

SOCIO-ECONOMIC DETERMINANTS OF HIV TESTING IN KENYA

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Declaration

This research project is my original work and has not been presented for research in any other University.

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This research project has been submitted for presentation with my approval as university supervisor

Signed..... Date.....

Dr. Martine Oleche

Dedication

I dedicate this thesis to my loving husband, who has supported me throughout this course duration.

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I would like to acknowledge and express my gratitude to all those who have supported me throughout my entire research work. I am particularly grateful to:

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Abbreviations and Acronyms

AIDS	Acquired Immune Deficiency Syndrome
ANC	Antenatal Care
HIV	Human Immunodeficiency Virus
KAIS	Kenya AIDS Indicator Survey
KDHS	Kenya Demographic and Health Survey
MOH	Ministry of Health
NACC	National AIDS Control Council
NASCOP	National AIDS and STI Control Programme
PMTCT	Prevention of Mother To child Transmission
UNAIDS	United Nations Programme on AIDS
UNICEF	United Nations Children’s Fund
VCT	Voluntary Counselling and Testing Center
WHO	World Health Organization

Definition of Terms

Social-Economic-As used in the study it can be defined as a measure of an individual's or family's financial and social place in relation to household income, education, occupation and standards of living.

Determinant-A factor affecting the outcome of an element.

HIV testing-The phrase as used in the study defines those that have sought services at a VCT for the purpose of knowing their HIV status.

Abstract

The study aimed at investigating the determinants related to the economic and social aspects of individuals that cause a change in the HIV testing pattern in Kenya. Acquired Immune Deficiency Syndrome (AIDS) is caused by a virus called the human immunodeficiency virus (HIV) that wanes the immune system. HIV is a disease that continuously causes impairment to an individual's immune system. There has been various interventions to curb the infection rate globally. However HIV testing has been the major approach to deal with HIV prevention and also make people aware of their HIV status. Previously new HIV infections have drastically reduced but the testing target is not where it is expected. Various reports (Kenya Demographic Health survey, Kenya HIV county profiles and Kenya AIDS progress report) indicate that HIV testing statistics remain low. Kenya Demographic and health survey is a cross sectional report documented every 5 years. This study aimed at finding out the various socio-economic determinants such as (age, gender, wealth index, residence, marital status and education level) as independent variables to reveal the association of the indicated variables to the dependent variable (HIV testing) that affect the low HIV coverage in Kenya. Kenya Demographic Health Survey of 2014 was used as a data source since it contained the various factors under consideration. The logit regression model was employed in estimation of the variables. The dependent variable used was HIV testing (service utilization) while the independent variables used included: age, gender, marital status, level of education, place of residence and wealth index. At 5% and 10% significance levels, the study findings revealed age, gender, marital status, level of education, place of residence and wealth index as significant determinants of utilization of HIV testing services. Age, gender and place of current residence reduced HIV testing with every unit increase of the said variables, whereas education, marital status and wealth index positively and statistically increased utilization HIV testing services among the respondents in Kenya. The study suggests development and implementation of policies targeting more men, older people and those not in any unions or marriage. As from the study movement from lower wealth quintiles towards higher wealth quintiles is associated with increase in HIV testing .There is need to hold sessions and meetings among men and older people to enlighten them on their right and responsibility to ensure they are aware of their status by seeking HIV testing services.

CHAPTER ONE: INTRODUCTION

1.1 Background

Human immunodeficiency virus (HIV) causes the disease Acquired Immune Deficiency Syndrome (AIDS) which manifests by severely weakening the human immune system. In 2013, AIDS new infections and related deaths were estimated to be over 1.5 million globally, with Africa being the most affected (WHO, 2014).

This issue of HIV illness, incidence, and mortality was hence declared a crisis globally. A report released by United Nations on HIV (UNAIDS, 2014) lay emphasis on HIV awareness in Africa. The report revealed a global estimated prevalence of 35 million infections at the end of 2013, which has been attributed to more people enrolling for treatment and therefore living longer and healthier lives (UNAIDS, 2014). However, HIV is still currently a national and global challenge and still regarded as a crisis in the public health field (Simon, Ho, & Abdool Karim, 2006). Earlier in the 19th century, the World Health Organization (WHO) projected that before the year 2000, about 26,000,000 individuals would be infected worldwide, with the largest majority coming from low-income countries.

In some low income countries like Zambia and Zimbabwe some ways to help reduce HIV infections were to encourage people to be counseled and tested (Corbett et al., 2006; Matovu & Makumbi, 2007; Miller et al., 2014; Osborn & Obermeyer, 2016; Yahaya et al., 2014). This strategy improved the consumption of testing and counselling of HIV which has been a key for advancement in the management of the ailment (Matovu & Makumbi, n.d.); (Wringe et al., 2008); Yahaya et al., 2014). When infected patients are diagnosed early, they are compelled to use the programs recommended for management of the disease and hence reduce the likelihood of spreading the disease in their communities.

The Kenyan government contributes to HIV testing through a model that ensures the client willingness to be tested and go through a counselling session. The process involves setting up of counselling sessions before, during and after the testing with adherence to strict confidentiality between the client and the care giver. However, years later the nation is still struggling with the intake of counselling and testing due to various factors in different regions of the country. Testing

and counseling of HIV has proven to be an essential step towards HIV prevention for the whole population. Evidence regarding the obstacles to HIV testing has been reported: some of which result from elements related to health services, inadequate staffing, deficit resources and infrastructure; inability and unwillingness to pay for tests or transportation; others from unsatisfactory awareness about HIV and concerns about stigma and discrimination (Osborn & Obermeyer, 2016)

1.1.1 Profile of HIV testing

In the United States research was carried out on HIV testing rates in high schools and they found that about 9% of students had been tested for HIV. They reported that of males who had sexual relations with other males, only about 15% had been tested for HIV. This continues to reveal that low coverage of testing is a global concern hence there is an increase in the risk of spread and also disadvantages people unaware of their positive status since they cannot benefit from care and treatment and might pass the virus to others without their knowledge (Brener ND et al., 2016). A previous research carried out by NASCOP recommended that more emphasis should be placed in HIV prevention and stigma elimination, especially on adolescents and young people (NASCOP, 2016).

