomic and cultural key factors which maintain the high prevalence of HIV/AIDS at country level among men and women for the year 2005 and 2011. The Study is conducted at a national level and includes all adults (age 15-49 for female and 15-59 for male) which are interviewed in the survey years of 2005 and 2011 of the Ethiopian demographic and health survey. Most of the studies which were conducted on the prevalence of HIV AIDS, in Ethiopia, were only focusing on one of the key factors and one cross sectional year. Different from these studies, this paper will include and analyze all the demographic, socioeconomic and cultural key factors at the same time and also it will compare the two cross sectional years datasets for analysis.
- b) The second aim of the paper will focus on identifying which factors have still have a significant effect on the prevalence of HIV/AIDS in both years. This will help to identify and make an assessment to figure out whether the same factors or different factors are attributed responsible for the prevalence of HIV/AIDS in both years and it will also help policy makers and others stakeholders that are working on HIV prevention, are and give a clue to which factors should they focus to mitigate the prevalence of the epidemic.

1.3. Research Questions:

Through this research I will try to answer the following main research questions:

1. Which factor(s) was/were responsible for the prevalence of HIV/AIDS in Ethiopia during 2005 and 2011?
2. Was/were the same factor(s) responsible for the spread of HIV in the two periods (2005 and 2011)?
3. Were there factors that aided the spread of HIV/AIDS among men and women?
4. Does the prevalence of HIV/AIDS vary with place of residence (rural and urban)?

To answer the above research questions, this thesis has taken into consideration the real setup of cultural, demographical and socioeconomic attributes of the country. This may have a power of mitigation or acceleration of the prevalence of the epidemic.

1.4. Outline of the thesis

This paper is organized in such a way that starts with discussing the general introduction of the epidemic in the world and narrowing the discussion to the context of Ethiopia. The aims and scope of the study are also discussed and four research questions are designed based on the aim of the paper.

The introduction part is followed by the background section. In this section the real setup of Ethiopia is put forward by classifying it into demographic, socioeconomic and cultural background accordingly. In the demographic background subsection the number of total

population, sex composition and related demographic features are deeply presented. Under the socioeconomic background part a glance at current status of the country's economy, the educational attainment for both cross sectional years of 2005 and 2011 in urban and rural areas is presented. In the subsection on the cultural background of the country, the traditional way of living is described, and how widely harmful traditional practices are expanded in the country level and particularly in the context of rural areas of the country.

Next to the background section, a theoretical background section will be put forward. In this subsection some theories that show the relation between the underlying determinants and the prevalence of HIV will be discussed and some theories will be discussed based on the research questions which are stated in the introduction part of the paper. Together with this some researches which have been done so far related to prevalence of HIV/AIDS will be revisited. Following this the data analysis part will be presented. In this subsection the appropriate model which fit the data at hand and the nature of the variables under study will be discussed thoroughly. The statistical output will be discussed in the last section of the paper. In this subsection the theories and formulated hypothesis will be revised to answer the research questions and to test the hypotheses accordingly.

2. Background

2.1. General setting

Ethiopia is a landlocked country located at Horn of Africa, and it is bordered by Kenya, Sudan, Somalia, Djibouti and Eritrea. Its total surface area is about 1.1 million square kilometers. The major physiographic features range from the highest peak at RasDashen, 4550 meters above sea level, down to the Afar depression, 710 meters below sea level (World Health Organization, 2013). The temperature of the country ranges from below 0⁰C to the hottest temperature zone in the world 48⁰C. The majority of the population lives in the highland areas.

Ethiopia is the oldest independent country of Africa and among ancient and historical countries of Africa. Paleontological studies identify Ethiopia as one of the origins of mankind.

Ethiopia has been categorized as one of the largest populated countries in the world and ranked 2nd largest country in sub-Saharan Africa countries, and it embraces a complex variety of nationalities, peoples and linguistic groups. Over 80 different languages are spoken in the country.

Regarding the current governmental structure, the country is formed by 9 regions and 2 city administrations with large variation of in terms of economic level and living standard. More than 80% of the country's total population lives in the regional states of Amhara, Oromiya and SNNP. There is also a wide variation of cultures, traditions and living standard of the people between regions and within regions according to EDHS report (Central Statistical Agency, 2011).

According to the EDHS report, before 1990s population policies had low priority in Ethiopia (Central Statistical Agency, 2011), but since 1993 the transitional government maintains a national population policy. Since then, improvements have been established nationally and globally that have a direct bearing on the country's population. The main objective of the 1993 national population policy was to adjust the rate of population growth to socioeconomic development so as to bring a high level of welfare. It had also a long term goal, to reduce rural urban migration and to reduce morbidity and mortality.

2.1.1 Demographic background of Ethiopia

Ethiopia is the second most populous country in sub-Saharan Africa. According to the CIA world fact book, in 2011 the country had a total population of 93,815,992. Among this 83% of the population lives in rural areas and the rest 17% lives in urban areas. Due to this the country is categorized as one of the least urbanized countries in the world according to EDHS report (Central Statistical Agency, 2011).

The population distribution varies significantly across the region in terms of percentage. Oromia region (36.7%) is followed by Amhara (23.3%) and SNNP (20.4%) regions. The lowest population size is found in Harare regional state (0.2%). The population growth rates increased from about 2.2% in the 1960s to a peak of 3% in the early 1990s, then again the population growth began to fall from the 1990s onward but the speed of the decline is very slow. Since then, the population growth rates has dropped slightly to 2.6% in 2007 which is slightly higher than the sub-Saharan countries, which have an average growth of 2.5% (DHS, 2011, Ringheim et al, 2009). Urban-rural distribution of the population of Ethiopia shows that the overwhelming majority of the population resides in rural areas. Ethiopian people and housing census 2007 reported that 83.8 percent of the population lives in rural areas of the country and the remaining 16.2 percent live in urban areas, making Ethiopia one of the least urbanized countries in the world even by the standard of sub-Saharan countries.

However, the urban population growth rate is quite high with an average growth rate of 4 percent per annum, and the rural population has an average of 2.3 percent per annum, the EDHS report showed (Central Statistical Agency, 2011). According to the 2007 census report the percentage distribution of male and female individuals is 50.5 percent and 49.5 percent respectively. On the other hand, like in other developing countries, the age structure of the population of Ethiopia shows that the population in the early young age group (<15 years) contributes about 47 percent while only about 4 percent of the total population is aged above 64 (older age group). The proportion of the population aged 15-64 makes up about 49 percent of the total. Such age structure reflects the prevalence of high fertility rate which guarantee a continuing future of rapid population growth.

2.1.2 Socioeconomic background of Ethiopia

Socioeconomic variables are among the factors which are most frequently put forward when studies have been conducted on the prevalence of the epidemic in a nation. Therefore, it is worth discussing the general socioeconomic background of the country to have a clear overview of the setting of the country before moving to the analysis part. In this subsection the distribution of socioeconomic variables which are selected for the data analysis part will be put forward and discussed in urban and rural areas settings accordingly.

Education is one of the factors which are usually categorized under socioeconomic variables. Ethiopia is amongst the countries where low enrollment rate, school dropout and repeating of the grade are widely manifested. The problem is more serious in rural areas as compared to urban areas. For example regarding enrollment rate, on average 65.5% and 23.5% of individuals who live in urban and rural areas respectively are never enrolled in school during their school age according to EDHS (Central Statistical Agency, 2005). A similar trend was revealed in the current years also. According to EDHS report (Central Statistical Agency, 2011), among individuals in the age group 15-49, only 38% of women and 67% of men are literate and the literacy rate of urban dweller women is more than 2 times higher than that of rural dweller women. Similarly among all literate men who live in the country, two third of them live in urban areas and only one third of literate men live in rural areas of Ethiopia. All in all, recent reports show that about 51% of Ethiopian women and 30% of Ethiopian men have had no formal education during their school age (Central Statistical Agency, 2011). This clearly indicates that, in Ethiopia educational enrollment is very low and it is worse in women and rural residents. (See the table below)The number in brackets is the percentage for the year 2005.

Place of residence	%age of women education attainment for the year 2011 and 2005				%age of men education attainment for the year 2011 and 2005			
	No education	Complete primary	Complete secondary	More than secondary	No education	Complete primary	Complete secondary	More than secondary
Urban	22.2(24.7)	9.4(6.7)	3.5(12.5)	15.0(6.9)	8.2(7.9)	10.1(5.8)	4.6(18.1)	23.6(13.4)
Rural	59.8(74.8)	2.3(2.2)	0.1(0.1)	1.1(0.2)	35.7(49.2)	4.7(7.0)	0.3(0.6)	2.6(0.5)

Table 3 school attainment by place of residence and sex for both years (2005 and 2011)

As a third world country, poverty is another big problem in Ethiopia. According to the WorldBank 2011 report the per capita income was estimated at US\$370² per annum which categorized the nation as one of the world's poorest countries. The problem is more rampant and widely spread in rural areas. Farming is the common activity for the population who are

² The country's per capita income is substantially lower than the sub-Saharan regional average which is estimated to be US\$1,257

living in the rural part of the country, while the low-land areas are mostly inhabited by pastoral people, whose life activities are mainly based on livestock production and who move from place to place looking for grass and water. The economy of Ethiopia mainly depends on agriculture: about 80% of the population of Ethiopia are engaged in this sector and it accounts about 43% of the total GDP of the country (Central Statistical Agency, 2011). Most peasants, particularly rural dwellers are engaged in primitive and very backward agricultural practices and their farms are mainly rain fed. The farms are also degraded and deforested due to intensive plowing, overgrazing and erosion. Due to this and other related problems the country has been exposed to food insecurity and vicious drought and famine for the past several decades.

