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# Logistic Regression on Effects of Relationship Between Condom Use on Comprehensive HIV Knowledge Among the Youths in Kenya

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**Abstract:** HIV/AIDS knowledge in Kenya is universal in that 99% of both male and female have heard of the epidemic and how it can be avoided. Despite the widespread knowledge of HIV/AIDS, comprehensive HIV knowledge which refers to one being able to correctly identify the modes of HIV transmission and reject the most common misconception about HIV transmission among the youths, is just above average, 65% for males and 54% for females. There seems to be lack of information on the effects of the determinants of comprehensive HIV knowledge among the youths. This study, using KDHS 2014 data, investigates the effect of the relationship between condoms use and comprehensive HIV knowledge among the youths in Kenya. A logistic regression model is used to explore the effects of relationship between condoms usage and comprehensive HIV knowledge among the youths. Comprehensive HIV knowledge among the youths aged 15-19 was 12.9% while those aged 20-24 was 87.1% and on average 55.5%. Significant association was found between consistent use of condoms during the first sexual intercourse and comprehensive HIV knowledge with a p-value < 0.001. 78.8% of the youths consistently use condoms during their first sexual intercourse. Interestingly, results showed that condoms use have no effect on comprehensive HIV knowledge which means there are other factors that influence comprehensive HIV knowledge that seems to suppress the effect of condoms use. Nevertheless, much intervention among the youths aged 15-19 should be considered to increase the level of comprehensive HIV knowledge. Further research need to be conducted to determine the effect of the relationships between other correlates of comprehensive HIV knowledge among the youths in Kenya.

**Keywords:** HIV/AIDS, Comprehensive HIV Knowledge, Logistic Regression, Youth

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## 1. Introduction

HIV epidemic was diagnosed in 1981 as a major health challenge globally. Among the sub-Saharan African countries, Kenya emerged the country with the highest HIV infection index. Accordingly, new HIV infections has continued to decline globally despite the fact that this trend is slower than expected [2, 3, 6]. In Sub Saharan African countries, female youths were the most vulnerable group to HIV infections than their male counterparts. Among the adults and adolescents, young people 15-24 years contributed 40% of the adult new HIV infections which is a reduction

from 2013-2017. Knowledge about HIV/AIDS in Kenya is common among the general population however studies have shown that there exists inconsistent level of knowledge on HIV/AIDS. Kenya Demographic and Health Survey 2014 reported on various indicators associated with HIV/AIDS attitudes and behavior for people aged 15-49 years and established that HIV awareness is high despite the low level of comprehensive HIV knowledge [4, 7].

Comprehensive HIV knowledge is a composite measure of how far one knows about HIV transmission and prevention. This includes the knowledge that consistent use of condom during sexual intercourse, having just one uninfected faithful

partner can reduce the chance of HIV infection, knowing that a healthy looking person can have HIV, knowing that HIV cannot be contracted by sharing food with an infected partner. The youths who are persons aged 15–24 years, contribute significantly to high HIV infection. This high rate is attributed to poverty, incorrect perception of their risk, limited knowledge on sexual behavior that exposes them to HIV infection, use of drugs exposing them to unprotected sexual intercourse and failure to resist forced sex [5].

In central Uganda, sexual abstinence was only practiced for at least six months among the youth. Of all the respondents, only 31% of both male and female can disclose their HIV status to their partners. Also this study found that most of the youths (57%) did not use condom during sexual intercourse and 30% of them had more than one sexual partner in the past six months [13]. HIV awareness was fairly universal among the three countries (Ethiopia, Burundi and Kenya) even though comprehensive HIV knowledge varied significantly among women in the three countries. In all the three countries, acceptance towards infected individuals was observed with Burundi having higher percentage than (Ethiopia and Kenya), Kenya had higher percentage than Ethiopia. Access to sexual education and communication activities were found to be key determinants of comprehensive HIV knowledge, [16]. In Uganda, research found that the level of comprehensive HIV knowledge is lower (38%) among women aged 15-49. Age, wealth, place of residence, access to information and having tested for HIV were stronger determinants of comprehensive HIV knowledge [15]. Using Demographic and Health surveys for 2003-2013, research showed that comprehensive HIV knowledge increased significantly within the three period of surveys despite the lag behind the expected target among the young people in Nigeria. The significant determinants of comprehensive HIV knowledge were age, wealth, level of education place and region of residence and access to HIV screening [14]. Even though comprehensive HIV knowledge is low among urban young women in Kenya, research showed a significant increase in comprehensive HIV knowledge from 9% to 54% over a 15 year period. Sexual education, wealth, knowing someone with HIV and having a small or moderate to great risk perception were found to be the key effects of having comprehensive HIV knowledge on transmission and prevention [11]. Accordingly, research in Eastern Ethiopia found that comprehensive HIV knowledge was greatly associated with wealth index, education, sex and access to HIV information among the adolescents. Comprehensive knowledge on HIV was higher among the females than the males. Those with access to HIV information and wealth had a significant increase in comprehensive knowledge on HIV [12]. A similar study in Ethiopia by found that comprehensive knowledge on HIV transmission and prevention methods among the comparative (First year students) and intervention group (Second year students) varied significantly. Level of education, access to information, sexually transmitted diseases (STD) screening and use of condoms were the associates of comprehensive

HIV knowledge [8].

