

A LOGISTIC REGRESSION TO IDENTIFY KEY DETERMINANTS OF  
HIV/AIDS KNOWLEDGE, RISK PERCEPTION AND CONDOM USE  
AMONG YOUNG PEOPLE AGED 15-24 YEARS IN KENYA

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Master of Science in Medical Statistics at the University of Nairobi-Institute of Tropical and  
Infectious Diseases (UNITID)

**DECLARATION**

This proposal is my original work and has not been presented for a degree in any other university.

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**CERTIFICATION BY SUPERVISOR**

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## **LIST OF ABBREVIATIONS**

AIDS	Acquired Immunodeficiency Syndrome
EPSEM	Equal Probability Selection Method
HIV	Human Immunodeficiency virus
IDUs	Injecting Drug Users
KAIS	Kenya AIDS Indicator Survey
KDHS	Kenya Demographic and Health Survey
KNBS	Kenya National Bureau of Statistics
MSM	Men who have sex with men
NACC	National AIDS Control Council
NASSEP V	National Sample Survey and Evaluation Programme
PWID	People who inject drugs
STIs	Sexually Transmitted Infections
UNAIDS	Joint United Nations Programme on HIV/AIDS

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## **ABSTRACT**

In 2014, Joint United Nations Programme on HIV/AIDS (UNAIDS) estimated that 36.9 million people are living with HIV in the world. In that same year, there were 106 000 new infections in Kenya where 38% of the new infections were among youth aged 15-24 years. Consistent and correct use of condoms has been shown to be the single most effective means of preventing transmission of HIV and other sexually transmitted infections (STIs) among sexually active individuals. A study conducted in Kenya, revealed that comprehensive HIV knowledge increased from 9% in 1993 to 54% in 2008/09. As of 2014, only 30% and 37% of young women and young men, respectively, have comprehensive knowledge on HIV globally. In addition, only 40% of young women used condoms during their last sexual encounter as compared to 59% of young men.

Currently, there are few up-to date studies on sexual behaviour, risk perception and knowledge of HIV especially in Kenya. As such, objectives of the study is to analyse the determinants of condom use among young people in Kenya while identifying the socioeconomic, cultural, biological, and behavioural factors influencing condom use

A total of 2078 young people between the ages of 15-24 years were included in the study.

Kenya AIDS Indicator Survey (KAIS) 2012 was utilized, which is a nationally representative population-based survey.

Descriptive statistics was performed to determine the characteristics of the sample used.

Multivariate logistic regression was used to determine the factors influencing risk perception and condom use. Multivariate analysis revealed that number of sexual partners, having received money, gifts or favours in exchange for sex; female gender; and history of STI symptoms were significantly associated with risk perception. Knowing where to get

condoms, number of lifetime sexual partners, marital status and level of education were significantly associated with having ever used a condom.

## **1.0 BACKGROUND INFORMATION**

In 2014, UNAIDS estimated that 36.9 million people are living with HIV in the world. [1] In the same year, 2 million people became newly infected with HIV and 89% of these were older than 14 years. Since 2000, an estimated 38.1 million have acquired HIV and there have been 25.3 million AIDS-related deaths.

In 2013, HIV prevalence for sub-Saharan countries was estimated to be 4.7%. [2] Prevalence for the various countries varies greatly with some as high as 27.4% in Swaziland and as low as 0.5% in Senegal. [2] Of the 36.9 million people living with HIV, 70% are in sub-Saharan Africa. More than half of the number of people living with HIV in sub-Saharan Africa is women. Number of new infections and AIDS-related deaths in sub-Saharan Africa has gone down by 41% between 2000 and 2014, and 48% in the last ten years respectively. [1]

Most sub-Saharan countries experience a generalized epidemic. However some groups are at higher risk of acquiring HIV. These are referred to as key populations. Key populations in sub-Saharan Africa include young women, children, sex workers, men who have sex with men (MSM) and people who inject drugs (PWID). HIV prevalence in young women in Mozambique is 7% for those between 15-19 years and rises to 15% in the 25-year olds. Similarly in Lesotho, prevalence of girls aged 15-19 years is 4% and rises to 24% in young women aged 20-24 year-olds. [3]

### **1.1 HIV in Kenya**

Ever since the first case of HIV in Kenya was diagnosed in 1984, the epidemic has grown to be one of the major causes of death in the country. [4] In 2012, 5.6% of Kenyans were living with HIV, a significant decline from 7.2% in 2007. [5] Like many other sub-Saharan countries, prevalence is higher among women (6.9%) as compared to that of men (4.4%).

This was especially alarming in young women aged 20-24 year old whose HIV prevalence was 3 times that of young men (4.6% vs. 1.3%). There were 106 000 new infections in Kenya where 38% of the new infections were among youth aged 15-24 years. Majority of the new infections occurred in persons aged 25-34 years. Prevalence in young women aged 15-24 years has declined significantly over the last one decade unlike prevalence in young men. In 2003 3% and 9.2% of adolescent girls and young women, respectively, had HIV while 0.4% and 2.4% of adolescent boys and young men had HIV in the same time period. [5] HIV prevalence was almost six-times greater among uncircumcised men as compared to their circumcised counterparts (16.9% vs. 3.1%).

Kenya has both a generalized and concentrated epidemic [5] where the epidemic is spread out in the general population with higher prevalence among the key populations. HIV prevalence among injecting drug users (IDUs) and men who have sex with men (MSM) is each three times greater than that of the general population, while that of sex workers is 5 times greater. Heterosexual transmission remains to be the main mode of HIV transmission in Kenya. [6] There are several heterosexual partnerships where HIV can be transmitted, namely between married partners, steady sexual partners, concurrent sexual partners where one person may have two steady partners or one steady partner and a casual partner.