2.1.3 Cultural background of Ethiopia

Ethiopia is one of the African nations where many kinds of religions are practiced harmonically. According to the 2011 EDHS report, the highest proportion is covered by the two main religions of the country, Christian and Islam. About half the population are Orthodox Christian followers, one-third are Muslims, about 18% are Protestants and the remaining 3% are traditional religion followers. There is a difference between the proportions of the urban and rural religion followers. The highest proportion of Muslim and traditional religion followers are living in rural areas; on the other hand, most Orthodox Christians are living in urban areas. There is also a strong social bond in society. Many individuals are engaged in local traditional associations, so called “iqub” and “idir”, that enable and ensure their social interaction. The members of this traditional association are liable to be supported financially by the society and receive many condolences for about 3 days if they face some problems related to death.

In spite of the above traditions, many harmful traditional practices are also manifested in Ethiopia, particularly in rural areas. Although the constitution of Ethiopia criminalizes several harmful traditional practices (such as early marriage, polygamy, abduction and female circumcision, and gender inequality), these harmful traditional practices are widely common and accustomed by the society, especially by rural dwellers of the country.

Early age marriage and polygamy are a very common in rural parts of some of the regions of the country. Girls in early young age (10 to 12 years old) are forced to get married. These practices are very common particularly in rural areas of the “Amhara” region. Similarly polygamy and widow inheritance are a common kind of marriage in the country. For example, according to EDHS 2005 report, overall, 12% of married women reported that they are in a polygamous union, i.e. they are married to a man who has more than one wife. Moreover, these girls have no power and right to select their husband by themselves. A substantial number of marriages are consummated by the consent of the family without notifying the woman with to whom she is going to be married.

Gender inequality is another devastating problem in the country especially after marriage. The wives have very limited autonomy in family issues like sexual negotiation, bearing of her own family and administrating the property which is handled by both her and her husband. In addition many tiresome and waist breaking daily activities are solely carried out by women, and the problem is much more serious in rural areas. There are persistent beliefs in a society that a man has a full control on his wife in every respective. For example, the 2005 World Bank report shows that 88 percent of rural and 69 percent of urban women believed that their husband had the right to beat them. In some regions, there are also several other harmful traditional practices which are very common in the country. For example uvulectomy and extraction of milk tooth are widely practiced in Oromia, Amahara and SNNPR regions. Female genital cutting practices also widely manifested in the country. DHS

and ORC macro report of 2001 both confirmed that 80 percent of the women in the age group 15-49 years old have been circumcized during their childhood.

3. Data sources and method of analysis

3.1. Data sources

The main data source of this thesis is the 2005 and 2011 Ethiopia Demographic and Health Survey (EDHS) which was conducted under the aegis of the Ministry of Health Ethiopia (MOH) and was implemented by the Central Statistics Authority (CSA). EDHS is part of the survey which was conducted in various developing countries. It has been conducted since the year 1984 in more than 85 different countries of the world.

So far, in Ethiopia, three consecutive surveys were conducted in the cross sectional years of 2000, 2005 and 2011 respectively. Similar to other demographic and health surveys, the principal objective Ethiopian Demographic and Health survey (EDHS) was to provide current and reliable data on fertility and family planning behavior, child mortality, adult and maternal mortality, children's nutritional status, use of maternal and child health services. Moreover, except for EDHS 2000, data were collected on the prevalence of HIV/AIDS in EDHS 2005 and 2011.

The 2011 EDHS sample was selected using a stratified two stage cluster population and the 2007 population and housing census has been serving as a sampling frame. The primary unit for this survey was Enumeration Areas (EAs) which is the lowest administrative unit in the data collection process. In the first stage, samples of 624 EAs were selected. From this 17817 households have been selected in the second stage. After this selection a complete listing was made in each household. As for 2011 EDHS, an identical procedure was implemented in selecting representative samples in EDHS 2005. In the first stage, 540 EAs were selected, using the sampling frame of the 1994 population and housing census. In the second stage a representative sample of around 14,500 households were selected from the given cluster.

In order to address the objective of the survey, various questionnaires were prepared based on the specific socio-cultural setting of Ethiopia. The quality of the questionnaire was assured and revised by a senior demographer from a different institute after the first draft had been prepared. The survey uses three types of questionnaire, the women's questionnaire, the household questionnaire and the men's questionnaire. The women's and men's questionnaires were designed to collect information of women aged 15-49 and men aged 15-59 about their demographic, socioeconomic and cultural status as well as to obtain voluntary consent to give blood samples for HIV testing at an individual level. In order to collect HIV data from eligible respondents, Dried Blood Samples (DBS) was taken and tested by the responsible body called Ethiopian Health and Nutrition Research Institute (EHNRI). In order to keep the confidentiality of blood test result, instead of the respondent's name, some standard codes were employed for each and every HIV test results which can be mapped to individuals and household backgrounds and characteristics using some key variables. After selecting relevant data the sample was weighted according to EDHS 2011 protocol to be population representative. The data were adjusted for sampling weight. Furthermore, some missing values were observed in both 2005 and 2011 datasets. To tackle this problem, I firstly have checked out whether the missing values are completely random or not. To do this, I calculated the percentage distribution of the non missing values to the total observation for each groups (e.g. among gender). In each group, I found that the percentage of non missing values is roughly the same in the groups under consideration. This suggests that the missing values are not distributed systematically among them. In the other word it explains the complete randomness of the missing values in the given data (see the detail calculation in the appendix table 15). If the missing values are missing completely at random, the missing values will be similar to the non missing one in every respect. Hence, Due to this, I prefer to use case wise deletion method to handle the problem and avoiding biasness of regression

estimates. That means missing values in the datasets are deleted in a case wisely without affecting the unbiasedness of the estimates.

3.2. Methodology

The main purpose of this thesis is to identify the demographic, socioeconomic and cultural factors that are fuelling the HIV epidemic by using logistic regression techniques. In this chapter, the theoretical background and the method behind the analysis of the data will be presented. Also to answer the listed research questions, in the next subsection empirical and analytical analyses will be made and also the regression for male and female for the two periods (2005 and 2011) will be run separately at country level.

3.2.1 Statistical model

To identify the underlying determinants which have significant effect on the transmission of HIV/AIDS, a statistical model will be employed. Therefore, due to the binary nature of the outcome variable in this study, being HIV positive or negative, a binary logistic regression model will be employed for the given data. One of the main applications of logistic regression is to determine or forecast the chance of the occurrence of a particular outcome of the response variable on the basis of independent or explanatory variables by fitting a given data to logit function. Based on the number of categories of the outcome variable, a logistic regression model can be classified as binary or multinomial. The dependent (outcome) variables which are binary in nature are classified under binary logistic regression whereas outcome variables which have more than one category are categorized under multinomial logistic regression.

3.2.2 Logistic regression

3.2.2.1 Binary Logistic regression for continuous explanatory variables

For a binary response Y_j and quantitative explanatory variable X_{ij} , $i=1,2,\dots,m$ and $j=1,2,\dots,n$, where

m is the number of variables included in the model

n is the number of observations,

let $\Pi_j = P(X_{ij})$ represent the “success probability” when X_{ij} takes the values x_{ij} . The problem with a linear model is that the probability model $E(Y) = X\beta$ (where β is the vector of parameters to be estimated) is used to approximate a probability value, $\Pi_j = P(Y_j=1)$ within the interval 0 and 1, while $E(Y_j)$ is not so constrained. Therefore, we apply the logit transformation where the transformed quantity $\text{Ln}(\Pi_j/(1-\Pi_j))$ lies in the interval $(-\infty, \infty)$ and is modeled as

$$\text{Logit}(\Pi_j) = \ln(\Pi_j/(1-\Pi_j)) = \beta_0 + \beta_1 X_{1j} + \beta_2 X_{2j} + \dots + \beta_m X_{mj} \quad (1)$$

Through algebraic manipulation

$$\Pi_j = \frac{\exp(\beta_0 + \beta_1 X_{1j} + \beta_2 X_{2j} + \dots + \beta_m X_{mj})}{1 + \exp(\beta_0 + \beta_1 X_{1j} + \beta_2 X_{2j} + \dots + \beta_m X_{mj})} \quad (2)$$

where the parameter β_i represents the coefficient of parameter to be estimated.

In the logistic regression model maximum likelihood estimation technique is used for³ parameter estimation.

³ The variables in the two models are shorthand. The following is what the shorthand stands for: edu=education attainment, wealth=wealth index, occupation=respondent’s occupation, media=media exposure,

β_0 = the intercept term.
 $\beta_1, \beta_2, \dots, \beta_m$ = regression coefficients.
 X^s are the explanatory variables.

Notice that in equation (1), although the regression model is linear on the right side, the left side is a non-linear function of the response variable Π . This function is called the logit link function. As mentioned above the usual least squares methods cannot be used to estimate the parameters. Instead the maximum likelihood method is used to obtain these estimates and since the regression model is non-linear, an iterative algorithm is needed for parameter estimation.

3.2.2.2 Binary Logistic regression model for categorical predictors

Logistic regression can also have categorical predictors, rather than continuous (quantitative) explanatory variables. Since I am going to use categorical predictors in this study, logistic regression for categorical predictors will be presented below.

Suppose the model has a binary response Y and m predictors X_i , $i=1,2,\dots,m$. the predictors may have more than 2 categories (levels).

X_{ij}^r , $i=1,2,\dots,m$, $j=1,2,\dots,n$, $r=1,2,\dots,k_i-1$

Where m is the number of variables (factors) included in the model.

n is the number of observation.