Despite low testing coverage in Kenya, national prevalence trend indicates that prevalence has decreased; adults between 15 and 49 living with HIV rose to 10-11% in the 1990s, declined to 6% in 2006 and has plateaued since then. In 2017 the prevalence rate was likely at 4.9% with women at (5.2%) and men at (4.5%) (NASCOP, 2018). Low testing coverage led to a national objective being set by UNAIDs for testing, counselling and awareness of HIV at 80% of the population in Kenya to ensure that VCTs reach out to as many people (Unaid, 2010). It is evident that incidence rates have reduced but with the low reportage of testing the country should be concerned about the increasing HIV related deaths.

1.2 Statement of the problem

A proportion of 40% of the world population are uninformed of their status. A gap in testing in Kenya was realized by a report that found that just about 53% of those infected have sufficient education of their status and awareness (KAIS & NASCOP, 2012). The low coverage was linked

to stigma associated with the disease. The infected ones have no access to HIV/AIDS timely treatment and infected mothers remain unaware of utilization of PMTCT services.

Additionally (NASCO, 2016) reported that the HIV Mother-to-Child transmission statistic was high regardless of rigorous coverage measures of PMTCT services, they also found that less than 50% of the population had comprehensive knowledge of HIV and that 3/10 women and 6/10 men had not tested in the last 1 year. Studies carried out by Kenya Health Demographic Survey (KDHS 2014) continue to suggest that those who were tested amounted to 83 % women and about 71% men.

According to table 1.1 pregnant women did not seem to seek HIV testing services as a priority.

Table 1.1: Prevention of Mother to Child Transmission Statistics

	Pregnant Women(estimates)	Those tested for HIV during ANC
2014	1,655,305	1,158,245 (69.9%)
2015	1,675,820	1,204,046 (71.8%)
2016	1,785,417	1,213,720 (67.9%)
2017	1,926,104	1,094,334 (56.8%)

Source (Ministry of Health (MOH); National AIDS Control Council (NACC); Nairobi - Kenya, 2018)

The number of infected individuals was estimated at about 1.5 million in Kenya in 2017 (NASCoP, 2018). However, this is a relatively high number compared to the numbers tested for HIV.

Regardless of the headway in moving forward to set targets much remains to be done to halt and reverse HIV. In real time statistics, a huge number of Kenya's population has been infected and affected by the epidemic of HIV. The incidences per year still overtake mortality rates related to HIV, causing a net yearly surge in the number of the diseased people (NASCoP, 2018) .A better way to have a clearer reflection of those infected is by advancing the HIV testing methods and creating more awareness.

The study aimed at defining the socio-economic determinants related to HIV testing in Kenya. In some regions we find that the prevalence is low while the testing is lower hence the data has a system bias. Where there is low coverage in testing the prevalence results might also not be as reliable as expected. There are various determinants affecting HIV testing; wealth, age of an individual, alleged risk of getting HIV, gender, HIV knowledge, excellence of the testing center, stigma and the geographical location.

In Kenya where we have had several issues surrounding HIV the population might fear seeking testing services since they might not also trust the facility equipment. Most people also rely on their partners results and conclude on their HIV status which is not necessarily an indicator of their status. Generally more people are aware of HIV as a disease but ignorant of testing and counselling services. This study therefore aimed to analyze the various barriers and provides insight to the matter.

1.3 Objectives

The main objective of the study was to understand the socioeconomic determinants affecting the uptake of HIV testing services in Kenya. The specific objectives were;

- i. To examine the profile of the uptake of HIV testing services in different regions in Kenya.
- ii. To examine the main factors affecting HIV testing services in Kenya.
- iii. To suggest policy recommendations related to HIV testing in Kenya

1.4 Hypothesis

H₀; there is no impact of socio-economic determinants in regard to HIV testing services in Kenya.

H_a; there is an impact of socio-economic determinants in regard to HIV testing services in Kenya.

1.5 Contribution of the study

Counselling and testing of HIV is a vital measure in dealing with HIV. The numbers reflected are evidence as to how well a country is doing in the sensitization of the disease. While HIV is one of the diseases with the highest stigmatization and discrimination testing and counselling reflects on better understanding and increased awareness of the disease in the society.

This study was concerned in finding out the different barriers that might lead to people not seeking testing services in Kenya. As far as the Ministry of health goes the services are provided for free to encourage more people to seek this service and prolong life in the event of a positive diagnosis. The findings of the study will be used to develop ways to approach individuals on matters HIV testing. Previously it was revealed that the sooner individuals knew of their status, the earlier they availed themselves for treatment hence living longer. This study will assist the Kenyan government through the ministry of Health to be able to curb potential barriers of not seeking HIV testing services. Policy makers will also be able to identify bottlenecks when it comes to dealing with HIV awareness, management and prevention. The Kenyan population will also be educated about HIV disease and the measures surrounding different regions in the country in regard to testing and counselling.

CHAPTER TWO: LITERATURE REVIEW

2.1: Introduction

This chapter comprises a compilation of various studies that have been studied by various researchers and authors relating to the topic; social economic determinants of HIV testing.

2.2: Theoretical Literature Review

HIV is an immunodeficiency syndrome that over the years has caused havoc in all the sectors of the economy. Every government through the various ministries of health has come up with various ways to implement strategies to reduce the prevalence and identify all incidences. Earlier in the 1990s, HIV was a major cause of morbidity in Kenya, exerting pressure on the healthcare system. The epidemic has been severe since then, However the prevalence has alleviated in Kenya reported at about 6%, with the incidence rate being estimated at 88,620 every year (National AIDS and STI control programme, 2014).

The need to create awareness and treat infected individuals led to setting of the '90-90-90 goals' in order to mobilize the response to HIV by the United Nations Programme on HIV/AIDS (UNAIDS) in 2013. The expectations are that 90% of the infected people are to be informed of their status, 90% of those known should be on management whereas 90% of those on treatment should be virally suppressed by 2020. In 2016 statistics revealed the infected people who were aware of their status was unknown, those infected and on treatment was 61% and those found to be on treatment and virally suppressed was 51% (UNAIDS, 2017). The data concludes that Kenya as a country is far off the goal compared to countries like Rwanda and Malawi who in 2016 reported higher percentages in the statistics.

