FACTORS INFLUENCING NEW HIV INFECTIONS AMONG YOUTH (15 – 24 YEARS) IN NAIROBI COUNTY: A CASE STUDY OF MAMA LUCY KIBAKI HOSPITAL

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DECLARATION OF ORIGINALITY FORM

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LIST OF ABBREVIATION / ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
ARV	Antiretroviral
CCC	Comprehensive Care Clinic
CDC	Centre for Disease Control and Prevention
FGD	Focused Group Discussion
HIV	Human Immunodeficiency Virus
KII	Key Informant Interview
NASCOP	National HIV/AIDS Control Program
NACOSTI	National Commission for Science, Technology and Innovation
NGO	Non-Governmental Organization
ODK	Open Data Kit
OI	Opportunistic infection
OPD	Out-patient department
PrEP	Pre-exposure Prophylaxis
STD	Sexually Transmitted Disease
UNAIDS	United Nations Programme on HIV/AIDS
US	United States
VCT	Voluntary counselling and testing
WHO	World Health Organization

OPERATIONAL DEFINITION

Demographic factors – Population characteristics that define an individual such as age, marital status and gender.

Knowledge of HIV/AIDS – A person understanding of HIV/AIDS, how it is transmitted, the risk factors and how one can prevent from acquiring HIV.

New HIV infection - The estimated number of individuals who contracted the HIV virus in the current calendar year

Sexual activities – Individual's practices that relate to types of sexual partners, age of first sexual exposure, use of condoms and number of sexual partners.

Socioeconomic factors – The societal and monetary aspects that influence an individual such as income, occupation and education attainment.

Structural factors – These are social, policy, organizational, economic or environmental facilitators or barriers to a person's HIV prevention behavior

Structural interventions – HIV prevention strategies that include policy, social, organizational, cultural, physical, economic, community and legal factors.

Youth ----------Persons between the ages of 15 and 24 years.

ABSTRACT

Background

There are rising cases of adolescents and young adults between the ages of 15 and 24 years that are active sexually which is enhancing their risk of contracting Human Immunodeficiency Virus (HIV) and other sexually transmitted infections. Though Sub Saharan African countries have made notable improvement in controlling new HIV infections, the youth aged between 15 and 24 years remain at high risk.

Objective

This research sought to study the factors influencing new HIV infections in the youth aged 15 to 24 years in Nairobi County, so that it can inform policy and adoption of targeted interventions.

Methodology

The study was conducted at Mama Lucy Kibaki Hospital located in Embakasi Sub-County, Nairobi County through a case-control study. Quantitative data was gathered through a semi structured questionnaire on the Open Data Kit. The population for the case-control study was the youth aged between 15 and 24 years who visit Mama Lucy Kibaki Hospital seeking health services. Controls were systematically random sampled while cases were selected to achieve the computed sample size of 424 participants. Ethical considerations of approval, informed consent and confidentiality were upheld. Collected quantitative data was analyzed utilizing descriptive analysis whereas logistic regression analysis was applied to determine whether the independent variables were predictors to the new HIV infection among those aged 15 to 24 years.

Results

Out of the 424 participants who were included in the study, 75% were controls and 25% cases. The female participants represented 57.8% and 42.2% were males. The median age is 21, age ranges from 15 to 24, with an inter-quartile range 19-23. Majority of the respondents were single representing 69.6% and married 30.4%. Majority were Christians representing 85.6% (n=363). In the Univariable analysis of the factors influencing new HIV infection among youth, marital status, area of residence, source of income, age, level of education, household income, age at first sexual encounter, risk behavior of HIV, condom use in last the sexual activity, STIs in the last one year and sexual partner type were found to be significantly associated with new HIV infections among the youths (15-24 years) in Nairobi County, at 20% of level of significance.

Results from multivariate analysis indicated that age (aOR-=2.7; 95% CI 1.1-6.2), area of residence (aOR=2.1; 95% CI 1.2-3.7), condom use in the last sexual encounter (aOR=2.1; 95% CI 1.2-3.8), STIs in the last one year (aOR=7.5; 95% CI 4.1-13.7) and sexual partner type (aOR=5.4; 95% CI 1.8-16.5) were statistically significant predictors of new HIV infection among youths (15-24years) at 5% significant level. Even after exclusion of the non-significant variables in the model, this did not lead to over 30% change in regression coefficients of the remaining variables.