X_{ij}^r refers to the r^{th} level of a factor

Let us also assume that one level of each factor is taken as a reference category, therefore the model will have (k_i-1) dummies as shown below

$$P(Y=1) = \beta_0 + \{\beta_1^1 X_{1j}^1 + \beta_1^2 X_{1j}^2 + \dots + \beta_1^{k_1-1} X_{1j}^{k_1-1}\} + \{\beta_1^1 X_{2j}^1 + \beta_1^2 X_{2j}^2 + \dots + \beta_1^{k_2-1} X_{2j}^{k_2-1}\} + \dots + \beta_1^1 X_{mj}^1 + \beta_1^2 X_{mj}^2 + \dots + \beta_1^{k_m-1} X_{mj}^{k_m-1} \quad (3)$$

Using the above equation (3), four general logistic regression models and six partial logistic regression models by each factor and its levels will be built and analyzed for both year sample dataset separately. In all models the first group taken as a reference. The general models include all selected variables in the model and analyze the effects of each explanatory variable on the odds of being infected by the epidemic. The general models can be expressed as

Model 1.1

$$\text{Logit}(\Pi_j) = \beta_0 + \beta_1 * \text{edu} + \beta_2 * \text{wealth} + \beta_3 * \text{occupation} + \beta_4 * \text{media} + \beta_5 * \text{place} + \beta_6 * \text{work} + \beta_7 * \text{sex.hh} + \beta_8 * \text{age} + \beta_9 * \text{marts} + \beta_{10} * \text{agma} + \beta_{11} * \text{numsx}$$

Partial logistic regressions are the division of the general logistic regression model by demographic, cultural and socioeconomic variables. In the socioeconomic model, the explanatory variables are education attainment, wealth index, respondent occupation, media exposure, types of place of residence, respondent current working status and sex of head of house hold are included.

Socioeconomic model

Model 2.1

$$\text{Logit}(\Pi_j) = \beta_0 + \beta_1 * \text{edu} + \beta_2 * \text{wealth} + \beta_3 * \text{occupation} + \beta_4 * \text{media} + \beta_5 * \text{place}$$

place=place of residence, work=respondent's current working condition, sex.hh=sex of head of household, age=age group of the individuals, marts=marital status, agma=age at first marriage, agsx=age at first sex, numsx=number of sexual partners in the last 12 month including spouse.

$$+\beta_6*work+\beta_7*sex.hh$$

Demographic model

Model 3.1

The probability of being infected by the epidemic is predicted by the respondent age and marital status.

$$Logit(\Pi_j)=\beta_0+\beta_1*age+\beta_2*marts$$

Cultural model

In the cultural model are included the cultural factors that affect the prevalence of HIV/AIDS. The two explanatory variables that are included in the models are age at first marriage and number of sexual partners in the last 12 month including spouse. The mathematical equation for the cultural model is:

Model 4.1

$$Logit(\Pi_j)=\beta_0+\beta_1*agma +\beta_2*numsx$$

To fit these models, I used IBM SPSS statistics 20 software. Since all explanatory variables which are included in this study are categorical, I used categorical data analysis command to run the desired model. By considering this command, the software creates a set of dummy variables for each categorical variable by taking one of the level as a reference. In this paper the first level of each factor (explanatory variable) has been taken as a reference category. The reference level is basically assigned to zero by the software and the other levels will be compared to this reference level.

3.2.3 Interpretation of the coefficients of Logistic regression model for categorical predictors

In logistic regression, one level of the dependent and independent variable should be selected as a reference level. The effect of explanatory variables on the outcome of the dependent variables are given by the regression coefficients. The sign of the regression coefficient tells us whether the independent variables increased or decreased the likelihood of the outcome as compared to the reference level, where a positive regression coefficient indicates that the independent variables increase the probability of the outcome and the opposite effect will be showed when the regression coefficient is negative. The probability of the outcome of the dependent variable is determined by the magnitude of the regression coefficient of the given independent variables. Big regression coefficient means the independent variables affect the chance of the outcomes occurring strongly; on the other hand small coefficient has opposite effect, providing that the reference category sets to zero.

The interpretation of logistic regression model can be in the following way. The effect of the explanatory variable on the outcome of the dependent variables explained by β 's unit that means the intercept term (β_0) can be interpreted as the value of the log-odds of success outcome when all the risk factors (X 's) are set to their reference level. To interpret the regression calculating odds ratio will be very useful because it is reasonable and comparatively easy to interpret and understand the result of the logistic regression, if it compared with the log-odds. An odds ratio (OR) is a measure of association between an independent variable and an outcome dependent variable. The odds ratio can be easily calculated using different statistical software, and its value lies in the interval between 0 and ∞ . In this thesis for calculating the odds ratio and estimation of regression coefficients, SPSS statistical software was used. The odds ratio of a logistic regression for categorical predictors can be interpreted as the change of the level of a given categorical explanatory

variables as compared to that of reference level, provided that all other levels assigned to zero. The software gives a p-value of the Wald test, and the estimated regression coefficients. Based on the values of the odds ratio it is possible to interpret the result as follows. An odds ratio greater than one indicates that the likelihood of the occurrence of success is higher, while an odds ratio less than one shows the opposite effect. An odds ratio equal to one shows that the occurrence of the two outcomes are equally likely.

4. Theoretical Discussion: Analytical frame work

In order to easily visualize the interaction between various key factors, it is very common to make use of analytical framework in epidemiological and demographic studies. To address the objective of this study, I have employed an analytical framework which is adopted from the DHS report, which is developed by researchers, as shown in the figure 2 below.

In the analytical framework, it can be shown that the underlying determinants (demographic, socioeconomic and cultural) are linked with Knowledge, Attitude and Practice (KAP) which eventually has influence on the prevalence of HIV/AIDS. There is also an interrelationship among the underlying determinants, that is cultural factors having influence on socioeconomic factors and there is also causality between socioeconomic and demographic factors. However, as it has been mentioned in the objective of the paper, the main purpose of this study is to show the relationship between the underlying determinant factors and the prevalence of HIV AIDS. Therefore, I will not go through the relation among these underlying determinant factors. Rather I strictly focus on the relationship between the underlying determinant factors and the prevalence of HIV/AIDS by considering the KAP as intermediate factors.

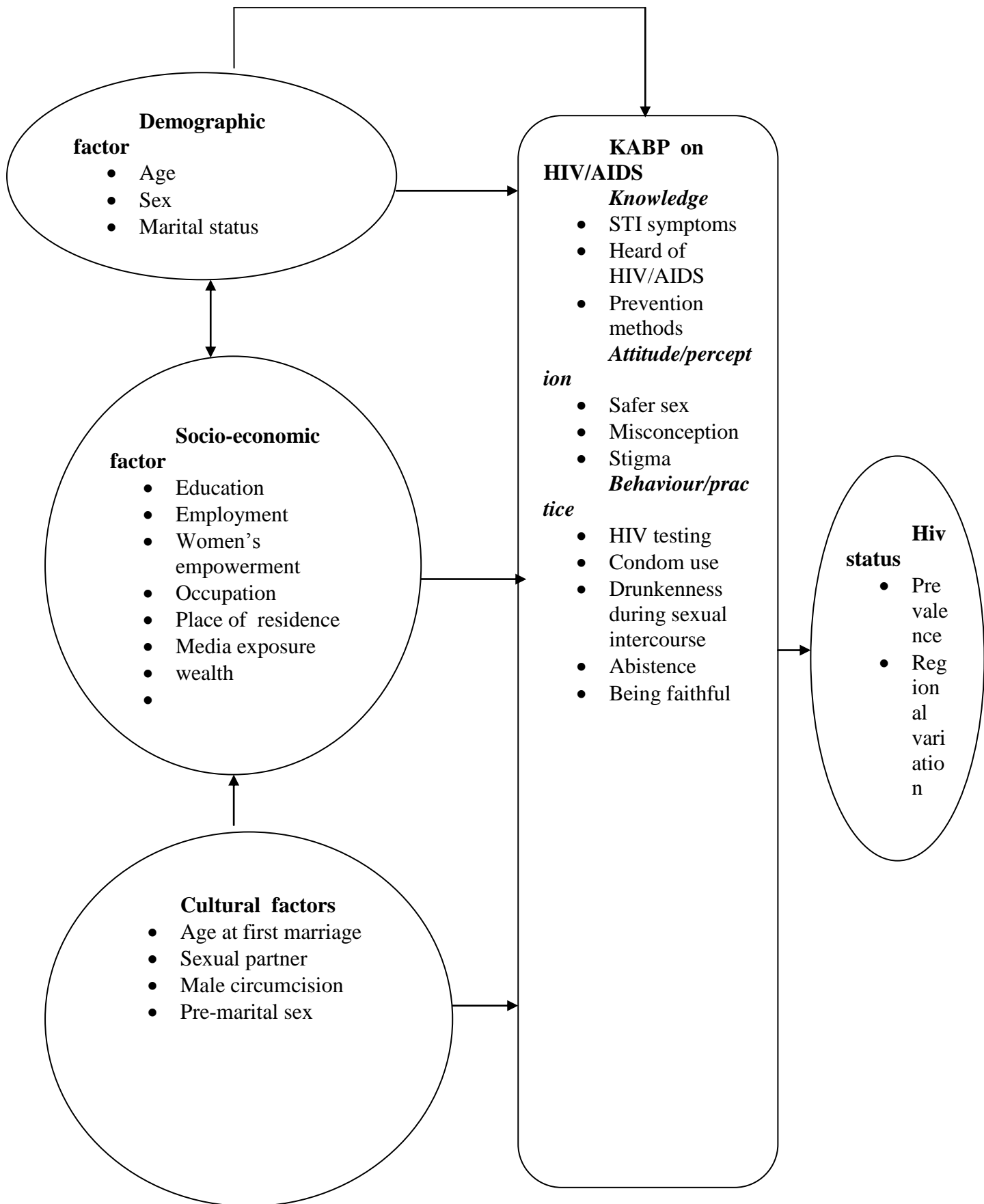


Figure 2 Analytical framework. Source: DHS 2005, and Developed by the researcher, 2007

Based on this, the theory of the relation between the prevalence of HIV/AIDS and underlying determinants factors is described below.

Socioeconomic factors: the impact of these factors on the prevalence of HIV/AIDS is mostly related to the building of the attitude of the individual and to creating a healthy environment through education and level of income.