Over the years, behaviour change information, education and communication has focused on abstinence, delayed age-at-first-sex, faithfulness in relationships, consistent condom use and indulging in safer sex. [6] Others include male circumcision and reduction of the number of partners. Despite the numerous behaviour change campaigns over the past few years, condom use is still low. At the time of the KAIS 2012, only 7.1% and 27.1% of women and men had used condoms with sexual partners of unknown HIV status in the past one year. In addition, only 22.5% of women and 33.2% of men reported using condoms in casual relationships. A small proportion of men (0.6%) reported ever having sex with another man and 1.8% of

people interviewed had ever had anal sex. In regards to transactional sex, 4.4% and 3.1% of women and men had engaged in some form of transactional sex.

Consistent and correct use of condoms has been shown to be the single most effective means of preventing transmission of HIV and other sexually transmitted infections (STIs) among sexually active individuals. [7]

## **1.2 Problem statement**

As the number of deaths decline globally, number of deaths among adolescents has gone up by 50% between 2005 and 2013. [8]A study conducted in Kenya, revealed that comprehensive HIV knowledge increased from 9% in 1993 to 54% in 2008/09. As of 2014, only 30% and 37% of young women and young men, respectively, have comprehensive knowledge on HIV globally. [9] In addition, only 40% of young women used condoms during their last sexual encounter as compared to 59% of young men.

Currently, there are few up-to date studies on sexual behaviour, risk perception and knowledge of HIV especially in Kenya. According to the latest KAIS result, HIV prevalence among adolescent girls and boys between the ages of 15 to 19 is 1.1 and 0.9 respectively. [5] The prevalence increases four-fold to 4.4 in young women aged 20-24 years while that of young men of the same age group increases to 1.3.

## **1.3 Justification**

Extent of individual perception of risk of contracting a disease, awareness of ways to prevent infection, belief that prevention is more beneficial as compared to the cost and belief in the effectiveness of the preventive measures influences change of behaviour. [6] Use of condoms remains to be the single most effective means of preventing transmission of HIV and other sexually transmitted infections (STIs) among sexually active individuals. [7]However, overall

use of condoms remains to be low (Lucea). There is need to understand these factors that influence young people to use condoms to prevent themselves from acquiring HIV. This is especially important for coming up with effective policies and strategies to address HIV among adolescents, more needs to be done to understand the sexual behaviour among adolescents and the factors that influence them. [11]

Governments committed themselves, in 2001, to ensure that at least 90% of young people would be able to ways in which HIV is transmitted and how it can be prevented by 2005. [12] Now, a decade later, comprehensive knowledge among young people across the world lies below 50%, and is even lower among young women and girls. This has translated to low level of condom use among young people with steady (married or in a committed relationship) or casual partners.

The association between an individual's perception of risk and their willingness to use condoms is yet to be fully understood. [13] Perception of risk is the motivating factor for change of behaviour. [14] Individuals who perceive themselves to be at high risk of contracting HIV are more likely to adopt preventive measures like use of a condom during sexual intercourse while those who do not feel at risk are more likely to adopt high-risk behaviour. Rational HIV risk perception has great implications towards health if they lead towards non-risky behaviour. Therefore there is great need to assess the perceptions of youth about HIV infection in order to understand how young people relate their sexual behaviour to the risk of infection. [15]

## **1.4 Objectives**

### *1.4.1 Broad objective*

To determine the factors influencing risk perception and condom among Kenyan youth aged 15-24 years

#### *1.4.2 Specific objectives*

1. To determine the level of HIV knowledge among Kenyan youth aged 15-24 years
2. To determine the level of perceived risk of HIV among Kenyan youth aged 15-24 years
3. To determine the level of condom use among Kenyan youth aged 15-24 years
4. To determine factors influencing risk perception on condom use among Kenyan youth aged 15-24 years

#### **1.5 Research questions**

1. What is the level of HIV knowledge among Kenyan youth aged 15-24 years?
2. Do Kenyan youth aged 15-24 years perceive themselves to be at risk of contracting HIV?
3. Do Kenyan youth aged 15-24 years use condoms?
4. What are the factors that influence risk perception and condom use among Kenyan youth aged 15-24 years

#### **1.6 Hypothesis**

##### *1.6.1 Null hypothesis*

1. There is no relationship between level of HIV knowledge and condom use among Kenyan youth aged 15-24 years
2. There is no relationship between risk perception and condom use among Kenyan youth aged 15-24 years

### *1.6.2 Alternate hypothesis*

1. There is a relationship between level of HIV knowledge and condom use among Kenyan youth aged 15-24 years
2. There is a relationship between risk perception and condom use among Kenyan youth aged 15-24 years

## **2.0 LITERATURE REVIEW**

### **2.1 HIV knowledge, risk perception and HIV/AIDS knowledge among young people and adolescents**

#### *2.1.1 HIV knowledge*

Research has shown has identified a host of factors that affect condom use among young people. A cross-sectional survey carried out among high school students in South Korea revealed that level of HIV/AIDS knowledge was very low. [16] Only 50.2% of students had correct facts when asked about HIV transmission via kissing and 59.4%, 57.4%, 60.5% answered correctly when asked about toilets, cup sharing and daily school life respectively.

Boys were almost three times more likely to be sexually active as compared to girls.

However, the boys were less likely to use condoms as compared to the girls. Only 39% of the boys used a condom during their last sexual encounter and only 35.3% reported ever using a condom as compared to more than half of the girls.

Strong determinants of comprehensive HIV knowledge in Kenya include education level, history of testing for HIV, knowing someone with HIV and having a small or moderate to great risk perception. [17] In the study carried out using Kenya Demographic and Health Survey (KDHS) 2008/09 data, more than half of the young Kenyan women residing in urban residence had comprehensive HIV knowledge. Results show that young women with primary education and at least secondary education were approximately 5 and 10 times more likely to have comprehensive HIV knowledge as compared to their non-educated counterparts when effects of other variables was controlled for. As compared to those from poor households, young women who were from medium and rich households were 1.6 and 2.6 times more likely to have comprehensive HIV knowledge. Young women who had been tested previously for HIV were 50% more likely to have comprehensive HIV knowledge as

compared to those who had never been tested. Similarly knowing someone with HIV increased chances of having comprehensive HIV knowledge by approximately 50%.