Conclusion

Socio-demographic factors have significantly significant influence on new HIV infections among youth (15 – 24 years) in Nairobi County.

Recommendation

The government and other stakeholders in HIV prevention should come up with programs on enhancing implementation of preventive measures such as condom use and basic principles such as ABC(abstain, be faithful and condom use) specifically geared towards the youth.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

Though people living with HIV/AIDS around the world have experienced reduced mortality rates, the Joint United Nations Program on HIV/AIDS (UNAIDS) notes that efforts to control infection rates have not been relatively successful (UNAIDS, 2018). In the world, HIV/AIDs is still the second leading cause of death while in Africa, it is the leading cause of death amongst the youth (Points & Hiv, 2016a). Statistics on the global level indicate that the number of new infectious have reduced steadily from 2010 to 2015. However, the reduction has stagnated since the statistics for 2017 indicate that globally, new HIV infections were 1.8 million. This was similar to what was recorded in 2016. Moreover, the decline in new HIV infections has averaged just 2.5 percent per annum for the past seven years to 1.8 million in 2017 from 2.2 million in 2010. This decline is not enough to attain the global goal of less than 500,000 or fewer new HIV infections by 2020. (UNAIDS, 2018) defines new HIV infection as the estimated number of individuals who acquired the HIV virus during a particular year. For statistical purposes, however, the United Nations without prejudice to any other definitions made by Member States defines 'youth' as those persons between the ages of 15 and 24 years

Southern and eastern Africa remains the region to be mostly affected with new HIV infections. The region accounts for 45 percent of the global total of HIV infections. Though rigorous efforts and interventions by the research community, civil society, the region's governments, international non-governmental organizations (NGOs) and national NGOs and CBOs have managed to reduce infection rates, huge challenges still remain. UNAIDS/WHO policy on prevention of HIV infection include; client initiative HIV testing and counseling (CITC) and provider initiative HIV testing and counseling (PITC). CITC is also known as VCT, where the client takes the effort to know their HIV status, while in PITC, the provider

makes an effort to ensure that the client know their HIV status. In Kenya the PITC has picked in almost all government and private institutions. Health sector intervention to prevention of new HIV case includes; male circumcisions in high prevalence areas like Migori and Nairobi counties just to mention a few. Detecting and managing sexually transmitted infection (STI), changing individual's behavior and addressing cultural norms, social attitudes and promoting condom use (WHO, 2009). Despite the international mobilization to combat new HIV infection, In Sub-Saharan Africa, the trend of new HIV infections is off target to meet the Fast Track targets for 2020 of UNAIDS that seek to have below 500,000 annual new HIV infections globally. People are unable to seek HIV preventive services quite on time; preventive services have been late in starting and at times under resourced. (UNAIDS, 2018). In Southern and East Africa, new HIV infections recorded in 2017 were 800,000.

Kenya ranks fourth worldwide in the HIV epidemic with around 1.6 million people living with HIV/AIDS in a population of around 40 million. The country reported 53,000 new HIV infections in 2018 (National AIDS Control Council - NACC, 2018). The statistics provided by the NACC and the ministry of health (2016) indicated that in 2015, the 15-24 age categories had increased in new HIV infection. This was an increase from the 29 percent that had been recorded in 2013. Additionally, the 2018 report on Kenya Aids Response Progress indicated that among the age group of 15 – 24 years was responsible for 51 percent of Kenya's new HIV infections. HIV infections among youths were highest in Nairobi (2,587) trailed by Homa Bay (1,852) and Siaya (1,641) counties. Other counties that recorded high prevalence include Migori (1,143), Kakamega (596), Kiambu (730), Kisumu (1,630) and Mombasa (562) (Aids & Council, 2018).