Poverty: Poverty enhance the vulnerability of contracting HIV through different channels, including increased movement of people from one place to another (urban to rural) or (rural to urban), limited media exposure, limited access to health education, sexual exploitation and gender inequality. Poverty exposes people to food insecurity and fail to fulfill other basic needs. This problem facilitates sexual risk behaviors by forcing them to engage in commercial sex practices. Women's economic dependence on their partner may also expose them to their partner insisting on unsafe sex. Poverty is also related to the biological problems of human beings through food insecurity and malnourishment. Malnutrition will expose individuals to the disease through weakening of their immune system.

Education: In lots of research, education is one of the most focused socio-economic factor which is put forward in relation to the prevalence of the AIDS epidemic. The benefit of education in relation to diminishing the prevalence of the epidemic can be classified in short and long terms. In the short run, education will benefit individuals through raising awareness, accessing and perceiving different information through reading and experience how to protect themselves from the epidemic. Hence, more educated individuals have a tendency of preventing the diseases by applying safety methods in the short run. In the long run, education may benefit individuals by eradicating poverty and other related risk factors through discovering a new knowledge and increasing the level of income of individuals which in turn diminishes the prevalence rate of the epidemic. In the other hand individuals who are less educated experience a higher rate of HIV infection due to their low income, decreased autonomy and limited access to information concerning the way the disease is transmitted and its prevention method.

However, contrary to the above argument, studies show that, in the early stage of the epidemic in many countries, groups of people who are economically strong with better education have a higher rate of partner change due to greater personal autonomy and spatial migration. However, in the later stage of the epidemic due to the accessibility and exposure of information the prevalence rate diminishes in these groups through building their awareness about the epidemic.

Occupation: the mobility of individuals mainly depends on the profession in which they are engaged. Since most migrant workers are forced to stay in their work places for extended periods separated from their families and marriage partners, there will be a tendency of having new sexual partners during their migration period. Hence, they will have a wider range of sexual networking than non migrant workers. Thus, this will in turn accelerate the transmission of the HIV/AIDS epidemic.

The transmission of HIV epidemic due to mobility of individuals is also determined by the structure and the conditions of the migration process. Individuals who are engaged in professions which make them migrate, may experience separation from their present socio-cultural norm to a new society and socio-cultural norms. This spatial migration will lead them to adapt the new culture of the society which may have some contribution to the prevalence of the epidemic. Some studies argue that there is empirical evidence for the link between human mobility and HIV transmission. In sub-Saharan Africa countries the probability of HIV infection has been found be higher near roads, for individuals who have been experiencing migration and for individuals who have sexual partners who are migrants. Migrant labor is highly correlated with high risk sexual behavior, thus migrants and migrant workers are at higher potential risk of HIV infection. Due to a high level of mobility, activities which are

associated with agricultural marketing, military and transportation service have a significant contribution to the transmission of the disease.

Employment status:

Employment status is linked to the prevalence of the epidemic through generating income and migration to other places in order to look for jobs. This income difference and migration will affect the likelihood of individuals affected by the epidemic as stated in the above theories of poverty and education subsection.

Place of residence: place of residence of individuals may affect the prevalence rate of the epidemic through socio-cultural and socio-economic variation. For example, rate of STD transmission tends to be higher in rural areas due to unstandardized access to STD treatment. In addition to this the level of knowledge about HIV/AIDS is also lower in these areas. On the other hand, because of the limited scope for sexual networking in isolated communities and the highest influence of traditional values the prevalence level in rural areas is very low.

Demographic factors: In purely heterosexual sex, HIV prevalence level is higher among women than men. This is because of women are biologically more susceptible to infection due to larger genital tract surface area, which may be also torn during sexual activity, which leads to higher risk of HIV transmission.

The other demographic factor is age, which also affects the prevalence of the epidemic as follows. Most young people are rushing to sex and practicing unsafe sex due to their puberty age. Their economic status and knowledge about the epidemic also contributes to the prevalence level of HIV infection. For example, youth are more attracted to money specially if they are poor and have inadequate information about the disease.

The third demographic factor which was identified in the conceptual framework was marital status of individuals. Marital status will affect the transmission of epidemic through acquiring new sexual partners and less autonomy. For example married girls have higher levels of sexual activity than their sexually active unmarried peers, and they have also limited ability to negotiate condom use and have low power to refuse sex with their partner.

Cultural factors: Cultural practices, values and traditions have strong influences on the visible aspects of individual behaviors which in turn influence their vulnerability to disease. In the case of women, they are exposed to the disease through traditional practices such as husband sharing, early marriage, female genital mutilation and condoning of gender based violence. Early marriage refers to any form of marriage that takes place before a child has reached 18 years. Early marriage severely increases young girls' vulnerability to HIV as they are most likely to be forced into having sexual intercourse with their (usually much older) husband. Moreover, these very young girls have softer vaginal membranes which are more prone to tear, especially on coercion, making them susceptible to HIV infection, in addition to this their older husband is more likely to be sexually experienced and HIV infected. The severity of multiple sexual partners relates to the fact that if one person in a circle of partners gets infected with HIV, there is a very high likelihood that all persons involved will be infected.

Female genital cutting places girls and women at increases risk of HIV infection through several routes. In the first place, instruments such as razors or knives, which are used for genital mutilation, may not be sterilized. In the second place, female genital mutilation renders the female genital more likely to tear during intercourse.

According to report⁴ "the foreskin's inner mucosal surface is more susceptible to HIV because it has more immune cells that are vulnerable to HIV infection. The presence of the foreskin acts as a physical barrier, trapping HIV next to the surface of the penis for long

⁴ http://www3.niaid.nih.gov/news/QA/AMC12_QA.htm

periods. In this moist environment, the HIV virus can survive longer". After circumcision the penile shaft becomes less susceptible to viral infection.

4.1. Previous research

Good knowledge about demographic, socio-economics and cultural pattern of the prevalence and incidence of HIV/AIDS in sub-Saharan Africa is a useful input for developing programs for combating HIV/AIDS (Beegl & Walque, 2009). Under this subsection we will discuss some of the research which has been made on the driving forces of the prevalence of HIV/AIDS related to demographic, socioeconomic and cultural factors.

4.1.1 Demographic factors

The Sub-Saharan African region has a high transmission rate of HIV infection, where heterosexual intercourse is the main mode of transmission. Marriage is one of the demographic factors in which heterosexual sex is mostly exercised among couples. There are different views concerning the association between marriage and the prevalence of HIV/AIDS. Some researchers have shown that marriage has positive effect on the prevalence of the epidemic through unsafe sexual intercourse. On the other hand, studies have shown that marriage has negative effect on the prevalence of HIV/AIDS through reduction in the number of sexual partners. However, all studies have explained the existence of strong relationship between risk behavior and marital status. A study conducted by (Carael, et al., 2001) on HIV within behavioral risk groups using sample surveys data conducted in Kampala and Lusaka showed relatively higher rates of HIV infection in unmarried than in married people. According to this study the highest rates were often found among singles, followed by the divorced and the widowed. However, many recent researches on the HIV epidemic in developing countries have got higher levels of infection in married than unmarried individuals, specifically in men. On the other hand based on clinical data of couples' HIV status with population based data on sexual behavior, a study carried out by Krisin et, al (2008) in urban areas of Zambia and Rwanda showed that most heterosexually transmitted HIV infections occurs within a marital relationship. In this study using a probability model, it has been found that the estimated proportion of HIV infection was high in Rwanda; it is estimated that 55.1% to 92.7% of new heterosexually acquired HIV infection among adults in urban Zambia and Rwanda occurred within a serodiscordant marital or cohabiting relationship. The explanation for the high prevalence of HIV in married couples were some cultural factors supporting extramarital sex for men and limiting the autonomy of women preventing them from negotiating safe sex with their husband.

A study by (Clark, 2004), on early marriage and HIV risk in sub-Saharan Africa, by examining the effects of girls' early marriage on their risk of acquiring HIV/AIDS found that married adolescent girls in urban centers in Kenya and Zambia have higher rates of HIV infection than do sexually active unmarried girls. In this study on both countries it has been found out that early marriage increases coital frequency, decreases condom use, and diminishes girls' ability to abstain from sex. In addition to this, the likelihood of being HIV positive among husbands of married girls is three times higher than among boy friends of single girls. Even though married girls have less multiple partners they may be exposed to unprotected sex with partners who have higher rates of infection.

In Ethiopia different research on HIV showed that in general HIV prevalence is closely related to marital status. The likelihood to be HIV positive among widowed and divorced was higher than among those who had never been married according to EDHS report (Central Statistical Agency, 2011). This is consistent with a cross sectional study conducted by (Mmbaga, et al., 2007) on the prevalence of HIV infection in urban, semi-urban and rural

areas in Arusha region, Tanzania. This study revealed that divorced and separated individuals have higher HIV prevalence compared with married and cohabiting individuals. The same result revealed in Zambia, according to (Sandøy, et al., 2006) report after adjusting the age factor, divorced and widowed women had a significantly higher risk of being HIV positive than married women.

Age is another important demographic variable which is often included in the models, in order to point out its effect on the prevalence of HIV epidemic. The prevalence of the epidemic is not the same in different age groups. Some groups are more vulnerable to the epidemic than others. In the context of Ethiopia for women, HIV prevalence peaks at age 30-34. For men, the HIV prevalence peaks at age 35-39 EDHS, (Central Statistical Agency, 2011). According to 2011 and 2005 EDHS report the HIV prevalence among adults age 15-49 was 1.5 and 1.4 percent respectively. In parallel to this approximately 60 percent of new HIV infection affects the young age group globally (Da Ros & Da Silva Schmitt, 2008). Similar studies have revealed much higher levels of infection among girls than boys. This is due to the fact that at young age, boys have sex with girls of similar age, whereas girls have sexual relations with older men, who are more likely to be infected (Hallett, et al., 2007). Poverty drives many girls to have sex with 'sugar daddies' (Jewkes, 1999).