Various reasons have been reported to have been the bottlenecks that deter the healthcare system from achieving the desired results and the set targets. Some of the reasons being; inaccessibility of the healthcare facilities due to underdeveloped infrastructure. In reference to HIV there is still some discrimination and stigma surrounding the disease and hence most people unaware of their status.

2.3: Empirical Literature

“Voluntary counselling and testing” also “client-initiated testing and counselling” (Kennedy et al., 2013). Voluntary counseling and testing centers (VCT) have been used as essential parts in dealing with HIV/AIDS and as a preventive measure. VCT is also used to help patients achieve right to use HIV treatment, support and that will enable individuals cope with HIV in their daily lives.

HIV testing coverage still is adequately low in major parts of Africa. Statistics reported in Africa on HIV testing from 2007–2008 showed that numbers varied lowest in Liberia with women at 3.2% and about 4.9% in men and the highest being South Africa at 56.7% and 43.0% in women and men respectively (WHO, UNICEF, & UNAIDS, 2010). However, Kenya has improved HIV testing and counselling capacity ominously since 2003, they include provider initiated centers, mobile and voluntary counseling and testing sites (Marum et al., 2006).

Studies carried out in the past have reported factors such as age, busy schedules, costs and distance, stigma, staff deficiencies, and long waiting hours at the centers as reasons for low testing coverage. Studies have analyzed the barriers to testing in HIV at the individual level (Bwambale et al., 2008)(Cremin et al., 2010)(Steward et al., 2009). The studies reported low utilization of testing in HIV in Africa as low (less than 30%) and varied widely from about 2% in Guinea in 2005 to almost 27% in Rwanda in 2005.

Kenya as a country should focus on testing and counselling more people to be able to effectively curb the epidemic, since prevention has been proven to be better than cure. Additionally, it has been crucial to reduce the occurrence of HIV through VCT, which has led to emergence of various studies by many researchers such as (Corbett et al., 2006)(Matovu & Makumbi, n.d.)(Tsehaye et al., 2012) some of the studies include reduced incidences of new infections, longer life expectancy and reduced HIV related stigma. Hence emphasizing on the role of VCT in achieving the set and desired goals of prevention and care of HIV (Odimegwu et al., 2013).

2.3.1 Determinants of HIV testing

Education level of various populations determines their perception and interpretation of HIV as an illness. In most set ups the more educated a population is the more they tend to seek HIV testing services as they are more aware of living ignorantly. Populations that have been educated or made aware about HIV also tend to seek the testing services more so as to get informed on their status and also seek proper management where a positive diagnosis is made. Previously Allen et al. (1992) carried out research, where they intended on investigating whether consumption of VCT services was as a result of increased or decreased condom use. Discordant couples showed an increase in condom use after consumption of VCT services up from 4% before utilization of VCT to 57% after utilization of the services. Scholars postulated utilization of VCT increased condom use, which led to a decrease in the incidences. The outcome revealed that about 57% of the discordant couples used condoms as opposed to the larger cohort of about 14% who did not use condom. The conclusion arrived at suggests that VCT as a healthcare consideration is pivotal in monitoring the spread of HIV. Limitations in the study included the study being conducted among illiterate people and were observed to exhibit a positive adjustment. It is assumed, they could have had trouble understanding the educational content presented hence making the study results bias and not a clear representation of the population. The deduction was later disputed since the alteration exhibited by the partakers was purely their perception of the benefits of VCT and not their education (Beardsell, 1994).

Geographical location of HIV testing centers is a great concern in Africa .In some of the regions where the health facilities are proximal to the population high consumption rates of HIV testing services are experienced compared to regions where the health facilities are distant. This is because the closer the facility the less resources (time and money) used by the community to seek services. A researcher (Corbett et al., 2006) in Zimbabwe wanted to comprehend the relationship between approaches towards testing centers and closeness of the testing centers to their workstation. This trial made use of two VCT measures in the involvement stage: an on-scene center to take HIV testing straightaway and an off-scene voucher- for use at a suitable period in a testing site with no charges. It was reported that the preference was about 51.1% for the on-scene and 19.2% for the off-scene of the population. There was reported zeal shown by those who choose the on-scene service, hence the conclusion was user-friendliness play pivotal roles in individuals' verdicts.

Stigmatization and discrimination are the most common social issue surrounding the HIV endemic. Stigma is seen all round the patients' support system, including the health workers who treat and diagnose the condition. People not been tested seem to have more of stigma related to AIDS and negative attitude toward testing than those who visited and sought services at a VCT (Hutchinson & Mahlalela, 2006). Stigmatization and discrimination accounts for a significant percentage of hurdles to VCT uptake in populations. According to study done in Zimbabwe, 63% of health workers had never visited a VCT and attributed this to stigmatization especially from fellow service providers whom they feared would disclose their status. A Ugandan study reported that a number of people do not seem to seek testing services to avoid being seen by people close to them like family, friends or neighbors, and being judged on unfaithfulness (Bwambale et al., 2008).

According to (Kalichman & Simbayi, 2003) the problem of uptake was approached differently, concluding that social barrier was a contributing factor to low reception of VCT. A quantitative research to identify attitudes related to HIV testing in Cape Town was carried out. They had 224 men and 276 women with ages ranging from 21 to 25 years. A questionnaire was administered in English or the native language. They used an AIDS stigma scale to measure the impact of stigma on VCT that revealed false impressions about infected individuals. They found that those who had used VCT were about 44%, those who had never used it were 53%, and those tested only about (33%) had used the VCT once in their lifetime. In addition they reported that those tested and not patient to wait on the results were (38%) and those who never tested said that "they believed any HIV-positive individual must have done something wrong or dirty" (Kalichman & Simbayi, 2003). There was however no statistics to conclude that those who did not wait on their results had any misconceptions. The scholars therefore concluded that undesirable attitude displayed by those never tested before was an issue of stigma. Additionally, those who did not wait for their results and those not previously tested believed testing was beneficial to combat HIV. This suggested that there were many reasons for not testing and not just stigma as deduced by (Kalichman et al., 2009).