According to the most recent report (MOH, 2021) on AIDs world's day, approximately 67% of Kenya's population is under the age of 29. Despite a considerable decline in new HIV

infections among teenagers and young adults, the government has not reached its 75% reduction goal. Adolescents and young adults make up around 42% of new HIV infections in adults (15-24 years). The counties with the greatest rates of new HIV infections among young people were Homabay, Nairobi, Meru and Uasin Gishu.

Pei et al. (2018) indicate that there are significant factors that are shown to influence the high new HIV infection rates among the 15 – 24 years age group. These include incorrect perception of HIV risk, engagement in unsafe sex when intoxicated by drugs or alcohol and sexual violence among others. According to Ziraba et al. (2018), there are rising cases of emerging adults and adolescents between the ages of 15 and 24 years that are active sexually which is enhancing their risk of contracting STIs including HIV. This is because of risky sexual behaviors such sex without condoms and having many sexual partners.

Mabaso et al. (2018) established that though sub–Saharan African countries have made remarkable progress in controlling new HIV infections, in South Africa, women and young girls who are aged between 15 and 24 years old remain at high risk. The contributors towards the high risk of HIV infection in young women and girls included being older (20 – 24) relative to being adolescent. Factors that were related with low rate of HIV infection included having sexual partner who is within five years of the woman's age, having one sexual partner, attainment of tertiary education level and low alcohol use. Additionally, decreased HIV infection risk was linked to being married and living in a household with a high economic power.

Agaba et al. (2016) established that in Nigeria, few studies focus on the 15-24 years age group, despite the age group being the most affected with new HIV infection burden. The

study established that new HIV infection risk factors were residence in urban areas, female sex, being older, being in a polygamous marriage and having multiple sexual partners. Religious and cultural practices such as wife inheritance, giving daughters away for marriages are some of the main aspects contributing to HIV infection risk (Jeremiah & Okuku, 2017).

A study in Zimbabwe by Kembo (2012) assessed the issues linked with the risk aspects of HIV infection among those aged between 15 and 24 years and established that young females had double the HIV infection risk compared to their male peers. Moreover, being widowed, divorced or living separately with spouse had elevated HIV infection risk compared to the never married peers. Additionally, engaging in first sexual encounter at an early age improved the risk of HIV infection by 2.7 times compared to the young people who waited until their 20th birthday or later to engage in sex.

Amornkul et al. (2009) carried out a study in western Kenya that established that young people who had multiple sexual partners increased HIV infection risk. Another study by Kimanga et al. (2014) had similar findings to those from other parts of Africa. HIV infection was strongly associated with multiple sexual partners, age, being widowed and HSV-2 seropositivity. The first research was undertaken in the western part of Kenya, which is mostly rural and hence could not be generalized to Nairobi which is mostly urban, while the second research was undertaken using data from the entire country and did not isolate Nairobi which has high HIV infection rate amongst the 15 – 24 years age group.

This study was carried out in Nairobi County because of the high incidence of HIV infection rates among the 15 – 24-year age group. The NACC (2018) report indicated that Nairobi

County had the greatest infection numbers in the country at 2,587. The location of the study was Mama Lucy Kibaki Hospital which is situated in Embakasi Sub County of Nairobi. This hospital was selected because it is a Level Five referral hospital that serves the residents of Nairobi not just from the Eastland area of Nairobi, but from the entire county. The hospital has expanded youth friendly health services and is well equipped to provide general and specialized HIV related services for the entire Nairobi County and beyond.

1.2 Statement of the Problem

Globally, over 30% of all new HIV infections in 2019 occurred among the youth aged between 15 and 24 years (UNAIDS, 2020). There were 460,000 of those aged between 10 and 24 years that had newly contracted HIV. Globally, about 1.7 million of those aged between 15 and 24 years were living with HIV in 2019. The situation is not different in Africa. The African youth bulge portends to intensify new HIV infection further. Most of the countries in Africa have majority youthful population and projections indicate that the number of Africans aged between 15 and 24 years old by 2030 will have increased over 321 million. The number of young adults living with HIV was 1.5 million with most being in sub-Saharan Africa. In 2019, 3.9 million young adults were living with HIV and amongst them 620,000 were new infections. If the trend continues, the results could be devastating (UNICEF, 2020). It is estimated that a further 740,000 young adults are at a high risk of contracting HIV between 2016 and 2030. The advancement in the medical management approaches for HIV is yet to awaken young people's reality, mostly in middle and low income countries, particularly those in sub-Sahara Africa, such as Kenya (Points & HIV, 2016). In Kenya, 29% of all those who have newly contracted HIV are aged between 15 and 24 years (UNAIDS, 2020).