A study carried out on public university students in Tanzania revealed that awareness of HIV is high among university students (100%). [18] Majority (92.7%) of the students knew or had seen someone who had or had died of HIV. Of the students interviewed, 35.9% felt that they had low risk of contracting HIV while 23.2% and 6.7% felt that they had moderate and great risk of contracting HIV respectively. 13.4 % of the students felt that they were not at any risk of contracting HIV. Most of the students rejected the common misconception that a healthy looking person can have HIV while lesser numbers rejected the other two misconceptions that HIV can be contracted by sharing food with a HIV-infected person or via mosquito bites. Higher levels of education and residing in urban areas were more likely to have comprehensive knowledge of HIV. Students who believed that HIV/AIDS exists were less likely to be involved in risky sexual behaviour whereas students with a perception of high risk were likely to engage in high risk sexual behaviour. Those students who knew or had seen someone with or had died with HIV were less likely to indulge in risky sexual behaviour.

Lack of knowledge on the effectiveness of condoms in preventing HIV transmission and low-risk perception are vital predictors for condom use. [19]

### *2.1.2 HIV Risk perception*

Prata et al carried out a study on 15-24 year olds in Mozambique to compare their perception of HIV risk to assessment of their risk based on history of sexual behaviour. [20] Overall, 53% of men and 46% of women predicted their risk level accurately. Young people who correctly predicted their risk level were more likely to use condoms as compared to those who predicted wrongly. Of the women interviewed, 32% felt that they were at no or low risk

of HIV, 22% felt that they were had moderate or high risk while 46% could not assess their risk level. Based on current and sexual behaviour, 27% of those who felt they were low risk and 23% of those who did could not assess their risk level were actually at moderate to high risk. In the same study, 38% of the men felt that they were at no or low risk, 46% felt they were at moderate or high risk, while 17% could not assess their risk. This is alarming 80% of those who felt that they had no or low risk and 92% of those who did not know how to assess risk were shown to have moderate to high risk of HIV.

### *2.1.3 Condom use*

According to Prata et al, increased age, residing in urban areas, history of STI symptoms, level of education, having known someone with HIV and having used testing and counselling services were all positively associated with condom use.[20]

Education, residing in urban areas, sex in non-union, positive attitude towards condoms, increased confidence in negotiating condom use and self-efficacy were all positively associated with condom use. [11] Likelihood of condom use by male adolescents who felt confident that they knew how to use a condom was 27 times greater than that of males who did not express confidence in how to use a condom. Among the male adolescents, positive attitude towards use of condoms did not have any effect on whether they used condoms at last sex. Contrary to this, positive attitude to use of condoms among the females increased the likelihood of using condoms. Female adolescents who had sex with their cohabiting partners were less likely to use condoms as compared to those who had sex with their boyfriend or a casual partner. Adolescents in rural areas were half as likely to use condoms as compared to their urban counterparts. The likelihood of using condoms increased with years of schooling among all the adolescents.

A study conducted among Ugandan adolescents aged between 12 and 19 years revealed that just over half of the adolescents had ever used a condom. [21] The adolescents were highly aware of HIV preventive measures. They scored highly in correct knowledge of condom use though majority of them had a negative attitude towards condoms. Correct knowledge on the use of condoms was the strongest predictor of ever using a condom. Adolescents with higher levels of HIV knowledge on prevention were more likely to have ever used a condom. Those who knew someone with HIV were twice more likely to have ever used a condom. Positive attitude is motivating factor for condom use. Those with a positive attitude were more likely to have ever used a condom.

Most common reason for use of condoms by Thai youths was prevention of pregnancy while a small proportion use condoms to prevent STIs. [13] In this study by Haque et al less than half of the youths used condoms with temporary partners. Majority of the youth were not using condoms. Unmarried youths were more likely to use a condom. Marital status, household wealth, place of residence, access to television and radio, and type of partner were also associated with how youth perceived their risk level.

A study conducted in Uganda to assess risk perception and condom use revealed that condom use, religion, level of education, marital status, place of residence, cumulative number of partners and history of having a STI were all associated with HIV risk perception. [22] Those who had a high risk perception were those who did not use condoms; those living in rural areas, having engaged in sex for exchange of money, gifts or favours; having ever discussed sex. People who consider themselves to be at risk of contracting HIV mistrusted their partners, had many sexual partners or had undergone blood transfusion. Post-primary education and residing in an urban setting were the strongest predictors for condom use. Those who did not consider themselves to be at risk of contracting HIV were less likely to

use condoms. Similarly people who have no history of a STI were also less likely to use condoms.

A study carried out in Nigeria revealed that despite numerous HIV awareness campaigns, level of HIV knowledge among young people remains low. [23] Generally, young people were aware about HIV and other STIs. However, very few could identify sources of infection, modes of transmission, or signs and symptoms.

A study conducted in Laos shows that sexually active adolescents have poor knowledge on HIV and STIs. [24]A good number of the adolescents could not reject common misconceptions relating to HIV transmission. For example, almost 80% thought one could not get HIV if their washed their genitals after sex. About 33% of the adolescents thought that a person cannot get HIV when they are taking antibiotics. More than half (58.4%) felt they were at no risk of contracting HIV with females feeling more at risk. Increased HIV and STI knowledge; and being male were all associated with perceived risk of getting HIV.