On the other hand, a study conducted by (S Afr, 2007) reveals that, the occurrence of HIV among females peaked in the 20-29 year age group at a level six times higher than the incidence found in 20-29 year old males. In the age group 15-24 years, females contribute 90 percent HIV infections. Not using a condom among youth and widowed were the socio-behavioral factors attributable to the highest HIV infection rates. Parallel to the above study (Fontanet, et al., 1998) conducted a study on age and sex specific HIV prevalence in the urban community setting of Addis Ababa, Ethiopia that showed the HIV prevalence by age and sex specific is significant. The result of Fontanet, et al., showed that a total of 3853 individuals were included in the analysis and the prevalence of HIV in adults was 6.0 percent for men and 6.9 percent for women. In this study the highest prevalence was observed in the 25-29 years age group. Moreover, a big difference in HIV prevalence rate was observed among men and women at the age 15-24 years, where women are four times more likely infected with HIV than men (Laural lee, 2012).

4.1.2 Socioeconomic factors

One of the crucial determinants on the prevalence of HIV epidemic is socio-economic factors. So far different studies have been carried out on the association between the different socio-economic variables and the prevalence of the epidemic and they showed different results. Poverty is one of the socio-economic variables, which has an effect on the spread of the epidemic through different channels, including migration of people from one place to another (urban to rural) or (rural to urban), limited media exposure, access to health education, nutrition, sexual exploitation and gender inequality (Casale & Whiteside, 2006). There is strong negative association between HIV and poverty at regional level in Africa (Bloom, et al., 2002). On the other hand, different scholars have hypothesized that high HIV prevalence is a result of poverty especially in sub-Saharan Africa societies (Gillies, et al., 1996).

The relationship between HIV/AIDS and poverty is complicated (Collins & Rau, 2000) and results from the current studies remain contradictory. A study conducted by (Casale & Whiteside, 2006) on HIV infection shows that it does not disproportionately affect the poorer in sub-Saharan Africa country. Furthermore, the result showed that in all eight countries, where the study was conducted, adults in the wealthiest quintiles have a higher prevalence of HIV than the poorer quintiles. Moreover, evidence from the Demographic and

Health Survey(DHS) data from developing countries specially sub-Saharan suggest that wealthier men and women tend to have higher prevalence of HIV than the poorer ones (Mmbaga, et al., 2007). On the other hand, other studies showed that poverty increases individual exposure to HIV infection and it is a key factor for HIV transmission. (Bloom, et al., 2002) Showed that economically poor young women are 50 percent more likely to have had sex than their economically richer peers and he also found that richer women were twice as likely to practice save sex and to know how to prevent HIV infection.

Poverty is the main factor directing risk behaviors that exposed people to risk of HIV infection according to (Collins & Rau, 2000). One of the channels through which poverty increases the vulnerability of HIV infection is through limiting access to health care. Poor individuals mostly have limited access to health service. Limited health service access can fuel the spread of HIV infection. According to (Clark & Vencatachellum, 2003) economically poor people have a shortage of information about HIV and they have limited access to education and condoms.

According to (Clark & Vencatachellum, 2003) poverty also increases HIV transmission through nutrition. Malnourished individuals are more exposed to illness and therefore infectious disease like HIV/AIDS. Most of the time economically poor individuals are exposed to malnourishment.

Education is the other socio-economic factor, which influences the prevalence of HIV and amplifies the awareness of people. In many researches, education is one of the most focused socio-economic factors in the context of AIDS epidemic. In the short run, education raises awareness of individuals, which enables individuals easily access and utilize different information regarding the epidemic. And in the long run education more likely helps individuals to have personal autonomy and increased income.

According to (Fylkesnes, et al., 1997) report the seroprevalence of HIV is increasing significantly with increasing educational attainment among both urban and rural residents in Zambia. The same result was observed in Cote d'Ivoire, where educated people run a higher risk of HIV infection. This is due to a high frequency of changing of sexual partners. However, this result (the case with Cote d'Ivoire) is somehow compensated by a higher chance of condom use relative to less educated people (Cogneau & Grimm, 2006). More educated people are more likely to receive and to employ information about HIV prevention methods than less social status group. A marked decrease in transmission of HIV is related to higher education and stable or rising prevalence to low education (Fylkesnes, et al., 2001). More educated individuals are more responsible about their health status and better able to take action on HIV prevention methods by changing their sexual behaviors. Individuals' condom usage is strongly associated with their educational level (Fylkesnes, et al., 2001).

According to Demographic and Health Survey report in 11 countries, the likelihood of using a condom at last sex was higher for women with primary school education than for those with no education (GCE, 2004). In nine of these countries there was a parallel increment of individuals' likelihood of using a condom at last sex and education attainment. Another study conducted in Zimbabwe revealed that women with secondary education were less likely to report having had unprotected casual sex (Hallett, et al., 2007).

On the other hand many studies showed that educated individual have higher risk of HIV infection in Africa. In a study conducted by (Mmbaga, et al., 2007) on educational attainment and risk of HIV-1 infection in the rural Kilimanjaro region of Tanzania,1991-2005. In this study eligible individual were aged 15-44 years living in Oria village. The individuals were interviewed and gave blood for HIV testing. The study showed that there was a positive relationship between education attainment and HIV infection in the year 1991. A reversed association was observed in 2005 where odds of acquiring HIV infection decrease with increasing level of individual education. This result is seen among educated men. Parallel to

this there was a reduction of risk behavior: like increased use condom and reduced number of sexual partners in the past years was observed among educated women.

According to (Hargreaves JR, 2010) educational attainment is a common variable to measure socioeconomic status in HIV dataset from Africa. Many studies have shown that higher HIV prevalence is observed among more educated categories, but this is not always true. According to their study HIV prevalence was stable among those with no education after adjustment for potential confounding factors (sex, age, urban/rural residence and household wealth), on the other hand it was significant for both primary and secondary education.

A study was conducted by (Bradley, et al., 2007), on educational attainment and HIV status among Ethiopian voluntary counseling and testing clients in order to examine the association between HIV infection and education attainment level among VCT clients. The study showed that HIV prevalence decreases significantly with each increase in education level for both men and women.

A study was conducted by (Lakhanpal & Ram, 2008), on educational attainment and HIV/AIDS prevalence. By using a large cross-country survey data the authors carried out an investigation of the effect of adult educational attainment on prevalence of HIV. From this study they found out that educational attainment has significantly negative effect on the prevalence of HIV/AIDS and male circumcision lowers acquisition of the disease.

People migration from rural to urban is more pronounced in the least developed countries. Different scholars revealed a high STD incidence and a high rate of HIV transmission in urban areas compared to rural areas. The reason for this could be long working hours exercised in urban areas and the fact that individuals are isolated from their family. According to (Vyllder & Stefan, 1993) high HIV infection rates are exhibited in urban areas, but the transmission of the epidemic is today frequent among the poor, hence increasingly also in rural areas.

A handful of studies showed that urban residence is characterized by safer sexual behaviors. Researchers found out that condom use was attributable to urban residence (Fylkesnes K, 2001). In a later study there was higher likelihood of a rural resident reporting problems with condom use related to availability and religious beliefs.

Rapid migration is a common activity in developing countries. Ethiopia is one of the least urbanization countries among sub-Saharan countries. The prevalence of HIV is different across urban and rural areas, where HIV prevalence is higher in urban than in rural areas.

Finally the relationship between the HIV prevalence and place of residence has been characterized as follows. A cross-sectional study conducted by (Mmbaga, et al., 2007) on prevalence of HIV infection in urban, semi-urban and rural areas in Arusha region, Tanzania showed that the prevalence rate is higher in urban areas than rural areas.

4.1.3 Cultural factors

Culture plays a great role in determining the health condition of individuals, families and different communities. The USAIDS, 2009 report on concurrent sexual partnerships and HIV infection evidence was conducted using national population based surveys. This survey showed that in many countries the HIV prevalence among women and men who had concurrent sexual partners in the previous 12 months was higher than among those who had only one lifetime partner. A cross sectional study conducted by (Hallett, et al., 2007) on age at first sex and HIV infection in rural Zimbabwe using cross-sectional behavioral data on eligible individuals. The result showed that women begin to have sex at an earlier age are more likely to be infected with HIV. This is because they have a greater life time number of sexual partners than those whose first sexual experience delayed.

(Adair, 2007) studied HIV status and age at first marriage among women in Cameroon. Using a multivariate analysis based on a nationally representative sample from 2004 Cameroon Demographic and Health Survey data, he showed that those who are married late and those who have a long period of premarital sex have highest odds of acquiring HIV. Such a relationship is observed in rural areas.

Concurrent sexual partnerships are widely believed to be one of the main drivers of the HIV epidemic in sub-Saharan Africa.

5. Hypothesis

In this subsection based on the theory and the background section that have already been discussed, selected testable hypothesis will be presented. The hypotheses will be grouped under the corresponding underlying determinant which is mentioned in the analytical frame work.

- The likelihood of being HIV positive is higher for less educated individuals than more educated individuals.
- The likelihood of infection is higher for urban than for rural residents.
- The likelihood of being HIV positive is higher for women than for men.
- The likelihood of being HIV positive is higher for unmarried than for married individuals.
- Economically poor individuals have higher likelihood of acquiring HIV/AIDS than economically rich individuals.
- Younger age groups are more vulnerable to HIV infection than older ones.

6. Definition of variables

Variables to be included in this study are selected from 2005 and 2011 (EDHS), which were carried out by the (MOH) and implemented by the (CSA) of the government of Ethiopia.

6.1. Dependent variable

The endogenous variable in this study is the individuals' serostatus of HIV, in the age group 15-49 for female and 15-59 for male respondents, and it takes the value 0 if the respondent HIV testing result is negative and 1 if the respondent HIV testing result is positive.