Data from the National Aids Control Council on World Aids, which was just published, shows that 61% of all adults who have newly contracted HIV in 2020 will occur in young adults and adolescents. The counties with the largest number of those aged 15 to 24 years who have newly contracted HIV were Homa Bay, Meru, Uasin Gishu, and Nairobi. Although the nation saw a 43% decrease in mortality attributable to AIDS between 2015 and 2021, 16,393 teenagers and young adults passed away from the disease this year alone. Additionally, 11,300 new HIV diagnoses have been reported among persons aged 15 to 24 years and another 5,300 among those aged 10 to 19 years (MOH, 2021). These findings indicate that the burden of HIV mostly affects the youth aged between 15 and 24 years, despite the resources, efforts, policies and strategies that have been focused on controlling new HIV infections.

1.3 Justification of the Study

The Kenya Aids Response Progress Report of 2018, notes that the 15 – 24-year age group is the most affected by new HIV infections (Aids & Council, 2018). In the last 10 years in the national agenda, adolescent reproductive and sexual health issues have increasingly featured. The high incidence of new HIV infections among the youth has fueled this issue. Despite the behavioral, structural and biomedical interventions that have been adopted in the country, trend of new HIV infections continues to rise and thus increasing the burden of HIV amongst the youth. Previous studies including Mabaso et al. (2018), Agaba et al. (2016) and Kembo (2012) were conducted in other countries in Africa whose results might not be generalizable to Kenya because of the differences in economic, socio, and cultural factors.

A study in informal settlements of Nairobi, Kenya by Ziraba et al. (2018) investigated the factors related with risk of HIV infection among adolescent girls and young women. The gap left by the study was failure to link new HIV infection risk with social and demographic

factors. The study also excluded young men and adolescent boys who were incorporated in the current study. This hence justified the current study which examine the factors influencing new HIV infections in the youth aged 15 to 24 years in Nairobi County, so that to inform policy and adoption of targeted interventions.

1.4 Research Objectives

The study's specific objectives were;

i) To determine factors influencing new HIV infections among youth (15 – 24 years) in Nairobi County (to assess demographics, socio-economic, knowledge of HIV/AIDS.

ii) To determine the influence of sexual behavior (sexual exposure, types of sexual partners, condom use and number of sexual partners) on new HIV infections among youths (15 – 24 years) in Nairobi County?

iii) To determine the influence of health care delivery and knowledge of HIV among youths on new HIV infection among youths (15-24 years) in Nairobi County?

1.5 Research Questions

i) What is the influence of socio-economic factors, demographic factors and knowledge of HIV on new HIV infections among youth (15 – 24 years) in Nairobi County?

ii) How does sexual behavior (sexual exposure, types of sexual partners, condom use and number of sexual partners) influence new HIV infections among youth (15 – 24 years) in Nairobi County?

iii) What is the influence of health care delivery and knowledge of HIV among youths on new HIV infection among youths (15-24 years) in Nairobi County?

1.6 Hypothesis

Socio-demographic factors, knowledge on HIV and health care delivery have no significant influence on new HIV infections among youth (15 – 24 years) in Nairobi County

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Literature review extant to the contributing factors towards new HIV infections among the young people of ages 15 to 24 years old is provided in this chapter. Presented in the chapter is an evaluation of past studies on the influence of socio-economic factors, demographic factors, policies and legal environment, sexual activities (sexual exposure, condom use, types of sexual partners and number of sexual partners) and knowledge of HIV/AIDS on new HIV infections amongst those aged between 15 and 24 years. Additionally, the theoretical and conceptual framework that guides the study is provided in the chapter.