An 18-year follow-up carried out in France revealed that young people were conversant with the various means of HIV transmission. [25] However only 50% believed condoms could protect against HIV in 2010 as compared to 70-80% in 1992-1994. Condom use at last sex was considerably low in 2010.

A study carried out in South Africa [26] among married couples revealed that there is high level of condoms and where to get them, very few reported consistent or occasional use. More educated men and women living in urban areas were more likely to use condoms as compared to their less educated counterparts living in rural areas.

### **3.0 METHODOLOGY**

#### **3.1 Study design**

This was a secondary data analysis and the study design was a cross-sectional survey carried out in 2012 using a population-representative sample. The study utilized the latest Kenya AIDS Indicator Survey (KAIS) 2012 data.

#### **3.2 Study area description**

The study will be nationally representative. Kenya as of 2014 had 45 million people. Majority of this population is less than 15 years (42.1%), 15-24 year olds represent 18.7% of the population, and 25-54 years represent 32.8%. Median age is 19.1 years, 18.9 years among the males and 19.2 years among the females. The sex ratio is one male to one female on average. The life expectancy at birth is 63.52 years. In 2014, there were 1.6 million people living with HIV 57500 AIDS-related deaths.

Kikuyu ethnic group makes up 22% of the Kenyan population followed by Luhya (14%), Luo (13%), Kalenjin (12%) and Kamba (11%). Christianity is the predominant religion in Kenya with approximately 47.4% being protestants, 23.3% are catholic and others (11.8%). Eleven percent (11%) of the population is Muslim while 1.7% of the total population are traditionalists. English and Kiswahili are the official languages. The school life expectancy is 11 years.

Data was collected from 9 out of 10 National AIDS and STI Control Programme (NASCO) programmatic regions. These included Central, Coast, Eastern North, Eastern South, Nyanza, Nairobi, Upper Rift, Lower Rift and Western regions. North Eastern region was excluded due to regional insecurity.

### **3.3 Study population**

This study was targeting young people 15-24 year old living in Kenya.

### **3.4 Inclusion/Exclusion criteria**

#### *3.4.1 Inclusion criteria*

The participant had to be between 15-24 years

The observation had to have ever had sexual intercourse

The KAIS 2012 inclusion criteria:

- All household residents aged 18 months to 64 years who had been present at the survey-eligible household the night before the survey
- Emancipated minors (married, pregnant or with children) also included

#### *3.4.2 Exclusion criteria*

Persons aged 25 years and above were not be included in the study.

Those who had never had sexual intercourse were excluded from the study

KAIS 2012 exclusion criteria included:

- Adults or children with cognitive or hearing disabilities

### **3.5 Data source**

Data for this secondary data analysis was extracted from the KAIS database which included information of all individuals interviewed including all the variables e.g. age, sex, education level among other variables required for this analysis.

Sample size

There were a total of 2793 young people who were included in the study based on the inclusion/exclusion criteria

### **3.6 Kenya AIDS Indicator Survey (KAIS)**

The KAIS is a nationally representative population-based survey of children, adolescents and adults aimed at providing a standardized tool for monitoring HIV programs in the country.

Aim of the KAIS is to collect data on knowledge, attitudes, and behaviours regarding HIV/AIDS; estimate HIV prevalence and incidence and; estimated the coverage and unmet needs of HIV services.

KAIS 2012 utilized National Sample Survey and Evaluation Programme (NASSEP V) sampling frame which is a household-based sampling frame developed and maintained by the Kenya National Bureau of Statistics (KNBS). The sample design is a conventional two-stage cluster sample survey which is representative at the national level and for both urban and rural areas. In the first stage, 372 KAIS clusters were selected from 5630 clusters using equal probability selection method (EPSEM). The second stage entailed a random selection of an average of 25 households per cluster from the list of households in that cluster using systematic random sampling method.

Data collection personnel had been trained for the KAIS 2012 through didactic presentations, small group discussions, and practical sessions such as mock interviews. Research assistants were trained on eligibility criteria, ethics and informed consent, completion of questionnaires, interviewing techniques and use of notebooks to collect data.

The KAIS 2012 data was collected using household questionnaires, individual female and male questionnaires for adults and adolescents aged 15-64 years, and a child questionnaires for children between 10 and 14 years. Questionnaires were administered in Kiswahili,

English and 11 local languages. Collected was collected via one-on-one interviews and captured via portable netbook computers. Data has since been made publicly available.

### **3.7 Variables**

#### **Outcome variable:**

Condom use: this was measured by 'Ever used a condom' and was recorded as either Yes or No

#### **Explanatory variables:**

**Age:** This was recorded as a continuous variable i.e. age at last birthday

**Sex:** Recorded a binary variable and was recorded as either Male or Female

**Highest level of education** was categorized into Nursery/Kindergarten, Primary, Post-primary/Vocational, Secondary 'O' level, Secondary 'A' level, College (middle level, certificate or diploma), University, Postgraduate or Do not know

**Religion** was categorised as Roman Catholic, Protestant/Other Christian, Muslim, No religion or Other

**Marital status** was categorised as either Ever-married or Never-married

**Age at first sex:** recorded as a continuous variable in years

**Knowledge of HIV:** this will be assessed using various questions asked during the survey

1. Ever heard of an infection, the virus that causes AIDS: recorded as either Yes or No

2. If a man/woman has HIV, their partner always has HIV: recorded as either Yes, No or Do not know
3. Is it possible for a healthy-looking person to have HIV: recorded as Yes, No or Do not know
4. A HIV positive mother can transmit HIV to baby during pregnancy: recorded as Yes, No or Do not know
5. A HIV positive mother can transmit HIV to her baby during delivery: Yes, No or Do not know
6. A HIV positive mother can transmit HIV to her baby during breastfeeding: Yes, No or Do not know
7. Awareness that there are drugs that a HIV positive woman can be given to reduce transmission to her baby: Yes, No or Do not know
8. Awareness that there are drugs people living with HIV can take to help them live longer: Yes, No or Do not know

**Risk perception** was categorized as No risk, Small risk, Moderate risk or Great risk. Risk perception was recoded to a binary outcome. Those who felt they were at no risk and low risk were grouped together while moderate and great risk was grouped together.