HIV knowledge and perception is essential in the consumption of voluntary testing services, this is because when a community is well informed and awareness created they tend to care about their health and their HIV status. A community that is aware of HIV does not take into account the

various misconceptions about the virus and is well knowledgeable about the transmission of the virus.(Odimegwu et al., 2013) discussed utilization of HIV testing and counselling services in relation to stigma in Nigeria by investigating people's opinion towards infected individuals. They interviewed various leaders in the community and from various religions. They learnt that despite the adequate HIV awareness, misconceptions were present, especially on the ways of spreading if the virus. The level of discrimination observed towards infected individuals Nigeria was also alarming since some called them "living ghosts". Hence the conclusion by (Odimegwu et al., 2013) that stigma interfered in the disease awareness and management and the enthusiasm to get information on their HIV status.

People are emotional beings and this makes them worry about what other people think if them. Due to this factor people seeking VCT services are worried about services delivery factors in VCT such as maintenance of confidentiality which is very crucial. It has been proven that one way of maintaining confidentiality is through anonymous testing which has been shown to improve uptake. Various studies have shown poor quality service leads to poor uptake. Type of testing also greatly affect uptake of VCT services. There is the simple rapid test versus long Elisa test. Simple rapid test are more acceptable as they reduce waiting time and anxiety too. A study in Guatemala showed increased VCT service uptake with introduction of simple rapid test. This continues to emphasize that the quality and duration of service is important regarding the acceptability of the VCT services by clients.

Wealth as a socio-economic determinant is measured at the household level. A study was conducted in South Africa where their keen interest was to determine wealth-related disparity in intake of HIV testing in women and identify various determinants. It was reported that the antenatal HIV prevalence was only about 33.2% and 43.7% of those arose from the lowest wealth group. Authors reported that the fraction of early testing remained higher in the lower wealth bracket as opposed to the higher 40% quintile (Ngandu et al., 2017). However according to (Staveteig et al., 2013) it was observed that testing rates were equitable for women compared to men in Zimbabwe 2010 and Lesotho 2009. Men in the highest quintile had a 50% likelihood to get tested than those in the lowest group. A different scenario is reported in the two countries where women in the highest wealth group had a 4-18% percent more probable to get a test compared to those in the

lowest wealth group. It is important to note that ANC testing ends up reaching women uniformly in various social and economic groups.

According to (Staveteig et al., 2013) who conducted a study in various countries, they reported that in 22 of 23 countries, uptake is least observed in younger women aged between 15-19 and those between 45-49 years. However in Lesotho where the testing rates stood out, the statistics showed that women age 45-49 in Lesotho had an equal probability as those between ages 30-44 to have been tested in the last year. The trend in men revealed that the rates were lowest between 15-19 years, shadowed by 20-24 years with the highest rates among those over age 25.

2.4 Overview of Literature

Deductions from the various studies imply that challenges surrounding continuous engagement of HIV patients in care can better be addressed when there is a clear understanding of barriers in all aspects surrounding human beings i.e. social, cultural and economic environments. Education as a determinant of HIV testing showed that the variable might not be a major determinant of since illiterate people also showed positive change in behavior as was later contested (Beardsell, 1994). Geographical location is imperative in the convenience of seeking HIV testing services as concluded by (Corbett et al., 2006), When he reported that ease of access is significant in the uptake rate of voluntary testing in developing countries. Therefore, making better the testing services through testing models could be of great importance in prevention of HIV.

The researchers (Hutchinson & Mahlalela, 2006) suggested that stigma and discrimination was the major factor contributing to low testing in his study. However (Kalichman & Simbayi, 2003) differed when they concluded that stigma may not be the only actor for not testing when they found that their participants who did not wait their results were willing to find out their status and were not necessarily discriminating those living with HIV.

Wealth is a debatable determinant where different authors had different findings. However among women wealth has a minimal impact on their need to sought testing of HIV services since it is mandatory during antenatal visits. Moreover (Ngandu et al., 2017) found that early self-initiated testing in women was higher in the lower 40% of the population in south Africa. A researcher

(Staveteig et al., 2013) also strongly suggested that men in the higher quintile seemed to be more probable to seek testing services equated to men in the lower quintile. Age as determinant was concluded by (Staveteig et al., 2013) that testing of HIV in individuals peaks at age 25-39.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the explanation of the theoretical framework, model estimation, definition of variables and measurements, data source and estimation techniques.

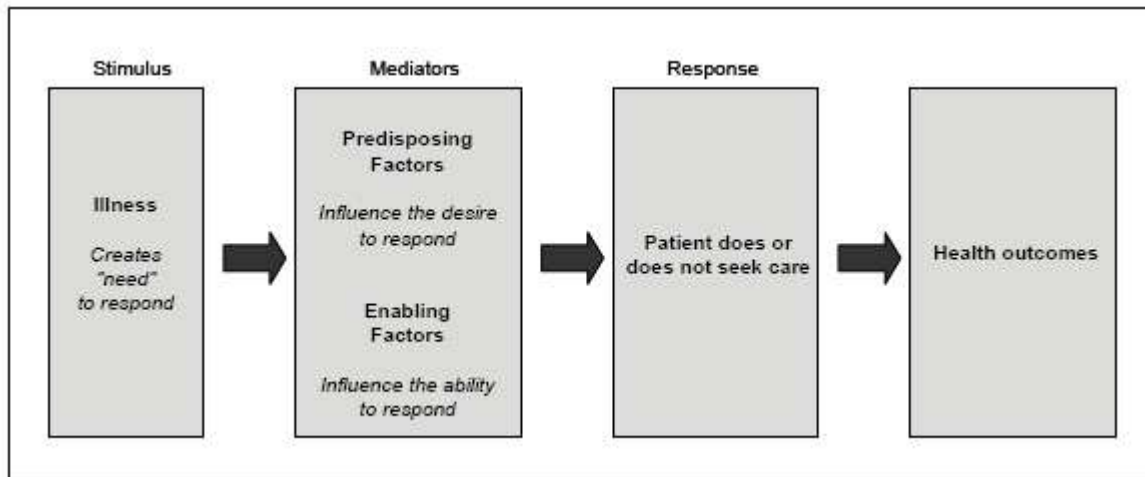
3.2 Theoretical Framework

This model was based on Andersen (Andersen & Newman, 1968) health care utilization model that analyses three different categories; predisposing, enabling and need characteristics. The tendency to utilize health care services is represented by predisposing characteristics. According to this category, human beings tend to seek health care services based on demographics, social status and what they believe to be benefits of health services. Those who prioritize on health based on their perception are likely to utilize healthcare services.