Further, a study in Lagos revealed that the main associates of comprehensive HIV knowledge were age, level of education, having screen for HIV, possession of knowledge about someone who has HIV and having small or moderate to great risk perception. Women with higher education were knowledgeable about HIV than those without education. Those aged 20-24 were more knowledgeable than those aged 15-19 [17].

While majority of the above studies examined determinants of comprehensive HIV knowledge across different regions, few of them had considered condom use as an indicator of comprehensive HIV knowledge. Hence, this study seeks to examine the effect of relationship between condoms use on comprehensive HIV knowledge among the youths in Kenya.

## 2. Data and Method of Analysis

The data used is from the Kenya Demographic Health Survey (KDHS) 2014, a national survey for men aged 15-49 years and 15-54 years for women. The key variables extracted from this survey were comprehensive HIV knowledge and condom use.

In the KDHS 2014 survey, the variable comprehensive HIV knowledge was generated out of the five statements to which respondents had to indicate “Yes”, “No” or “Do not know” depending on whether they agreed, disagreed or had no clue respectively. The respondents who had all the statements correctly answered were considered to be having comprehensive HIV knowledge while those who had failed in any of the statements were considered not to be having comprehensive HIV knowledge. The statements used to construct the variable comprehensive HIV knowledge were:

- a) HIV can be prevented by limiting sex to one faithful uninfected partner
- b) Condoms can be used to prevent HIV transmission
- c) A person can get HIV by sharing food with an infected person
- d) A person can get HIV from mosquito bites
- e) A healthy-looking person could be having HIV

Condom use was measured by asking the respondents whether or not they used condoms during their last sexual involvement with their partners in the last 12 months. This was coded “Yes” or “No” based on the respondent’s response.

To test for the association between comprehensive HIV knowledge and condom use a chi-square test was used. A logistic regression model was fitted to condom use and comprehensive HIV knowledge.

### 2.1. General Linear Models (GLMs)

Models that are linear after an approximate transformation of the expected dependent variable and whose stochastic component is not limited to normal distribution are called generalized linear models [1]. Logistic regression model is a generalized linear model with the following components;

- a. Random component

It identifies the response variable and selects a probability distribution for it. In most analysis of categorical variables, the observations are binary such as “Yes” or “No”. In this case binomial distribution is appropriate for the response variable.

b. Systematic component

It specifies the explanatory variable in the model. The independent variable  $X_i$  is specified in the systematic component in the expression below;

$$\beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} \dots \dots + \beta_k X_{ik} \quad (i = 1, \dots, n) \quad (1)$$

This linear function is a combination of explanatory variables which forms a response surface.

c. Link function

This is a component which combines both the random and systematic components. If the expected value of  $Y$  (dependent variable) is  $\mu = E(Y)$ , then the link function expresses  $f(.)$  that shows a relationship between  $\mu$  and a linear predictor;

$$f(\mu) = \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} \dots \dots + \beta_k X_{ik} + \epsilon_i \quad (2)$$

Where  $f(\mu)$  is a link function that connects random component and systematic component.  $\epsilon_i$  is the error term associated with the  $i^{th}$  response and variable  $X_{i1} \dots \dots X_{ik}$  is the response of the  $i^{th}$  individual. In ordinary regression modeling, the expected value of  $Y$ ,  $\mu = E(Y)$  is a linear function of  $X$ . For a binary response variables, the model is of the form;

$$\pi(x) = \alpha + \beta x \quad (3)$$

The linear model above shows that the probability of success changes linearly in independent variable. The above expression is an example of a General Linear Model. Even though this model is simple, it has a structural problem. For a logistic regression model, the random component for the outcomes has a binomial distribution. The response variable is dichotomous (success and failures) coded 1 and 0. The link function for this model is the logit function given by  $\log\{\pi(1 - \pi)\}$  of  $\pi(x)$ . In this model,  $\pi(x)$  is restricted to 0 and 1 but the logit can take any real number [1].