**Knowledge on source of condom:** Recorded as Yes or No

**History of STI symptoms:** measured by history of abnormal discharge from vagina or penis in the last 12 months: recorded as Yes, No or Do not know

**Number of cumulative sexual partners:** Recorded as the number of sexual partners

### **3.8 Data management**

Cleaning and analysis of data was done using Stata version 13. Cleaning involved the checking and cleaning of the data in terms of missing values, duplicate records, internal inconsistencies, and recording, renaming and generating new variables.

### **3.9 Data analysis**

#### *3.9.1 Descriptive statistics*

Descriptive statistics were used to indicate the number and percentage of young people in the various categories of the explanatory variables. Mean and confidence intervals were obtained for the continuous variables. Chi square will be performed to compare the proportions of young people, within and across sub groups, who correctly assessed their risk and proportions who reported condom use at last sex.

#### *3.9.2 Univariate and multivariate Logistic regression model*

To determine the factors influencing use of condoms, logistic regression was used. Initially the relationship between condom use and each of the explanatory was assessed using the simple logistic model. Further analysis was performed using a multivariate Logistic regression model. An adjusted Logistic model was also used where only the variables found to be significantly associated during univariate analysis were included.

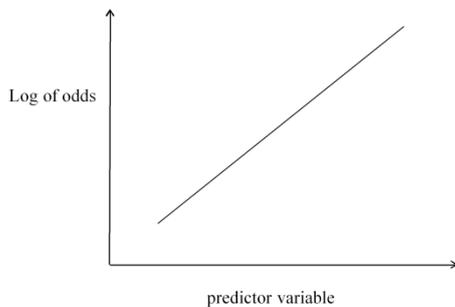
### 3.9.2.1 Logistic regression

Logistic regression is used to model dichotomous outcome variables. It is called the logit model where the log odds of the outcome is modelled as a linear combination of the explanatory variables. Binary logistic regression is a type of regression where a response variable with two categories is related to a set of explanatory variables which can be discrete and/or continuous. In this study, the binary response variable was 'Ever used a condom' which was either Yes or No.

A simple logistic regression model with only predictor

$$\text{logit } p_i = \ln \left[ \frac{p_i}{1 - p_i} \right] = \beta_0 + \beta_1 x_i$$

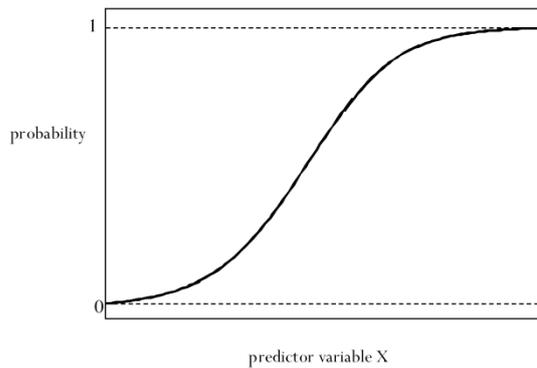
This model gives the following curve:



The model is equivalent to

$$p_i = (e^{\beta_0 + \beta_1 x_i}) / (1 + e^{\beta_0 + \beta_1 x_i})$$

This model gives the curve:



This curve is not linear. Therefore to get a linear model we model the odds of an event occurring where

$$\log \text{ of event} = \frac{p}{1-p}$$

The multivariate logistic model where we have more than one explanatory variable is

$$\text{logit } p_i = \ln \left( \frac{p_i}{1-p_i} \right) = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} + \dots + \beta_k X_{ik}$$

Where  $X_1, X_2, \dots, X_k$  are the predictor variables like age at last birthday, sex, religion, highest level of education etc.  $\beta_0, \beta_1, \dots, \beta_k$  are the unknown regression parameters determined running a model using the statistical software. The  $\beta$  indicates the amount of change in the outcome variable expected for each unit change in the explanatory variables when all the other predictors are held constant. Interpretation is similar to that of the simple logistic regression model. The odds ratio obtained from the multivariate logistic regression is an adjusted odds ratio because when assessing the effect of one explanatory variable all other variables are kept constant.

Checking significance of the model

To determine whether the fitted model is a good fit, we can compare the fitted model to either the null model or the saturated model.

Comparing the fitted model to the saturated model, we test the hypothesis

$H_0$ : the fitted model is a better fit

$H_1$ : the saturated model is a better fit

We use the deviance statistic as the test statistic. Large values of the deviance statistic indicate a poor fit. A small p-value also indicates a poor fit because we are aiming to fail to reject the null hypothesis.

Comparing the fitted model to the null model, we test the hypothesis

$H_0$ : the null model is the better fit

$H_1$ : the fitted model is the better fit

The null deviance statistic is the test statistic used in this case. Large values indicate a good fit. We are aiming at rejecting the null hypothesis.

### **3.10 Ethical considerations**

This study was approved by University of Nairobi Institute of Infectious and Tropical Diseases (UNITID). A copy of this report will be submitted to UNITID in accordance with Institutional Review Board guidelines for conducting health research.

In this study, secondary data from the KAIS 2012 was utilized hence informed consent was not obtained. The KAIS data is currently in public domain. However, during the survey, all participants had to provide verbal informed consent before being included in the study. For participants less than 18 years, parental or guardian consent and minor assent were required before inclusion in the survey.

### **3.11 Limitations**

The study was based on the KAIS 2012 which is the latest KAIS. Another limitation is that the variables and information contained in this data set are limited. Other variables not collected during the KAIS could have added value to the study.