Secondly, there is enabling characteristics, this refers to resources freely available in a family or society that will determine their health seeking behavior. Family resources include but not limited to economic status, geographical location while community resources factor in accessibility to health care facilities and the availability of trained personnel.

Lastly, need based characteristics include the perception of need for health service.(Wolinsky & Arnold, 1988) suggests that this need can be either social or clinically assessed perceptions of need. It can also be the perceived susceptibility and perceived severity of a health condition.

Figure 3.1: Model of healthcare utilization by Andersen



Source (Andersen & Newman, 1968)

The Andersen Model in figure 3.1 suggests some of the main factors that lead to high or low usage of HIV testing services. This study adopted and employed factors likely to influence HIV testing and used the appropriate econometric model to estimate their significance given the available data.

3.3 Econometric Model

Binary logit model was employed in assessing the determinants of HIV testing. Logit models assume logistic distribution which normally gives S-shaped curve where $y = f(x)$. The choice of the model was guided by the fact that this model is probabilistic in nature hence assisted the researcher to get the probability that testing occurred or did not occur. The model therefore ranged between 0 and 1. The error term in this case had features like logistic distribution, constant variance and a mean of zero. This was a perfect model since it assisted the researcher in establishing whether explanatory variables that influenced HIV testing also influenced the likelihood of having a HIV test done. HIV testing was a discrete variable that assumed the value of zero if not tested and one if one had been tested. We had the variable Y that assumed values ranging between zero and one (0 and 1) hence had equation;

$$Y^* = X_i\beta + \epsilon \dots \dots \dots 1$$

Where Y^* represented the dependent variable of either testing or not, X_i represented determinants of HIV testing, β represented the coefficients determined and ϵ the error term. The maximum likelihood method (MLE) was applied in the estimation of the logit model where the probability

that testing had been done relied on whether wealth and other factors affecting HIV testing increased or decreased.

$$Y_i = \begin{cases} 1 & \text{if } y > 1, \\ 0 & \text{otherwise,} \end{cases} \dots \dots \dots 2$$

This implied that the logit model used in this study was generated by cumulative distribution function (CDF) as shown below;

$$\Pr y = 1 = \Lambda(X\beta_i) = \int_{-\infty}^k \frac{1}{2\pi} e^{-\frac{k^2}{2}} dk \dots \dots \dots 3$$

Where $\Lambda(Z_i\alpha)$ is the cumulative distribution function for \mathcal{E} that resulted to the probability equation illustrated below;

$$\Pr = y = 0^{\Lambda(-Xi\beta)} \quad y=1^{[1-\Lambda(-Xi\beta)]} \dots \dots \dots 4$$

The above function was the cumulative distribution function for the error term. This implied that the logit model for the study was guided by a specific cumulative logistic probability function shown below;

$$Prob_i = \Lambda(Z_i) = [(\alpha + Xi\beta)] = \frac{1}{1 + e^{-Z_i}} = \frac{1}{1 + e^{-(\alpha+Xi\beta)}} \dots \dots \dots 5$$

3.3.1 Model Specification

In modelling the determinants of testing of HIV in Kenya, the study made use of binary logit model where the dependent variable was a binary random variable that took a value of one if a person had ever been tested for HIV and zero if never been tested. The linear version of the model was represented as;

$$Y^* = \beta_0 + \beta_1 X_1 + \dots + \beta_n X_n + \varepsilon \dots \dots \dots 6$$

Where; Y^* this was the dependent (utilization of HIV testing services) variable which is a dummy variable (1, 0).

β_i are the coefficients estimated.

ε is a stochastic random error term following a normal distribution which represents all other factors influencing HIV testing not considered in the model.

X_i is a vector for independent variable such as education level, marital status, wealth index, age and residence.

The equation of the study used was;

$$Y^* = \beta_0 + \beta_1 A + \beta_2 W + \beta_3 G + \beta_4 E + \beta_5 R + \beta_6 M + \epsilon \dots \dots \dots 7$$

Where A=age

W=wealth

G=gender

E=education

R=Residence

M=Marital status

The variables in the model in equation 7 can be operationalized in table 3.1

Table 3.1: Description of variables

Dependent Variable		Expected sign
Utilization of HIV testing services	1 if person has been tested for HIV 0 if otherwise	
Independent variable		
Age	Age in years	-
Education	0 if no education 1 if Primary education 2 if more than secondary education	+
Gender	0 if female 1 if male	-
Wealth Index	0 if poor 1 if middle income 2 if high income	+
Residence	0 if urban 1 if rural	-
Marital status	0 if never been in a union 1 if single 2 if widowed 3 if separated/divorced 4 if married(polygamous) 5 if married(monogamous)	+

(Source; Own computation)

3.4 Diagnostic tests

The study undertook some of the diagnostic tests like;

3.4.1 Normality test

Data that would fit into a bell curve before running regression is presumed to be derived from a regular distribution. However this is not always true in regression. This study conducted a Shapiro Wilk test which informed on whether the random sample came from a normal distribution. The test computed a value (W); small values suggest the sample is not normally distributed. The logit regression model was employed in estimation unlike ordinary least square method to provide a probability of lying between the range of zero and one and a measure of goodness of fit(Gujarati, 2004).

3.4.2 Multicollinearity

This is a state of significant relationships among the independent variables. Multicollinearity is a scenario where one independent variable where multiple regression model is applied would prove to be linearly anticipated from the rest with a significant level of accuracy .This kind of disturbance renders the statistical inferences in the data unreliable. Variance inflation factor test was therefore carried out since the presence of multicollinearity inflates the variance of the parameter estimates through correlation matrix as suggested by(Rosser Mike, 1993).

3.4.3 Heteroscedasticity

Heteroscedasticity is said to occur when the standard error of a certain variable probably monitored for a period of time appear to be non-constant. Hence the variability of selected variables is seen as unequal through the datasets. This phenomenon arises in datasets where there is a large range between the highest and lowest values. It was tested through scatter plots of residual-square against the fitted values of the dependent variable.