2.2 Prevalence of New HIV Infections

WHO (2019) indicates that over 30 percent of new HIV infections worldwide are projected to occur amongst the youth aged 15 to 25 years. Internationally, an approximated 11.8 million youngsters are living with HIV/AIDs in the 15 to 24 age group. Every day, in the world, nearly 6,000 youngsters between 15 and 24 years contract HIV. Nonetheless, just a portion of them recognize they have the virus.

In the United States (US), the Centre for Disease Control and Prevention (CDC) indicates that in 2017, the young people aged between 13 and 24 years experienced 21 percent (8,164) of new HIV diagnoses out of a total of 38.739 in the country (CDC, 2018). Further, CDC (2018) posits that young women contributed 13 percent (1,039) while young men contributed 87 percent (7,125) relative to the total number of young people who received an HIV diagnosis. Additionally, below one percent (25) of the youth who had an HIV diagnosis were between 13 and 14 years, 21 percent (1,723) were 15 to 19 years old while 79 percent (6,416) were 20 to 24 years old (UNAIDS, 2018).

In the Caribbean and Central America, the incidence of HIV/Aids amongst those aged 15 to 24 years is 1.3 per cent. This makes the Caribbean to be second in HIV/AIDS prevalence internationally. In the region, the most affected countries are Haiti, Guyana and Bahamas. Furthermore, this region reports most of the new infections to occur amongst those aged 15 to 24 years. However, the incidence in the Caribbean contradicts that in Central Asia and Eastern Europe where HIV prevalence estimates are approximated to be 0.4 million amongst those aged 15 to 24 years (UNAIDS, 2018). Most of the affected demographic groups in the two regions include those who are active sexually, engage in intravenous drug use and those in the 15 to 24 age group who have high mobility.

The incidence of HIV/AIDS in the Sub-Saharan Africa region is the highest. Specifically, 12 Sub-Saharan Africa nations have eight percent incidence amongst the 15 to 24 age group. Estimates further indicate that most new infections affect this age group. The situation in Zimbabwe, South Africa and Botswana is critical since projections show that over 60% of the boys who are currently aged 15 years will contract HIV at some point in their life. Southern and eastern Africa remains the region to be mostly affected with new HIV infections. The region accounts for 45 percent of the worldwide total of HIV infections (UNAIDS, 2018). In 2017, there new HIV infections were around 800,000 in Southern and East Africa.

Kenya ranks fourth worldwide on HIV epidemic statistics, with around 1.6 million of its citizens living with HIV/AIDS. New HIV infections were 53,000 in the country in 2017 (NACC, 2018). The report by the ministry of health and NACC in (2016) reported that in 2015, 51 percent of the entire new HIV infections in Kenya arose amongst the 15-24 years age group. This was an increase from the 29 percent that had been recorded in 2013 (Aids & Council, 2018).

2.3 Socio-economic factors

A study by Awotidebe et al. (2014) investigated the contributing factors towards HIV infection risk. This study was conducted on young adults and adolescents who were attending school. The study's population was 430 students selected from two secondary schools in rural South Africa. In the study population, girls were 52.6% while boys were 47.4%. Questionnaires were utilized to collect the primary data on HIV/AIDS information sources, sexual behaviors, self-efficacy to decline sex, time perspective, HIV knowledge, negotiation and communication skills, peer influence and demographic information. The study results determined that 27.2% of the respondents were sexually active, 42.2% had previously engaged in penetrative sex with multiple partners while 48% indicated to have engaged in sex before their 15th birthday. Besides, the study results showed that those that regularly and consistently used a condom were 44.8%. Further, results from the study determined that peer influence was strongly associated with risky sexual behaviors of the study participants and increased their risk of new HIV infection. However, peer influence was more prevalent on boys than girls.

Pei et al. (2018) on a study in China examined factors associated with HIV infection risk for those unmarried youth aged 15 to 25 years. This study was conducted amongst the 6311 Yi community which is a region with ethnic minorities. To gather data for the research, questionnaires were utilized to gather data on key risk determining characteristics including socio-economic aspects. The study also engaged in testing the respondents for HIV. Data analysis was by logistic regression analysis and multiple correspondence analyses (MCA). Analysis established that there were 4.18 HIV infections among the respondents. Results from logistic regression analysis revealed that main factors contributing to risk of HIV

infection included history of migrating out to look for work, illiteracy and having primary school level of education or lower.