Estimates obtained from sample surveys are affected by both sampling and non-sampling errors. Non-sampling errors are those that result from mistakes done during planning, data collection and data processing. KAIS made numerous efforts to minimize this error during the survey. Sampling errors are due to using a sample instead of the whole population. KAIS made efforts to minimize bias in sampling.

## 4.0 RESULTS

### 4.1 Demographic characteristics

A total of 2798 young people aged between 15-24 years were included in the study. There were 1090 (38%) young men as compared to 1708 young women. Mean age of the young people was 20.8 years (20.7-20.9years). Mean age of the men was 20.5years while that of the young women was 21years. Majority (70.4%) of the young people were between 20-24 years while 29.6% were in the 15-19 years age-group. Young people from the Luhya ethnic tribe were the majority (16.88%) followed by Kikuyu (14.66%), Luo (13.91%), other tribes (11.33%) and Kalenjin (11.08%).

Majority of the young people (36%) interviewed had primary education as the highest level of school completed. Twenty-eight percent of the young people had attained secondary 'O' level education, 6.39% had attained college education whereas only 1.95% had achieved university or post graduate education. More than half (62%) of the young people were Protestants while 22.27% were Catholic and 10.33% were Muslims.

Table 1: Frequency distribution of respondents by selected background characteristics

	Frequency	Percentage
Ever used a condom		
Yes	1096	39.2
No	1702	60.8
Socioeconomic factors		
Sex of respondent		
Male	1090	39.0

Female	1708	61.0
Age category		
15-19 years	827	29.6
20-24 years	1971	70.4
Ethnic tribe		
Embu	22	0.79
Kalenjin	310	11.1
Kamba	225	8.04
Kikuyu	410	14.7
Kisii	228	8.2
Luhya	473	16.9
Luo	389	13.9
Maasai	55	2
Meru	125	4.5
Mijikenda	186	6.7
Somali	13	0.5
Taita/Taveta	33	1.2
Swahili	12	0.4
Other	317	11.3
Highest level of education		
Nursery/Kindergarten	195	7.6
Primary	927	36.1
Post-primary/vocational	49	1.9
Secondary/ O level (Form 1-4)	740	28.8
Secondary/A level (Form 5-6)	6	0.23
College (middle level, certificate or diploma)	164	6.4
University	48	1.87
Postgraduate	2	0.08
Do not know	435	17

Religion		
Roman Catholic	623	22.23
Protestant/other Christian	1746	62.31
Muslim	290	10.35
No religion	96	3.43
Other	47	1.68
Marital status		
Ever married	1362	48.61
Never married	1440	51.39

## 4.2 HIV Knowledge

Majority (98.71%) of young people interviewed had heard about HIV or AIDS. Only less than 2% had never heard of HIV or AIDS. Close to half of the young people interviewed felt that if a man/woman had HIV, their partner would always have HIV. An equal number disagreed with the statement, while 5% did not know. Majority of young people (88%) interviewed agreed that a healthy looking person could have HIV, while 8% disagreed with the statement while 4% did not know.

Of the young men, only 45%, 73% and 87% knew that a HIV positive mother could transmit HIV to her baby during pregnancy, delivery and breastfeeding respectively. Eighty-nine percent (89%) of young people had heard about antiretroviral drugs (ARVs) while 10% had never heard of ARVs.

Table 2: HIV knowledge among young people aged 15-24 years in Kenya

	Frequency	Percentage
Heard of HIV virus that causes AIDS		
Yes	2763	98.71
No	36	1.29
If man/woman has HIV, the partner must always have		
Yes	1309	47.38
No	1305	47.23
Do not know	149	5.39
A healthy-looking person can have HIV		
Yes	2438	88.24
No	227	8.22
Do not know	98	3.55
A HIV positive mother can transmit the virus to her baby during pregnancy*		
Yes	484	44.73
No	523	48.34
Do not know	75	6.93
A HIV positive mother can transmit the virus to her baby during delivery*		
Yes	795	73.48
No	217	20.06
Do not know	70	6.47
A HIV positive mother can transmit the virus to her baby during breastfeeding*		
Yes	940	86.88
No	80	7.39
Do not know	62	5.73
Are there drugs that a doctor/nurse can give to a woman infected with HIV to reduce the transmission to the baby		
Yes	1753	67.58
No	384	14.80
Do not know		

	457	17.62
Heard of ARVs		
Yes	2459	89
No	271	9.81
Do not know	33	1.19

### 4.3 Risk perception

Majority (39.63%) of the young people felt they were at small risk of getting HIV while 31% felt they were at no risk of HIV. Only a small proportion (6%) felt that they had great risk of getting HIV, less than 1% already had HIV while 12% could not assess their risk level.

Eighty-two percent (82%) of the young men felt that they were at no or low risk of HIV. An almost similar proportion of young women felt that they were at no or low risk of HIV. Sex has no association with perceived risk.

On univariate logistic regression number of lifetime partners, religion, ethnic group, having ever used a condom, condom use at first sex and having a history of abnormal discharge in the last 12 months were all statistically associated with risk perception. When fitted in a multivariate logistic model only number of lifetime partners; female gender; having received gifts or favours in exchange for sex; and history of abnormal discharge in the last 12 months were significantly associated with risk perception. Number of lifetime partners and female gender were the strongest predictors for risk perception.

Young people with a higher number of cumulative partners are likely to perceive themselves to be at high risk of contracting HIV. Females were 70% more likely to perceive themselves as having moderate to great risk of HIV as compared to men. Young people who had not received money, gifts or favours in exchange of sex were 48% less likely to feel at moderate or great risk of HIV as compared to those who had. Those without history of STI symptoms

as measured as having an abnormal discharge from the penis/vagina in the last 12 months were 44% less likely to assess themselves as having moderate to great risk.