3.5 Data Source and Type

Kenya Demographic Household Survey (KDHS, 2014) which is a household-based cross sectional data usually collected after duration of every five years was used. This survey contains general information regarding to the target population (population tested for HIV). This survey also

contains household information on HIV testing which was collected comprehensively across the counties and country as a whole. Other specific information pertaining to the population was also available for example information obtained included age, region of residence, education levels among other pertinent factors necessary for this study. The study identified these respective factors and cleaned them before conducting estimation.

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1. Introduction

This chapter entails the descriptive statistics and an assessment of estimates. The study used Stata version 15.0 software with application of the binary logit model in assessing determinants of HIV testing in Kenya.

4.2. Descriptive Statistics

Data analyzed revealed that there was a total of 13,720 respondents, with 57% of them being women leaving the remaining 42% to be men.

Table 4.1: Respondent's percentage

Respondent sex	Freq.	Percent	Cum.
Female	7,954	57.97	57.97
Men	5,766	42.03	100.00
Total	13,720	100.00	

Source: Own Computation based on KDHS, (2014)

In describing the HIV testing and the socioeconomic determinants, the study considered mainly average, range and standard deviation. As specified in table 4.2 an aggregate of 13,720 respondents were surveyed. Specifically, the study considered HIV testing as the dependent variable while age, marital status, education level, place of current residence, gender and wealth index as independent variables. Based on the findings in the table 4.2, 72.7% of the respondents were reported to have been tested for HIV with the average age being 32 years old where the oldest respondent was 64 years and the youngest 14 years.

The statistics revealed that 62.9% of the respondents live in rural area while the rest live in the urban area. Additionally, 52.8% of the respondents are married and in a monogamous union while those in a polygamous union were 6.7% those respondents never in a union were 29.4%.

Table 4.2: Summary Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
HIV_Test	13,683	.7270335	.4455	0	1
Age	13,720	32.59701	12.87706	14	64
Gender	13,720	.4202624	.493619	0	1
Residence(Rural)	13,720	.6295918	.4829316	0	1
Education_~level					
Primary Education	13,720	.3991254	.4897364	0	1
More than Secondary Education	13,720	.4858601	.4998182	0	1
Wealth_Index					
Middle	13,720	.403207	.4905595	0	1
High	13,720	.3890671	.4875564	0	1
Marital					
Single	13,710	.020496	.1416946	0	1
Widowed	13,710	.0444931	.2061954	0	1
Separated/divorced	13,710	.0479942	.2137617	0	1
Married/cohab – polygamous	13,710	.0678337	.2514695	0	1
Married/cohab – monogamous	13,710	.5281546	.4992249	0	1

Source: Own Computation based on KDHS, (2014)

The study also revealed that 39.9% and 48.5% of the respondents had primary education and more than secondary education while 11.6% had no education respectively. The study also established that of the respondents 40.3% were in the middle wealth quintile while the rich were 38.9% leaving the remaining 20.8% in the poor quintile hence most of the respondents in the study belonged to the mid-level wealth index classification.

4.3 Diagnostic tests

4.3.1 Multicollinearity test

Correlation matrix was undertaken to identify the relationship between HIV testing related variables and the independent variables considered in the study. The Positive and negative signs in the analysis are indicative of the direction of association between variables. Based on the correlation matrix table 4.5 HIV testing was found to be negatively correlated with Age, gender and residence while there is a positive correlation with the rest of the study variables. Age was

negatively related to education level and wealth index. To confirm presence of multicollinearity, the study computed Variance of Inflation Factors (VIF) as indicated in table 4.3;

Table 4.3: Variance of Inflation Factors (VIF)

Variable	VIF	1/VIF
Age	10.0	0.09803
Gender	1.87	0.533453
Residence	3.42	0.292737
Education_~l		
Primary Education	3.63	0.275703
More than Secondary Education	4.52	0.221105
Wealth_Index		
Middle	2.97	0.336526
High	3.66	0.273014
Marital		
Single	1.13	0.886763
Widowed	1.56	0.641211
Separated/divorced	1.3	0.768717

Since most of all the VIF values were less than the recommended threshold of 10 multicollinearity is absent (Research, 2007).

4.3.2 Normality test

The study undertook a normality test of the distribution of the residuals. Table 4.4 specified the results.

Table 4.4: Shapiro Wilk Test of Normality

Variable	Obs	W	V	z	Prob>z
HIV Testing	13,683	0.99984	1.042	0.110	0.45625
Age	13,720	0.94976	327.866	15.635	0.00000
Gender	13,720	0.99996	0.275	-3.487	0.99976
Residence	13,720	0.99996	0.261	-3.627	0.99986
Education level	13,720	0.99925	4.911	4.296	0.00001
Wealth Index	13,720	0.99965	2.304	2.252	0.01215
Marital	13,710	0.97100	189.159	14.150	0.00000

Note: The normal approximation to the sampling distribution of W' is valid for $4 \leq n \leq 2000$.

The results show that the data used was normally distributed to some variables such as HIV testing, gender and residence while other variables were not normally distributed since their respective p values were less than 5% leading to rejection of the null hypothesis of normality of the residuals.