Ibrahim et al. (2019) carried out a study in Nigeria that established that in the high risk of Nigeria, being employed enhanced the probability of HIV infection. This is because those who were employed had a high probability ratio of HIV infection than the ones who were not employed. The study also established that in lack of education was a significant factor increasing the risk of HIV infection amongst the low HIV prevalence areas in Nigeria. Begna (2015) in a study in Ethiopia established that smoking and taking alcohol were key predictors of HIV/AIDS infection risk.

Karmacharya et al. (2012) investigated the factors determining the risk and incidence of HIV infection in Nepal, targeting youth and street children in Kathmandu. Purposive sampling was applied on 10 streets to select 251 youth and street children. These streets were also selected purposively since they have a high number of street families of the 17 to 24 age group. Data collection instruments were structured questionnaires. Study results showed that HIV incidence was 7.6%. Besides, intravenous drug use was indicated to be the most significant HIV infection risk factor. Moreover, the results indicated that weekly intravenous drug users were had 46 times higher risk that those who did not use while those who were occasional intravenous drug users had nine times the risk of those who did not use.

2.4 Demographic factors

The study by Awotidebe et al. (2014) established that gender difference was a key factor that influencing adolescent sexual risk behaviors. The study established that boys had a lesser risk of new HIV infection than girls. These findings concurred with findings by Kembo (2012) in

Zimbabwe. The study established that women aged 15 to 24 years had a significantly increased risk of contracting in relation to young males. The study also established that youth aged 15 to 24 years who were unmarried had significantly lesser risk of contracting HIV relative to those who were cohabiting, widowed or divorced. However, these findings contradicted the findings in china by China by Pei et al. (2018). The research by Pei et al. (2018) had established that males had a higher risk of new HIV infection compared to females. The difference in the findings from the two studies can be due to difference in social-cultural factors amongst the two communities that the studies were conducted in.

In Nigeria, Ibrahim et al. (2019) investigated the demographic factors that significantly determined the risk of HIV infection with a comparative analysis between high and low risk areas. The study targeted young adults in the 15 to 24-year age group in a cross-sectional survey. Data on socio-cultural aspects, HIV infection status and socio-demographic factors were collected and recorded in a questionnaire. Analysis of the resultant data was conducted using logistic regression analysis. Study results established that demographic factors had no statistically significant influence on HIV infection risk in low HIV incidence areas. However, study results determined that age above 19 years was related with high likelihood of HIV infection in the areas that had high HIV prevalence.

2.5 Knowledge of HIV/AIDS

Lacking HIV information on HIV/AIDS (OR = 1.22; 95 percent CI = 1.03–1.44) is regarded as one of the key factors influencing adolescents' sexual risk behaviors and increasing the risk of new HIV infection (Awotidebe et al., 2014). The study established that sexual activity was prevalent in most adolescents attending school. The study also determined that condom use in every incidence of penetrative sex was more prevalent amongst adolescents who

possessed high HIV infection knowledge as compared to those with low HIV infection knowledge.

A study by Jones, Modeste, Marshak and Fox (2013) explored the influence of education on HIV/AIDS in enhancing adolescents' knowledge and lessening risky sexual behaviors in Trinidad and Tobago. This study also examined the usefulness educational interventions on HIV/AIDS in influencing severity, susceptibility and perception regarding HIV/AIDS. The target population for the study was secondary school students from nine schools where a sample of 196 was selected. The study design utilized was quasi-experimental. The study was grounded on the Health Belief Model and the questionnaire concepts were developed using the five constructs of the model. Case control study approach was used. The study findings underscored that those in the group that undertook the four lessons of HIV education had higher scores on HIV knowledge. Moreover, study findings revealed that those that undertook HIV education lessons had an equal probability of delaying initiation of sexual activity compared to their counterparts that had not received the four lessons on HIV. The conclusion made in the study was HIV AIDS knowledge did not make the youth change their risky behavior.