6.2. Independent variables

The independent variables that are used in the study were classified as demographic, socioeconomic and cultural variables and each variable has its own levels. Age is one of the demographic variables which is fuelling the HIV epidemic. In this study the variable age is categorized into 3 levels. Before editing it had 7 and 9 levels in the EDHS (2005 and 2011) dataset for female and male respondents respectively. Here I am interested to know which age groups are more vulnerable to HIV epidemic, young age (15-24), middle age (25-34) and older age (35-59). The other variable is the marital status of the individuals; in this case we made some modification on the variables. According to the EDHS of the two periods this variable has 6 levels but now it is reduced to 3 for the sake of convenience. EDHS classified this variable in detail, like the one who had wife/husband previously was classified as divorced and widowed, but here they are merged together. Also EDHS classified in detail married individuals as married, living together, not living together. Here also married individuals and individuals living together are merged together. Hence, the variable categorized in this way, it will have three main levels.

The other determinant factor that affects the prevalence of HIV epidemic is the socio-economic factor. Under this factor there are seven variables, which will be included in the model to see their significance on the prevalence of the epidemic. Here sex of the head of the household taken as proxy for women empowerment. The other selected socioeconomic variable which is common for the two periods and for both women and men individuals is wealth index, it has three levels. Frequency of listening radio is taken as a proxy for media exposure. For example in Ethiopia most of households have at least a radio even in the rural part of the country.

Demographic factors		
Variables	Variable label	category
age	Age groups	1=15-24 2=25-34 3=35-(49)59
marts	Marital status	1=never in union 2=married/living together 3=widowed/divorced/separated
Socioeconomic factors		
edu	Education attainment	1=no education 2=primary 3=secondary 4=higher
work	Respondent current working	0=No 1=Yes
Sex.hh	Sex of house hold head	1=Male 2=Female
occupation	Respondent occupation	0=doesn't work 1=professional 2=sales (trade workers) 4=agricultural workers 5= household domestic
Place	Types of place of residence	1=urban 2=rural
media	Frequency of listening radio	1=not at all 2=almost everyday
wealth	Wealth index	1=poorer 2=middle 3=richer
Cultural factors		
numsx	#of sexual partners including spouse in last 12 month	0=0 1=1 2=more
agma	Age at first marriage	1=8-17 2=18-28 3=29-54

Table 4 independent variables with their label and category

7. Result

In this subsection, the output of the logistic regression employed to measure the relationship between the prevalence of HIV and the key independent variable will be discussed at 10%, 5%, and 1% level of significance accordingly. Some of the estimated coefficients of the general and specific models show that some predicting variables and their corresponding levels are matched as it was expected theoretically and hypothetically at least at 10% level of significance.

As it shown in the demographic model, in the year 2011, the odds of being infected by HIV/AIDS in the middle age groups are significantly less as compared to very young age groups in general terms. For example as it is shown in the demographic models that the odds of being infected by HIV/AIDS in the age group 25-34 was about 0.07 and 0.3 less for male and female respectively as compared to the very young age groups (15-24). However, unlike for male respondents, the odds of acquiring of HIV for female respondents in the age group 35-49 were significant and 1.6 times higher than their younger counterpart.

Regression output of 2005 the demographic model shows that, similar to 2011, the effect of age on the odds of acquiring of HIV was significant for the middle age group (25-34) at 5% and 10% level of significance for male individuals, with the young age group as reference group. Unlike 2011 output, other age groups have insignificant effect on the prevalence of HIV/AIDS as compared to the reference age group 15-24.

In general, marital status and age group of the respondent also had overall statistically significant effect on the prevalence of HIV/AIDS in the year 2011. Regarding marital status, the likelihood of being affected by the epidemic has decreased among married and widowed/divorced/separated individuals as compared to their unmarried counterparts. In the other hand, in the year 2005, the coefficient estimates of the demographic model show that the effect of marital status on the odds of being infected by the epidemic is statistically significant for male respondents at 10% level of significance. However, the likelihood of being infected by the epidemic is getting decreased and is highly significant for female respondents.

Demographic factors 2011							
variables	category	Male			female		
		B	sig	Exp(B)	B	sig	Exp(B)
age	age	-----	0.000	-----	-----	0.000	-----
	25-34	-2.656	0.000***	0.070	-1.176	0.000***	0.308
	35-49(59)	-0.685	0.001***	0.504	0.515	0.000***	1.673
marts	marts	-----	0.000	-----	-----	0.000	-----
	Married(1)	-1.917	0.000***	0.147	-1.803	0.000***	0.165
	Widowed/divorced(2)	-1.829	0.000***	0.161	-1.653	0.000***	0.191

Table 5 demographic model 2011 regression result

Demographic factors 2005							
variables	category	Male			female		
		B	sig	Exp(B)	B	sig	Exp(B)
age	age	-----	0.090	-----	-----	0.163	-----
	25-34(1)	-1.373	0.047**	0.262	-0.504	0.067*	0.604
	35-49(59)(2)	0.072	0.820	1.075	-0.277	0.241	0.758
marts	marts	-----	0.125	-----	-----	0.000	-----
	Married(1)	-1.373	0.063*	0.253	-1.932	0.000***	0.145
	Widowed/divorced(2)	-0.895	0.078*	0.409	-1.386	0.000***	0.250

Table 6 demographic model 2005 regression result

Cultural variables also had overall statistically significant effect on the prevalence of HIV/AIDS in both cross sectional years of 2005 and 2011. The regression output showed that, in the year 2005 and 2011, male individuals who engaged in to their first marriage in the age 18-29 and 30-54 had a significantly lower risk of acquiring HIV as compared to their reference age group of 10-17. However, age at first marriage had no significant effect on female respondents in the year 2011 in each age group level; however in the year 2005 it turned out significant for female individuals in the age groups 18-29 and 30-54. Number of sexual partners in the last 12 month including spouse has also an overall statistically significant effect at least at 10% level of significance on the prevalence of HIV/AIDS, under cultural regression model. In the year 2011, the odds of acquiring HIV of male respondents who had one sexual partner are 2.5 times higher than male individuals who had no sexual partners. However, the number of sexual partners for the last 12 month for female individuals who had one and more sexual partners yields a significantly lower risk of acquiring HIV as compared to female individuals who had no sexual partners in the last 12 month. Unlike in 2011, the number of sexual partners in the last 12 month including spouse had no significant effect in the prevalence of HIV in the year 2005, except for male individuals who had more than two partners.

		male			female		
Cultural factors 2011		B	sig	Exp(B)	B	sig	Exp(B)
agma	agma	-----	0.042	-----	-----	0.023	-----
	18-29(1)	-0.754	0.035**	0.471	-0.154	0.851	0.857
	30-54(2)	-0.689	0.015**	0.502	0.202	0.806	1.224
numsx	numsx	-----	0.000	-----	-----	0.000	-----
	1(1)	0.929	0.039**	2.533	-1.226	0.000***	0.293
	>2(2)	-0.336	0.375	0.715	-2.801	0.000***	0.061

Table 7 cultural model 2011 regression result

		male			female		
Cultural factors 2005		B	sig	Exp(B)	B	sig	Exp(B)
agma	agma	-----	0.005	-----	-----	0.018	-----
	18-29(1)	-4.168	0.061**	0.015	-1.616	0.034*	0.199
	30-54(2)	-1.102	0.004**	0.332	-2.060	0.009**	0.128
numsx	numsx	-----	0.051	-----	-----	0.000	-----
	1(1)	-0.928	0.444	0.395	-0.405	0.771	0.667
	>2(2)	-1.252	0.015**	0.286	-1.545	0.266	0.213

Table 8 cultural model 2005 regression result

Education, occupation, wealth index, sex of head of household and place of residence, which are categorized under socioeconomic variable also, were significantly associated with the prevalence of the epidemic. Regression output of 2011 socioeconomic model shows that educational level had a significant effect in increasing the prevalence of the epidemic. For instance, the risk of acquiring HIV for male and female individuals who had attended primary, secondary and higher education was about 3.6, 3.0, 3.0 and 3.6, 3.5, 3.2 times higher than male and female individuals who had no education, respectively. In the contrary, educational level had no a significant effect on the prevalence of the epidemic in the year 2005. On the other hand, contrary to 2005, in the year 2011, the socio-economic regression output showed that, all female individuals who are professional, trade workers, agricultural and household domestic workers had significantly lower risk of acquiring HIV as compared to respondents who are not working.

The regression output also showed that the likelihood of women being infected by the epidemic was overall statistically significantly affected by the wealth of the respondent in the year 2011, but not 2005. According to this, in the year 2011, the odds of being HIV positive for middle and richer women were about 0.32 and 0.53 times lowered than poorer women, respectively. Sex of head of household had also a significant effect on the prevalence of HIV for both men and women individuals. In this regard the odds of acquiring HIV of men in household headed by female are increased by 2.8 times as compared to the household headed by male individuals, in the same year. The other socioeconomic variables place of residence which has significant effect for increasing of risk of acquiring HIV/AIDS. However, Employment status of the respondent and media exposure of men and women had no significant effect on the prevalence of HIV. In the other hand, for male and female respondents the coefficient estimates of the socioeconomic model 2005 output revealed that the effect of respondent's occupation, current working status and educational attainment on the odds of being HIV positive were insignificant at all level of significance. On the other hand media exposure, sex of head of household and residential areas had a significant effect on the likelihood of being infected by the epidemic on female respondents.