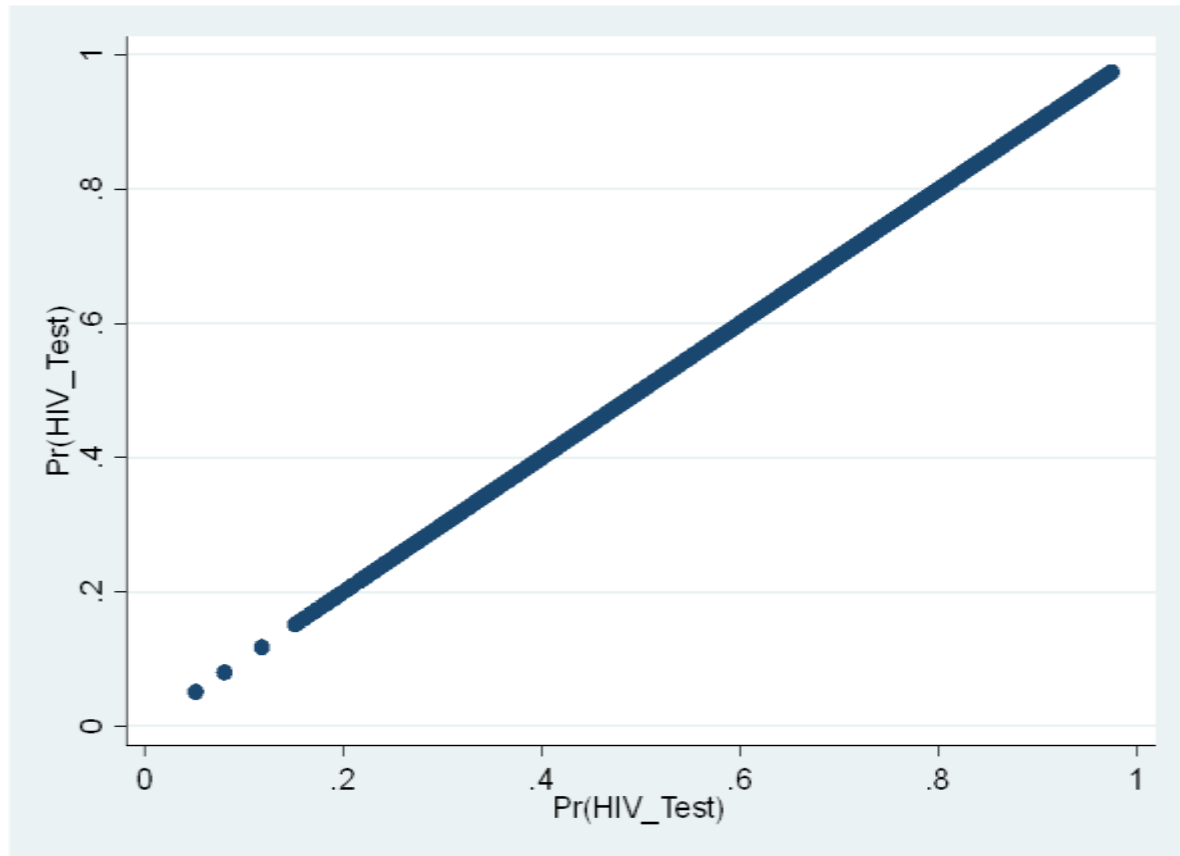
Table 4.5: Correlation Matrix

	HIV_Test	Age	Gender	Residence	Education_Level	Wealth_Index	Marital
HIV_Test	1						
Age	-0.0474	1					
Gender	-0.1867	0.0175	1				
Residence	-0.1315	0.0781	-0.0304	1			
Education_Level	0.116	-0.0789	0.1134	-0.1681	1		
Wealth_Index	0.1459	-0.0544	0.0311	-0.575	0.2817	1	
Marital status	0.1903	0.4663	-0.0967	0.0207	-0.0561	-0.0258	1

4.3.3: Heteroscedasticity test

Heteroscedasticity implies deviation of the residuals through the observations being investigated. The study used scatter plots a method of residual-square against the fitted values of the dependent variable. The results are as shown in Figure 4.1.

Figure 4. 1: A graph of Residual Square against predicted value of HIV testing



It was revealed that the plot exhibited a systematic pattern which implied that there was constant variance as expected. Therefore there is no heteroscedasticity

4.4 Regression Results

4.4.1: Introduction

Probit model was applied in the study to estimate the influence of various factors on HIV testing in Kenya. Findings are tabulated in table 4.6. to identify the impacts of the independent variables on the dependent variable. From the Table 4.6, the study found $\text{prob} > \chi^2$ of 0.000 the p value which compared to a critical value of 0.05 proved to be statistically significant. Hence our model is statistically significant with the log likelihood ratio of -7050.0889 implying that the variables considered fit the model and that the variables were significant in explaining socioeconomic determinants of HIV testing in Kenya.

Table 4.6: Marginal Effects of Probit Model

Variables	Marginal Effects	Std. Err.	Z	P>z	[95% Conf.	Interval]
Age	-0.00663	0.000337	-19.69	0.000	-0.00729	-0.00597
Gender	-0.14115	0.007051	-20.02	0.000	-0.15497	-0.12732
Residence(Rural)	-0.06601	0.009372	-7.04	0.000	-0.08438	-0.04764
Education_Level						
Primary Education	0.140902	0.013837	10.18	0.000	0.113782	0.168022
More than Secondary Education	0.180546	0.013601	13.27	0.000	0.153889	0.207202
Wealth_Index						
Middle	0.045593	0.010155	4.49	0.000	0.025689	0.065497
High	0.087151	0.012089	7.21	0.000	0.063458	0.110845
Marital						
Single	0.278072	0.025301	10.99	0.000	0.228482	0.327662
Widowed	0.285076	0.01918	14.86	0.000	0.247484	0.322669
Separated/divorced	0.312528	0.016954	18.43	0.000	0.279298	0.345758
Married/cohab - polygamous	0.330139	0.014886	22.18	0.000	0.300963	0.359315
Married/cohab - monogamous	0.312257	0.010153	30.75	0.000	0.292357	0.332156
Probit regression						
Number of obs = 13,677						
LR chi2(12) = 1935.63						
Prob > chi ² = 0.000						
Pseudo R ² = 0.1207						
Log likelihood = -7050.0889						

The Pseudo R² is 0.1207 which is low but normal in cross sectional studies which shows that the independent variables included in the model are able to explain 12% of the variation in the dependent variable.

From the results of the model, Residence, Primary education, more than secondary education, high and middle wealth index, gender, age and marital status were found to be statistically significant in determining HIV testing. Table 4.6 indicates more details of marginal effects of the probit model of various independent variables

4.4.2 Discussion of the results

Table 4.6 revealed that all variables were found to be statistically significant at both 10% and 5% significance level.

Education had a positive impact on HIV testing, statistics revealed that those with a primary education had a Z calculated of 10.8 and those that had an education higher than secondary education had a Z calculated of 13.27 which is higher than a Z critical of 1.96 hence statistical significance evidenced. This can be confirmed by the p value which was 0.000 and continues to further prove that the variable was statistically significant. An increase in education led to an increase in HIV testing where those with primary education had a 14% higher chance of testing while those that had education higher than secondary had an 18% higher chance of testing for HIV. Hence, the study established that education had a positive impact on utilization of HIV testing services. This findings however do not resonate with (Beardsell, 1994) who found that education level did not affect HIV testing rather people sought testing services due to their perception and beliefs of the benefits of the testing services. The findings imply that the more educated an individual is the more likely they are to know about HIV and hence seek testing services regularly.