In the South African city of Cape Town, a study undertaken by Simbayi et al. (2005) examined the aspects that significantly influenced the risk of contracting HIV-AIDS amongst the youth. The targeted black South Africans and investigated HIV risk aspects and risk behaviors among the community. The study enrolled a sample of 115 women and 113 men who were through facility-based surveying and street intercept, which are appropriate community-based outreach approaches. The sampled respondents were aged 25 years or below. The study findings established that 56% of the women and 68% of men had been

involved in risky sexual behaviors that exposed them to high HIV infection risk. This was despite the respondents having high HIV transmission knowledge. Moreover, the study noted that misconceptions regarding HIV/AIDS are still prevalent, mostly on the misunderstandings regarding transmission of HIV. Besides, the study results determined that lower extents of AIDS-linked knowledge were associated with high HIV infection risk amongst the male participants.

2.6 Sexual activities

WHO (2019) indicates that age of first sexual encounter is highly connected with the risk of contracting HIV among the youth. HIV prevention efforts should therefore, focus on imploring on the youth to delay engagement in sexual activity and abstaining from penetrative sexual activities. However, for those youth that are sexually active, focus should be on enhancing their access to, and utilization of wide-ranging preventative interventions, lessening sexual partner numbers, enhancing access to condoms and incorporating education on prevention. These findings relate to the findings by Kembo (2012) which established that risk of HIV infection was 2.696 times higher amongst the young people who engaged in sexual intercourse before their 14th birthday compared to those who waited until their 20th birthday to have their first sexual encounter. Moreover, Kembo (2012) revealed that HIV infection risk was 1.568 times higher amongst the youth in the 15 to 24 years age group with several sexual partners within the preceding year compared to the ones who had one or no sexual partners in the corresponding time period.

Begna (2015) on a study in Ethiopia investigated the factors that affect HIV/AIDS exposure amongst the youth in Mettu Town. The study was conducted though a cross-sectional survey design that targeted school going adolescents from grade nine to 12. Simple random sampling

method was utilized on the school registers to select a sample of 423. The study utilized questionnaires that were self-administered to collect data. Logistic regression was applied to analyze the gathered data. Results from the study determined that all the study participants had adequate knowledge on HIV/AIDS. Moreover, study results determined that over half of the surveyed school going adolescents (51%), had engaged in sexual activity, even though they were aware that that is the key means of HIV transmission. Moreover, the findings showed that condom utilization and having sexual intercourse significantly influenced the risk of contracting HIV/AIDS. This was supported by Mafigiri et al. (2017) who established that individuals who had more than two sexual partners and who did not use condoms regularly had a higher likelihood of contracting HIV.

In a study in rural Tanzania, Todd et al. (2006) investigated the risk factors for HIV infection and incidence. The study adopted a nested case-control research design. The controls in the study were 903 study participants who were selected randomly in the rural population while the cases were 92 HIV positive patients. The study results revealed that probability of HIV infection was lower in research participants who had spouses who were HIV negative compared to participants with HIV positive spouses. Furthermore, the study findings determined that the respondents with type 2 of herpes simplex virus had significantly higher prevalence of HIV infection than those who did not have the virus.

Simbayi et al. (2005) established that condom attitudes were a significant factor in explaining risk of contracting HIV amongst young men. However, the study determined that main factors enhancing the risk of contracting HIV amongst young women included having unprotected vaginal sex and negative perception that condoms intrude on sex. Another part of sexual network patterns that increased risk of HIV infections were sexual mixing designs.

Relationships between individuals at comparable HIV infection risk, also referred to as assortative mixing, significantly confine the risk in that subpopulation of risk. Begna (2015) had similar findings that most sexual and social relationships are comparatively assortative and poses less risk in the rate of HIV infection. However, sexual relationships amongst individuals with divergent risk position, also referred to as dissortative mixing, can spread the HIV infection to an entire population faster and more easily.