Table 3: Factors influencing risk perception among young people aged 15-24 years in Kenya

	$\beta$	Significance	(Exp $\beta$ )	95% Confidence interval	
				Lower limit	Upper limit
Constant					
Age	0.0108896	0.136	1.068	0.98	1.165
Socioeconomic factors					
Sex of respondent	0				
Male	0.5276597	0.000	1.702	1.287	2.251
Female					
Age category					
15-19 years	0				
20-24 years	-.3639052	0.111	0.695	0.444	1.087
Ethnic tribe					
Embu	0				
Kalenjin	1.213626	0.259	3.366	0.409	27.675
Kamba	.9986106	0.356	2.715	0.326	22.623
Kikuyu	1.328057	0.214	3.774	0.465	30.639
Kisii	1.710679	0.111	5.533	0.673	45.461
Luhya	1.63515	0.125	5.130	0.634	41.493
Luo	2.054616	0.054	7.804	0.963	63.242
Maasai	1.775131	0.134	5.901	0.579	60.105
Meru	1.279688	0.241	3.596	0.423	30.588
Mijikenda	1.737165	0.112	5.681	0.668	48.336

Somali	1.129531	0.489	3.094	0.126	75.873
Taita/Taveta	2.103925	0.068	8.198	0.858	78.333
Swahili	-	-	-	-	-
Other	1.427563	0.191	4.169	0.490	35.455
<b>Highest level of education</b>					
Nursery/Kindergarten	0				
Primary	-.1007919	0.669	0.904	0.57	1.434
Post-primary/vocational	.2403953	0.586	1.272	0.535	3.021
Secondary/ O level (Form 1-4)	-.1765838	0.476	0.838	0.516	1.361
Secondary/A level (Form 5-6)	-	-	-	-	-
College (middle level, certificate or diploma)	-.5919355	0.078	0.553	0.286	1.069
University	-.1347989	0.765	0.874	0.361	2.118
Postgraduate	1.066757	0.547	2.906	0.091	93.168
Do not know	-.2129969	0.416	0.808	0.484	1.35
<b>Religion</b>					
Roman Catholic	0				
Protestant/other Christian	.1732808	0.221	1.189	0.901	1.569
Muslim	-.2410371	0.440	0.786	0.426	1.45
No religion	-.162653	0.709	0.850	0.361	2
Other	-	-	-	-	-
<b>Marital status</b>					
Ever married	0				
Never married	.2184602	0.141	1.244	0.930	1.664
<b>Age at first sex</b>					
Age at first sex	-.0077702	0.122	0.992	0.983	1.002
<b>Ever used a condom</b>					
Yes	0				
No	-.1410071	0.297	1.151	0.883	1.501

Ever received money or favours in exchange for sex					
Yes	0				
No	-.6493737	0.002	0.522	0.343	0.795
History of abnormal discharge from the penis/vagina in the last 12 months					
Yes	0				
No	0.5718314	0.014	0.564	0.358	0.891
Know where to get a condom					
Yes	0				
No	-.2709705	0.205	0.763	0.501	1.160
Ever tested for HIV					
Yes					
No	.1641589	0.312	1.178	0.857	1.620
Number of lifetime partners	.3498768	0.000	1.419	1.299	1.549

#### 4.4 Sexual behaviour and condom use

All young people included in this study had ever had sexual intercourse. Mean age of sexual debut was 19.3 (18.8-19.8) years. Mean age of sexual debut was lower among young men, 17.4 years while that of young women was 20.5 years. Mean age was similar among Roman Catholics and Protestants: 19.3 years. Young people from other religion had the earliest age of sexual debut at 17 years followed by Muslims at 18.7 years. Young people with postgraduate education had the earliest age of sexual debut, 15 years while those with post-primary /vocational education had the highest mean age of sexual debut at 20.5 years.

Number of sexual partners ranged from between two and eight. Only 61% of the young people interviewed had ever used a condom, the rest had not. Younger men had a higher average number of lifetime sexual partners as compared to younger women (3.4 vs. 2.7).

During the first sexual intercourse, only 63% of young people used a condom while 36% did not. More than half (55%) of young women used a condom during first sexual intercourse as compared to 45% of men who used. A small proportion (4%) had ever engaged in anal sex while an even smaller proportion of men (1%) had had sex with another man.

Only 5% of the 2770 young people had received money, gifts or favours in exchange for sex. Of those who had received money, gifts or favours in exchange for sex, approximately 73% were young women. Sixty-seven percent (67%) of those who had engaged in sexual intercourse in the last 3 months had not used a condom with their partner(s). Approximately 78% of those who did not use condoms were young women.

Table 4: Factors influencing condom use among Kenyan youth aged 15-25 years

	B	Significance	(Exp $\beta$ )	95% Confidence interval	
				Lower limit	Upper limit
Constant	-1.268827	0.140			
Age at last birthday	.043445	0.075	1.044	0.996	1.096
Sex of respondent					
Male	0				
Female	-.2566341	0.046	0.774	0.601	0.995
Ethnic tribe					

Embu	0				
Kalenjin	-.0281036	0.960	0.972	0.320	2.95
Kamba	.3770234	0.512	1.458	0.472	4.499
Kikuyu	.1453084	0.796	1.156	0.384	3.484
Kisii	.2848218	0.619	1.330	0.433	4.082
Luhya	.7541784	0.182	2.126	0.702	6.435
Luo	.7044019	0.216	2.023	0.662	6.176
Maasai	.4826636	0.532	1.620	0.357	7.359
Meru	.048459	0.935	1.05	0.330	3.342
Mijikenda	.1631931	0.784	1.177	0.366	3.788
Somali	.9801143	0.453	2.665	0.206	34.452
Taita/Taveta	1.258275	0.115	3.519	0.736	16.824
Swahili	1.047612	0.47	2.851	0.181	44.950
Other	.4739407	0.420	1.606	0.507	5.085
Highest level of education					
Nursery/Kindergarten	0				
Primary	.3442043	0.080	1.411	0.960	2.074
Post-primary/vocational	.1624951	0.681	1.176	0.543	2.55
Secondary/ O level (Form 1-4)	.8211377	0.000	2.273	1.504	3.434
Secondary/A level (Form 5-6)	-	-	-	-	-
College (middle level, certificate)	.9288538	0.002	2.532	1.405	4.560
University	1.619107	0.005	5.049	1.640	15.541
Postgraduate	-	-	-	-	-
Do not know	.1060693	0.624	1.112	0.728	1.699
Religion					