Age variable revealed a Z value of 19.69 which suggests that the variable was statistically significant since the value was more than Z critical of 1.96. The variable can also be confirmed to be statistically significant by the P value of 0.000. However, the variable age was found to have a negative impact on HIV testing, for every unit increase in age there was a 0.6% decrease in HIV testing probability which implies that the older the respondent the less likely they were to test for HIV. This is a clear indication that older people do not seek HIV testing services as expected. This

findings do not concur with a study carried out in Botswana by (Staveteig et al., 2013) who found that uptake in women is least observed in younger women aged between 15-19 and those between 45-49 years. While the same study found that in men the rates were lowest between 15-19 years, followed by 20-24 years with the highest rates among those over age 25.

The study revealed a P value of 0.000 for the variable wealth which confirmed that the variable was statistically significant and further explained by a Z value of 4.49 for those in the middle wealth quintile and a Z value of 7.21 for those in the high wealth quintile which is more than the Z critical of 1.96 hence statistical significance. Wealth as a determinant revealed a positive impact on utilization of HIV testing services. Those in the middle wealth quintile had a 4.5% higher chance of testing while those in the high wealth quintile had a 8.1% higher chance of testing for HIV, this can be attributed to availability of resources like transport fees to a health facility. This continues to suggest that the poorer a population is the less likely they are to sought HIV testing services since they may even lack time to visit a facility as they might be busy looking for their daily bread. However wealth is a debatable determinant as different genders have different patterns due to the mandatory HIV testing during antenatal visits in women of all social status. (Staveteig et al., 2013) found that men in the highest quintile had a 50% likelihood to get tested than those in the lowest group, while women in the highest wealth group had a 4-18% percent higher chance of getting tested compared to those in the lowest wealth group. Hence research by (Staveteig et al., 2013) concurs with the findings.

This study revealed that a woman was 14.1% more likely to be tested for HIV than a man. This findings concur with (Obermeyer et al., 2009) who found that women had more use of HIV treatment and care facilities which is probably attributed to the cultural expectation of masculinity and femininity in the society where emphasis is placed on women depending on their husbands and the kind of disgrace that is associated with a man's incompetence to be responsible for his family. Hence suggesting that men are generally unable to seek help while women are not afraid to seek assistance which also reflects on the medical aspect as well. This variable had a Z value of 20.02 greater than the Z critical of 1.96 with a p value of 0.000 hence statistical significance

Geographical location was found to have an impact on HIV testing revealing a Z calculated value of 7.04 and a P value of 0.000 to confirm statistical significance. Those living in rural areas were 6.6% less likely to get tested for HIV this would be attributed to less allocation of resources required for HIV testing. The study concurs with (Welz et al., 2007) who carried out a study in rural South Africa where they found a high prevalence due to inadequate HIV testing and treatment resources.

Marital status revealed Z values of between 10.99-30.75 which proved to be significant since the values were higher than the Z critical of 1.96. The statistics also confirmed the significance with P values of 0.000. Married people who were in a monogamous union had a 31% higher chance of getting tested for HIV while those in polygamous unions had a 33% higher chance of getting tested. This shows that those in unions are more aware of HIV and their status compare to those not in any unions or never been in any unions. The single respondents only had a 27% chance of getting tested. Most research done on married couples was to identify discordant and concordant couples, hence the question of those likely to test between married or non-married is recommended for further study.

CHAPTER FIVE: SUMMARY, CONCLUSIONS AND POLICY RECOMMENDATIONS

5.1 Introduction

This section explores the study findings and policy recommendations on the socio-economic determinants influencing HIV testing in Kenya. Also areas to be considered in further studies are provided.

5.2 Summary and Conclusions of the study findings

The study reviewed theoretical and empirical literatures to establish the socio-economic determinants influencing HIV testing in Kenya. From the literature, challenges surrounding continuous engagement of HIV patients in care can better be addressed when there is a clear understanding of barriers in all aspects surrounding human beings i.e. social, cultural and economic environments. Based on this, the study pursued socioeconomic determinants influencing utilization of HIV testing services in Kenya. Kenya Demographic and Household survey (KDHS) of 2014 which contains factors associated with HIV testing was used. The logit regression model has been employed in estimation. The dependent variable used was HIV testing while the independent variables used include: age, marital status, level of education, place of current residence and wealth index. At 5% and 10% significance levels, the study findings revealed all determinants as significant to HIV testing.

The study found that rural residence reduced HIV testing utilization while education, marital status and wealth index positively and statistically increased utilization of HIV testing services. To improve on HIV testing coverage there is a need to consider the study findings obtained and indicated to be statistically significant.

5.3. Policy Recommendations

Kenya has been committed to eradicate HIV and to reduce the rate of mortality which has currently brought about introduction of self-testing kits. Currently, policies in place include access to testing facilities, efficient health care service delivery and confidentiality in individuals' results. The ministry and the other relevant stakeholders need to target more men and older people to reduce inadequacies of HIV testing. This could be done through creation of awareness and firm assurance of confidentiality in HIV testing centers.

There is need to develop and implement policies targeting more men individuals and those not in any unions or marriage. As from the study, those seeking HIV testing services are mostly married while those not in any unions tend to not seek the service. This can be done by conducting workshops among men to inform them on their right and responsibility as partners to ensure they are tested for HIV. This kind of awareness would lead to an increase of utilization of HIV testing in both genders.

Finally, higher education levels indicated higher utilization of HIV testing in the population. Therefore, there is a necessity of the government to ensure that more people are educated and also create more awareness on HIV which will lead to increased utilization of HIV testing.

5.4. Areas of further study

The study has mainly considered socio economic determinants of HIV testing in Kenya using a cross sectional data. The various factors that were considered in the study are indicated in the methodology section, however, other factors such as accessibility to healthcare facilities, availability of HIV treatment, trained health workers, long waiting hours in the health facilities and costs and distances incurred while seeking services were not considered. Therefore there is need to include these factors in future studies as well as include datasets relating with these independent factors.

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