		Male			female		
Socioeconomic factors 2011		B	sig	Exp(B)	B	sig	Exp(B)
occupation	occupation	-----	0.000	-----	-----	0.000	-----
	Professional(1)	-2.597	0.013**	0.074	-1.212	0.000***	0.298
	trade work(2)	0.123	0.700	1.131	-0.770	0.007***	0.463
	Agri.employee(3)	-0.182	0.468	0.834	-0.854	0.000***	0.426
	Household dome(4)	-1.632	0.000***	0.196	-1.296	0.000***	0.274
work	work	-----	-----	-----	-----	-----	-----
	yes(1)	-0.601	0.089*	0.548	0.072	0.730	1.075
edu	edu	-----	0.033	-----	-----	0.006	-----
	Primary(1)	1.233	0.006***	3.431	1.297	0.001***	3.659
	Secondary(2)	1.119	0.006***	3.061	1.274	0.000***	3.575
	Higher(3)	1.124	0.006***	3.076	1.170	0.002***	3.221
wealth	wealth	-----	0.038	-----	-----	0.000	-----
	Middle(1)	-0.768	0.054*	0.464	-1.117	0.000***	0.327
	Richer(2)	0.242	0.491	1.274	-0.629	0.014**	0.533
media	media	-----	-----	-----	-----	-----	-----
	Almost everyday(1)	0.419	0.063*	1.521	0.012	0.928	1.012
Sex.hh	Sex.hh	-----	-----	-----	-----	-----	-----
	Female(1)	1.052	0.009***	2.864	-0.823	0.000***	0.439
Place	place	-----	-----	-----	-----	-----	-----
	Rural(1)	1.052	0.000***	2.863	1.171	0.000***	3.224

Table 9 Socioeconomic model 2011 regression result

		Male			female		
Socioeconomic factors 2005		B	sig	Exp(B)	B	sig	Exp(B)
occupation	occupation	-----	0.740	-----	-----	0.053	-----
	Professional(1)	-0.226	0.931	0.798	-0.403	0.464	0.668
	trade worker(2)	-1.486	0.610	0.226	-0.086	0.944	0.918
	Agri.employee(3)	0.078	0.872	1.081	0.730	0.083	2.076
	Household dome(4)	-0.658	0.265	0.518	-0.138	0.818	0.871
work	work	-----	-----	-----	-----	-----	-----
	yes(1)	-2.406	0.320	0.090	-0.821	0.054	2.272
edu	edu	-----	0.136	-----	-----	0.300	-----

	Primary(1)	-0.347	0.559	0.707	1.731	0.129	5.648
	Secondary(2)	-0.936	0.113	0.392	1.940	0.087	6.956
	Higher(3)	0.134	0.791	1.144	1.673	0.138	5.331
wealth	wealth	-----	0.397	-----	-----	0.445	-----
	Middle(1)	-0.441	0.334	0.643	-0.004	0.991	0.996
	Richer(2)	0.186	0.680	1.204	-0.623	0.234	0.537
media	media	-----	-----	-----	-----	-----	-----
	Almost everyday(1)	-0.278	0.469	0.758	-0.641	0.019**	0.527
Sex.hh	Sex.hh	-----	-----	-----	-----	-----	-----
	Female(1)	0.538	0.309	1.712	-0.614	0.004***	0.541
Place	place	-----	-----	-----	-----	-----	-----
	Rural(1)	0.638	0.250	1.892	2.007	0.000***	7.443

Table 10 Socioeconomic model 2005 regression result

The general regression model annexed with this document, which includes all independent variables for both cross sectional years, was also run to visualize the general effect of independent variables and the consistency of the model on the prevalence of the epidemic. The regression output of this model reveals result that is almost consistent with the specific models (demographic, socioeconomic and cultural models) except for a small change on the magnitude and significance of the odds ratio of certain variables. For example, in the year 2011, the socio-economic model regarding educational level revealed that there was significant variation in the likelihood of acquiring HIV AIDS among individuals who attained some educational level and individuals who had no education at all. However, this variation has turned to insignificance for some of the educational levels as it shown in the general regression model output of 2011. Similarly, age at first marriage which had a significant effect on the prevalence HIV AIDS in the specific model of cultural model had turned insignificant effect in the general model.⁵

⁵ * significant at 10%; ** significant at 5%; *** significant at 1%

8. Discussion

In this thesis I have tried to broaden the understanding of how the risk of infection is linked to demographic, socioeconomic and cultural attributes at the national level. Besides, possible reasons have been suggested for the significance and insignificance of the effects of the selected socioeconomic, demographic and cultural variables on the odds of being HIV positive of the respondents. This population based cross-sectional study tried to assess factors affecting the prevalence of HIV/AIDS at country level, in Ethiopia. Hence in the next section all the explanatory variables which have been identified as a significant effect on the prevalence of HIV/AIDS at the national level will be discussed. The way of discussing will be the same as we did in the previous chapters; therefore, the explanatory variables will be categorized into three groups and analyzed separately.

As we mentioned in the theoretical background section the youngest age group is expected to rush to sex and practicing unsafe sex due to some biological and economical reasons. Parallel to these as stated on the hypothesis section these age group members are more vulnerable to HIV infection than older age groups. They have low economic status and low awareness about the epidemic and ways to protect themselves, and they may not have access to protective measures such as condoms, or are not able to afford them; hence they are easily exposed to the epidemic. In the Ethiopia context studies showed that the highest prevalence of HIV was observed in the young age group (Fontanet, et al., 1998). It is also consistent with the logistic regression result which showed that, as we expected, the young age group (15-24) was found to be highly affected by the epidemic as compared to middle and older age groups for both sexes. However, this result was not consistent in the year 2005 for both sexes in their older age group individuals.

As I discussed before, marital status of the individuals has been found to have a significant effect on the prevalence of HIV. From the theory section as I mentioned, it has two way effects on the transmission of the epidemic. Some scholars reflect that marital status has positive association with the prevalence of HIV through committing unsafe sexual intercourse (Clark, 2004). On the other hand, others studies support the idea that negative relationship exist between marital status and the prevalence of the epidemic through reduction the number of sexual partners (Glyn et al, 2001). From the logistic regression the result showed that the odds of being HIV positive are significantly higher in married and widowed/separated/divorced individuals than in those who have never married at least at 10% level of significance in both sexes and years, hence the result is inconsistent with the stated the hypothesis in Section 5.

In this study socioeconomic factors were found to be associated with the prevalence of HIV/AIDS. The variables included in this model were level of education, type of place of residence, type of occupation, wealth, sex of head of household as a proxy for women's empowerment, frequency of listening radio as a proxy of media exposure and employment status. It was found that individuals who are professionals, trade workers, agricultural workers and household domestic workers were less likely infected by the epidemic than individuals who are jobless. Among the socioeconomic variables included in the analysis part the wealth status of the respondents was the one. As described in the theory part, poverty fuelling the vulnerability of contracting HIV through migration, limited media exposure, sexual exploitation and gender inequality. Most of the time people migrate from rural to urban areas in order to look for a better job or a better opportunity. In these activities poor young men and women have participated and accounted for in large number. Since these individuals are far from their home and environment, it leads them to have casual and unsafe sex with bar ladies due to the parallel increase of commercial sex workers in these new areas (Choen 2010; R Bonnel 2000). The 2005 result showed that poverty has insignificant effect in the prevalence of HIV/AIDS for male and female individuals. This could be due to the presence of

Employment and Occupation in the same model, since these two variables are likely to be highly correlated with wealth. However, in parallel to the expectation, middle class and richer respondents were found to be less likely to be HIV positive as compared with poor respondents in the year 2011.

As it is discussed in the theory part, the impacts of education on the prevalence of HIV have two stages. For example in the early stage of the epidemic education and vulnerability of HIV among the rich people were highly correlated due to greater personal autonomy and spatial migration. However, in the later stage the prevalence rate diminished in this group through building their awareness about the epidemic. Hence, as stated in the hypothesis section, uneducated individuals experiencing higher rate of HIV infection due to their low income and inadequate information about the way to prevent the epidemic. On the other hand studies showed that a direct positive relationship exist between the prevalence of HIV and individuals educational attainments. From the 2005 regression result it was found that level of education had insignificant effect on the prevalence of HIV/AIDS among male and female respondents. However, in the year 2011, the odds of being HIV positive are significantly higher in primary, secondary and higher educational level than who have no schooling, which is inconsistent with what I expected.

Different studies showed that higher prevalence rate of HIV/AIDS is observed in urban areas compared to rural areas. This is because in urban areas there is a high prevalence of sexual networking and its related factors are highly manifested (Vyllder & Stefan, 1993). However, a contrary result was found for both cross-sectional years, i.e. the odds of being HIV positive are significantly higher in rural residents than urban residents, which is not parallel with the hypothesis that was stated in the previous section of the paper. This contradiction may be due to the fact that, the rural part of the country of Ethiopia is characterized by deep-rooted poverty and inaccessibility of health facilities that makes individuals easily susceptible for different diseases. More than this rural residents have also poor knowledge, attitude and practice regarding how to prevent themselves from the epidemic as compared to their counter parts.

9. Conclusion

In this section the research questions which were posed in this paper will be answered by reviewing the result and discussion sections. I begin with identifying the underlying determinants attribute for the prevalence of HIV/AIDS in the two periods. As I already mentioned in the result and discussion section among the underlying factors, all demographic variables have been revealed a significant effect on the prevalence of the HIV/AIDS. Age and marital status of the individuals had a significant effect on the prevalence of HIV/AIDS for both female and male individuals in both cross-sectional years of 2005 and 2011. The findings also showed that the odds of being HIV positive are higher in the age groups 15-24 and among married and divorced/widowed/separated individuals.

Regarding the socio-economic factors, unexpectedly poverty was found to have an insignificant effect on the prevalence of HIV/AIDS among male and female respondents in the year 2005. In the year 2011, unlike for male respondents poverty has been revealed to have a significant effect on the prevalence of HIV/AIDS for female individuals. Similarly significant effects were found on the socio-economic variables: respondent occupation, level of education, place of residence and sex of head of household in the year 2011 for both sexes. In general, unlike 2005 most of the socioeconomic variables were found significant in the year 2011. However, employment status of the individuals and media exposure have been found to have insignificant effect on the prevalence of the epidemic for the two periods.

Concerning cultural factors many of them have significant effect on the prevalence of HIV/AIDS at least at 10% level of significance. Age at first marriage and number of sexual partners in the last 12 months including spouse had been found to have significant effect on the prevalence of HIV/AIDS for male and female respondents in both periods. However, number of sexual partners and age at first marriage had insignificant effect for female respondent in the year 2005 and 2011 respectively.