2.2. Logistic Regression Analysis

Logistic regression is a statistical method for analyzing data in which there are one or more independent variables that determine the outcome, [1]. The outcome is measured with a dichotomous variable in which there are only two possible outcomes. This method provides a modelling of binary response variables which assumes values 1 (for success) and 0 (for failures). It determines the probability of an event occurring over the probability of an event not occurring. As a result, the effects of the explanatory variables can be explained in terms of odds. The odds of an event can be expressed as the ratio of the probability of an event occurring to the probability of an event no occurring. Under logistic regression the mean of the response variable is modeled in terms of the explanatory variables. If  $p$  is the

probability of an event occurring and  $q$  or  $1 - p$  is the probability of an event not occurring then, odds of an event can be as shown in Table 1.

$$Odds = \frac{p}{q} \quad (4)$$

Unlike other modelling methods logistic regression performs better for dichotomous dependent variables due to its structural properties. It is a nonlinear transformation of linear regression which is designed to describe a probability, which is always some number between 0 and 1. This model is therefore use to ensure that whatever the estimate we get, it will always lie between 0 and 1 which is not possible for other regression models. The logit transformation can be expressed as shown in equation 2 and 3.

$$logit(p) = \ln \left[ \frac{p}{1-p} \right] \quad (5)$$

$$= \beta_0 + \beta_1 X_{i1} + \beta_2 X_{i2} \dots \dots + \beta_k X_{ik} \quad (6)$$

Where  $X_i$  represents explanatory variables of  $i^{th}$  individual and  $\beta^l$ s unknown parameters. This study investigated the effect of one independent variable on the outcome variable and therefore, Wald’s test was appropriate for testing significance of the individual coefficients in the model. Statistical package SPSS version 21 was used for analysis.

3. Results and Discussion

In this research, a total of 1532 youths were included in the study. Findings showed that the overall level of comprehensive HIV knowledge was about 56% among the youths in Kenya as reported in Table 1.

Table 1. Comprehensive HIV knowledge among the Youths in Kenya.

	Frequency	Percent
No	682	44.5
Yes	850	55.5
Total	1532	100.0

Further, considering age-group as a background characteristic of the youths, those aged 20-24 years had more comprehensive HIV knowledge than those aged 15-19 years. The youths aged 15-19 years had little knowledge on the modes of HIV transmission with misconceptions about transmission and prevention. As shown in Table 2, comprehensive HIV knowledge among the youths aged 15-19 was 12.9% while those aged 20-24 was 87.1%.

Table 2. Age-group and Comprehensive HIV knowledge.

Age-group	% of Comprehensive HIV knowledge	
	No	Yes
15-19	19.9	12.9
20-24	80.1	87.1
Total	100.0	100.0

To determine whether these groups differed significantly on comprehensive HIV knowledge, a chi-square test was

used. The chi-square test indicates that age-group and comprehensive HIV knowledge are statistically significant among the youths ( $\chi^2 = 13.8$  on 1 degree of freedom with  $p < 0.001$ ). The youths aged 20 - 24 have higher comprehensive HIV knowledge than those aged 15 - 19 years.

**Table 3.** The youths who always use condom during their first sexual intercourse.

	Frequency	Percent
No	309	20.2
Yes	1223	79.8
Total	1532	100.0

Table 3 shows that 79.8% of the youths consistently use condoms during sexual intercourse against 20.2% who do not always use condoms. Interestingly, Table 4 revealed that condom use is insignificant in the model. The model indicates that condom use have no effect on the comprehensive HIV knowledge about transmission and prevention among the youths.

**Table 4.** Logistic regression of comprehensive HIV knowledge on condom use.

Step 1 <sup>a</sup>	B	S. E (β)	Wald	Df	Sig	Exp (β)
Condom Use	-22.019	2285.068	000	1	0.992	0.000
Constant	1.009	0.140	52.225	1	0.000	2.743

## 4. Conclusion

This research sought to explore the effects of relationship between condoms use on comprehensive HIV knowledge among the youths in Kenya. The results show that the overall level of comprehensive HIV knowledge was about 56% among the youths in Kenya. Among the youths, those aged 20-24 years have more comprehensive HIV knowledge than those aged 15-19 years. The 15-19 age group have little knowledge on the modes of HIV transmission and have misconceptions about the transmission and prevention of HIV.

Similar studies in three countries Ivory Coast, Cameroon and Cabon found that comprehensive HIV knowledge was significantly associated with age and together with other factors including place of residence, education level and wealth. Similarly, these studies found that the older youths aged 20-24 years have more comprehensive HIV knowledge compared to the younger youth, [9]. Moreover, a similar study among MIMAROPA youths in Philippines revealed that younger youths age 15-19 were less likely to have correct comprehensive HIV knowledge compared to the older youth age 20-24. This discrepancy was mainly due to advancement in education level, decrease in poverty level and having access to sexual information, [10].

Our findings indicated that 79.8% of the youths consistently use condoms during sexual intercourse against 20.2% who do not always use condoms. Interestingly, as shown in Table 4, using data for KDHS (2014), this research found that logistic regression analysis revealed that

condom usage had no effect on comprehensive HIV knowledge among the youths. Even though condoms usage had no effect on comprehensive HIV Knowledge among the youths, there might be other factors that suppress the effect of condom use among the youths in Kenya. More intervention measures should be done among the youths aged 15-19 years to increase the level of comprehensive HIV knowledge. This research therefore recommends further studies to determine the effects of relationships between other correlates of comprehensive HIV knowledge among the youths.

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