Roman Catholic	0				
Protestant/other Christian	-.0450302	0.716	0.956	0.750	1.218
Muslim	-.2644503	0.293	0.768	0.469	1.257
No religion	.3223506	0.399	1.380	0.653	2.920
Other	.0382008	0.947	1.039	0.339	3.187
Marital status					
Ever married	0				
Never married	.8209266	0.000	2.273	1.756	2.941
Age at first sex	.0034892	0.434	1.003	0.995	1.012
Perceived risk					
No or low risk	0				
Moderate to great risk	.0964169	0.481	1.101	0.842	1.44
Ever received money or favours in exchange for sex					
Yes	0				
No	-.2707842	0.268	0.763	0.472	1.232
History of abnormal discharge from the penis/vagina in the last 12 months					
Yes	0				
No	-.3467226	0.152	0.707	0.44	1.136
Know where to get a condom					
Yes	0				
No	-1.308639	0.000	0.270	0.195	0.375
Ever tested for HIV					
Yes	0				
No	-.2413469	0.097	0.786	0.591	1.044
Number of lifetime partners	.2088315	0.000	1.232	1.114	1.362

If the man/woman has HIV, his/her partners always has to have HIV					
Yes	0				
No	.1966197	0.068	1.217	0.985	1.504
Do not know	.2330706	0.394	1.262	0.739	2.157
A healthy looking person can have HIV					
Yes	0				
No	-.1123047	0.541	0.894	0.624	1.281
Do not know	-.8109143	0.053	0.444	0.196	1.01

When a univariate logistic model was fitted for each explanatory predictor gender; highest level of education; religion; ethnic group; marital status; number of lifetime partners; knowing where to get condoms; and agreeing that a healthy looking person can have HIV were the strongest predictors of ever using a condom. There was also a weak association between perceived risk and ever using a condom. The variables were then fitted in a multivariate logistic regression.

Knowing where to get a condom, number of lifetime partners, marital status, highest level of education and sex were the only variables significantly associated with ever using a condom. Never-married young people were 2.72 times more likely to have ever used a condom unlike their ever-married counterparts. An additional lifetime partner increased the odds of having ever used a condom by 1.23 times hence those with higher number of lifetime partners are more likely to have ever used a condom. Those who do not know where to get a condom were 73% less likely to have ever used a condom.

Young people with secondary education as their highest level of education were 2.27 times likely to have ever used a condom as compared to those who only have nursery education

( $p < 0.000$ ). Similarly, those with college education and university education were 2.5 and 5.04 times, respectively, more likely to have ever used a condom as compared to those with nursery education. Females were 23% less likely to have ever used a condom as compared to males, though the association was very weak ( $p = 0.046$ ).

## **5.0 DISCUSSION**

### **5.1 Discussion**

Young people aged 15-24 years have heard about HIV and are familiar with HIV transmission from a HIV positive mother to their baby during pregnancy, labour and breastfeeding. More than half of the young people rejected common misconceptions in regards to HIV transmission. Majority of the young people felt they were at low or no risk of getting HIV. This was generally influenced by number of lifetime sexual partners, female gender, engaging in transactional sex and history of STI symptoms.

Young people engage in sex at an early age however not all of them ever use a condom. They are likely to have an average of three lifetime sexual partners. Those who know where to get a condom are more likely to use a condom. Other factors influencing use of condoms include marital status, number of lifetime sexual partners, gender and highest level of education.

Studies to show effect of HIV knowledge on condom use have reported mixed results. Various factors have been identified including post-primary education; residing in urban areas; religion; history of STI infections; increased age; knowing someone with HIV; marital status; gender; and wealth amongst others. Some have shown positive associations [28, 29] while others have shown no association.

There has been massive scale up of interventions meant to increased HIV awareness though HIV knowledge remains low in Kenya. Slightly more than 1% of young people still had not heard about HIV. Some of the young people do not understand how HIV is transmitted. Only 89% of the young people had heard about ARVs. Similar results have been shown in other parts of the world. In Malaysia, young adults aged between 15-24 years had adequate knowledge on major routes of transmission but fewer were aware that HIV could be

transmitted via tattooing and piercing; sharing personal items; and from a HIV positive mother to her baby during breastfeeding. [30]

This study shows that risk perception does not influence condom use among young people in Kenya. According to Prata et al, sexually experienced men in Mozambique were more likely to use condoms if they assessed their risk level accurately. [20] Young people in Kenya and across should be empowered to assess their risk accurately. Condom use also remains low and having ever used a condom was influenced by level of education, gender, marital status and knowing where to get a condom. An estimated 15% of young people did not know where to get a condom. Condoms should be made easily accessible and affordable for the young people. [31]

## **5.1 Conclusion**

Findings from this study are important in understanding what influences condom use among young people. In many countries, young people's needs have been neglected which leaves them ill-equipped to deal with the transition to adulthood. Specific strategies should be devised to target those who are less likely to use condoms so as to increase the uptake of condoms. Promoting scale up of more effective HIV awareness campaigns to help young people increase their knowledge, understand their risk and increase use of condoms. Quality sex education should be provided to youth who are both in school and out-of-school. Use of media campaigns and digital innovations should be increased.

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