In general demographic variables had been attributed to the prevalence of HIV/AIDS in Ethiopia during the periods 2005 and 2011. However, the remaining factors related to the prevalence of the epidemic in the two periods were different among men and women and place of residence. Unlike in 2005 most of the socioeconomic and cultural variables had been attribute to the transmission of the epidemic for the year 2011 and in both sexes.

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Annex

Table 11. HIV prevalence by demographic characteristics

Percentage HIV positive among women and men age 15-49 who were tested, by demographic characteristics, Ethiopia 2011

	Age	Women		Men		Total	
		2005	2011	2005	2011	2005	2011
	15-19	0.7	0.2	0.1	0.0	0.4	0.1
	20-24	1.7	0.9	0.4	0.2	1.1	0.6
	25-29	2.1	2.9	0.7	0.9	1.6	2.0
	30-34	1.5	3.7	1.9	1.0	1.7	2.5
	35-39	4.4	3.0	1.8	3.0	3.2	3.0
	40-44	3.1	1.9	2.8	2.1	3.0	2.0
	45-49	0.8	1.8	0.0	1.4	0.5	1.6
Total	15-49	1.9	1.9	0.9	1.0	1.4	1.5
	50-59	na	na	0.3	0.6	na	na
Total	15-59	na	na	0.9	1.0	na	na
	Marital status						
	Never married	0.5	0.7	0.2	0.3	0.3	0.5
	Married/living together	1.5	1.6	1.3	1.3	1.5	1.5
	Divorced or separated	5.0	8.1	5.9	*	5.2	8.4
	Widowed	12.0	5.6	14.5	1.9	12.2	4.7

Table 12. HIV prevalence by socioeconomic characteristics. Percentage of HIV positive among women and men age 15-49 who were tested, by socioeconomic characteristics, Ethiopia 2011.

	Women		Men		Total	
	2011	2005	2011	2005	2011	2005
Employment (last 12 months)						
Not employed	1.4	1.5	0.1	0.0	1.3	1.3
Employed	2.2	2.3	1.1	1.1	1.5	1.5
Education						
No education	1.3	1.0	0.8	0.8	1.1	0.9
Primary	2.2	2.5	0.9	0.5	1.5	1.3
Secondary	4.3	5.5	2.1	2.0	3.1	3.4
More than secondary	1.6		1.1		1.3	
Wealth quintile						
Lowest	0.5	0.3	0.2	0.7	0.3	0.5

Second	0.5	1.0	0.4	0.3	0.4	0.7
Middle	0.7	0.4	0.7	0.9	0.7	0.6
Fourth	1.5	0.2	0.5	0.4	1.0	0.3
Highest	4.9	6.1	2.7	2.2	3.9	4.3
Total 15-49	1.9	1.9	1.0	0.9	1.5	1.4
50-59	na	na	0.6		na	na
Total 15-49	na	na	1.0		na	na

Table 13. HIV prevalence by sexual behavior Percentage HIV positive among women and men age 15-49 who were tested.

Sexual behaviour	Women		Men		Total	
	2011	2005	2011	2005	2011	2005
Age at first sex						
15 or less	2.4	2.2	2.1	0.5	2.3	2.0
16-17	2.1	3.5	2.7	2.2	2.3	3.1
18-19	2.3	2.7	1.5	1.3	1.9	2.0
20+	2.6	2.2	1.1	1.3	1.5	1.5
# of sexual partner in the past 12 month						
0	6.7	5.4	2.9	2.1	5.6	4.5
1	1.6	1.9	1.4	1.2	1.5	1.6
2	22.5	*	1.9	4.2	4.3	4.6

Table 14. Blood test result

Serostatus	2005				2011			
	male		female		male		female	
	frequency	%	frequency	%	frequency	%	frequency	%
HIV negative	5378	99.1	6004	98.3	13097	99.1	15434	98.2
HIV positive	48	0.9	106	1.7	125	0.9	285	1.8
Total	5426	100	6110	100	13222	100	15719	100

Table 15. Percentage distribution of non-missing data of HIV among gender

Serostatus	2005		2011	
	male	female	male	female
	frequency	frequency	frequency	frequency
HIV negative	5378	6004	13097	15434
HIV positive	48	106	125	285
Missing value	1	1	26	15
Total	5427	6111	13248	15734
%non-missing value	100	100	99.8	99.9

Note:- similar percentage distribution was also observed among the age groups

Table 16. General model

General model for male and female in the year 2005							
variables	category	male			female		
		B	sig	Exp(B)	B	sig	Exp(B)
occupation	Not working	-----	0.835	-----	-----	0.233	-----
	Professional	2.728	0.544	15.300	-0.098	0.868	0.907
	Sales(trade worker)	-3.103	0.590	0.045	-0.077	0.963	0.926
	Agriculture worker	0.498	0.400	1.645	0.765	0.096	2.149
	Household domesti	0.036	0.962	1.036	0.069	0.914	1.071
Respondent current working	No	-----	-----	-----	-----	-----	-----
	yes	-0.327	0.405	0.721	0.800	0.080*	2.225
Education	No education	-----	0.024	-----	-----	0.015	-----
	Primary	-0.986	0.163	0.373	0.722	0.552	2.058
	Secondary	-1.124	0.108	0.325	1.580	0.189	4.854
	higher	0.427	0.465	1.465	1.419	0.234	4.131
Wealth index	Poorer	-----	0.794	-----	-----	0.497	-----
	Middle	-0.056	0.916	0.945	0.160	0.682	1.174
	Richer	0.291	0.594	1.338	-0.460	0.386	0.631
Frequency of listening radio	Not at all	-----	-----	-----	-----	-----	-----
	Almost everyday	-0.394	0.404	0.674	-0.788	0.006***	0.455
Sex of head of household	Male	-----	-----	-----	-----	-----	-----
	female	-0.525	0.397	0.591	-0.554	0.038**	0.574
Place of residence	Urban	-----	-----	-----	-----	-----	-----
	rural	0.764	0.291	2.147	2.024	0.000***	7.572
Age	15-24	-----	0.912	-----	-----	0.168	-----
	25-34	-0.355	0.676	0.701	-0.565	0.063*	0.568
	35-49(59)	-0.067	0.865	0.935	-0.289	0.280	0.749
Age at 1 st marriage	10-17	-----	0.018	-----	-----	0.013	-----
	18-29	-4.501	0.046**	0.011	-0.442	0.610	0.643
	30-54	-1.062	0.020**	0.346	-1.297	0.139	0.273
Age at 1 st sex	Not had sex	-----	0.000	-----	-----	0.430	-----
	7-17	-14.215	0.998	0.000	-16.92	0.999	0.000
	18-29	1.729	0.004***	3.853	0.090	0.715	1.094
	30-54	0.130	0.764	1.139	0.601	0.097*	1.824
# of sexual partners	0	-----	-----	-----	-----	0.377	-----
	1	-1.051	0.407	0.349	-0.433	0.770	0.649
	More than 2	-1.255	0.023**	0.285	-0.826	0.577	0.438
	constant	-2.213	0.105	0.109	-3.925	0.058*	0.020

General model for male and female in the year 2011							
variables	category	male			female		
		B	sig	Exp(B)	B	sig	Exp(B)
occupation	Not working	-----	0.001	-----	-----	0.000	-----
	Professional	-1.043	0.383	0.352	-1.138	0.000***	0.320
	Sales(trade worker)	0.087	0.809	1.091	-1.685	0.000***	0.185
	Agriculture worker						0.376
	Household domesti	-0.172	0.528	0.842	-0.977	0.000***	0.298
		-1.511	0.000***	0.221	-1.212	0.000***	
Respondent current working	No	-----	-----	-----	-----	-----	-----
	yes	-0.327	0.405	0.721	0.388	0.095	1.474
Education	No education	-----	0.018	-----	-----	0.000	-----
	Primary	0.761	0.143	2.141	-0.176	0.697	0.838
	Secondary	1.234	0.009***	3.436	0.521	0.233	1.683
	higher	1.177	0.013**	3.243	0.874	0.053**	2.397
Wealth index	Poorer	-----	0.042	-----	-----	0.000	-----
	Middle	-0.688	0.105	0.503	-1.208	0.000***	0.299
	Richer	0.365	0.339	1.440	-0.567	0.033**	0.567
Frequency of listening radio	Not at all	-----	-----	-----	-----	-----	-----
	Almost everyday	0.576	0.020**	1.778	0.001	0.997	1.001
Sex of head of household	Male	-----	-----	-----	-----	-----	-----
	female	0.582	0.221	1.790	-0.594	0.001***	0.552
Place of residence	Urban	-----	-----	-----	-----	-----	-----
	rural	1.045	0.001***	2.843	1.124	0.000***	3.078
Age	15-24	-----	0.001	-----	-----	0.000	-----
	25-34	-2.819	0.024**	0.060	-1.223	0.000***	0.294
	35-49(59)	-0.767	0.001***	0.464	0.514	0.001***	1.672
Age at 1 st marriage	10-17	-----	0.113	-----	-----	0.230	-----
	18-29	-0.838	0.077	0.433	0.477	0.584	1.611
	30-54	-0.158	0.656	0.854	0.852	0.327	2.345
Age at 1 st sex	Not had sex	-----	0.000	-----	-----	0.359	-----
	7-17	-14.289	0.998	0.000	-17.13	0.997	0.000
	18-29	1.349	0.004**	3.853	-0.072	0.812	0.931
	30-54	0.130	0.764	1.139	-0.492	0.134	0.612
# of sexual partners	0	-----	0.704	-----	-----	0.000	-----
	1	0.093	0.853	1.097	-2.224	0.000***	0.108
	More than 2	-0.213	0.615	0.808	-2.836	0.000***	0.059
	constant	-3.925	0.000	0.020	-0.313	0.770	0.731