2.7 Interventions (Policy and legal environment)

One of the set ways to reduce HIV infections among young adults is the combined approach of set goals by the ministry of health of Kenya through the multi-sectorial approaches. Policy and legislative environment has been established in Kenya for the young adults and adolescents that inform operation framework on issues of HIV. The guidelines are documented in the Kenya guiding principles for conducting sexual reproductive health and HIV research amongst adolescents, Kenya HIV prevention revolution roadmap, workplace policy of HIV/AIDS in the education sector, Kenya AIDS strategic framework (2015 to 2019), Vision 2030, Kenya constitution 2010, Southern and Eastern Africa pledge on all-inclusive education on sexual reproductive and sexuality health services for the youth and adolescents and health policy on adolescents sexual reproduction (National AIDS Control Council, 2015).

In US, Ruiz et al. (2011) indicated that prevention of new HIV infection was effectively and greatly influenced by societal prevention interventions. Some of the notable interventions were able to reach most at risk populations and communities due to their efficiency. One such intervention which is effective and efficient in reducing HIV infections and enhancing HIV prevention behaviors amongst the youth applied in US is social marketing of condoms. This

increases the acceptance of condoms by promoting them through mass media and advertisements and also enhancing the design and production of condoms to fit the changing trends and tastes of the youth. Moreover, policies to increase access to condoms by the youth through promotional events, adult learning centers, social facilities, community health facilities and other avenues enhance access and use of condoms by the youth. Characteristically, social marketing of condoms has been associated with improved levels of condom use in the community and thus enabling the attainment of the goals of STD and HIV prevention.

A meta-analysis by Pettifor et al. (2013) established that adolescent interventions are categorized into three main groups which are structural, behavioral and biomedical. Structural interventions normally encompasses one or more of the approaches that comprise of empowering groups and communities, empowering environmental reforms, supporting political and social reforms, effecting legal or policy changes and changing detrimental social standards. Behavioral interventions deliver skills and knowledge that can significantly impact on people's capacity and motivation to enact change in behavior through behavior change communication and motivation. These include counseling, sex education and program to reduce discrimination and stigma. However, Pettifor and colleagues (2013) observed that the majority of studies are on behavior change. This leaves structural and biomedical interventions to be largely under researched among the adolescent and young adults.

According to UNAIDS (2016), HIV prevention program previously focused principally on behavior change to avert spread of HIV sexually. However, the behavior change based interventions were not effective in lowering the increasing HIV prevalence in sub-Saharan Africa. In high risks nations in Sub Saharan Africa, young people require various

interventions on top of behavior change communications to counter the spread of HIV. According to Colchero et al. (2016), community –owned, evidence-based and rights-based program that apply a combination of structural, biomedical and behavioral interventions, have been established to be relevant in meeting the youth's current HIV prevention needs. This enables the interventions to have the highest continued effect on reducing new infections.

Prevention of HIV infection using biomedical prevention mechanisms entails use of medicinal therapies or mechanisms such barrier methods (female and male condoms), post-exposure prophylaxis, antiretroviral, vaginal rings, vaginal gels and medical measures such as male circumcision with the purpose of controlling risk of HIV transmission. A study by Cohen, Chen and McCauley (2016) found that for taking ART regularly for heterosexual women and men significantly reduced HIV transmission risk to their partners who were HIV–negative. Another study by Marcus, Hurley and Nguyen (2017) found that risk of contracting HIV is reduced by 99% when one uses Prep consistently or daily. The implication of these findings is that effectiveness of PrEP depends significantly on adherence.

Johnson, O'Leary and Flores (2018) established that the risk of acquiring HIV when having sex with a HIV-positive partner is reduced by 91% when the HIV-negative partner uses condom. However, the study indicated some limitations. One of the key limitations of the study was that was that accuracy and reliability of the information may be compromised because of self-reporting. Some respondents may have self-reporting bias and this compromising data accuracy and hence the study findings. This may fail to portray the accurate indication of the effectiveness of consistent use of condom. Moreover, respondents

could have a bias in reporting on knowledge about good condom use in every sexual activity which also influences condom effectiveness.

2.8 Theoretical Framework

The social ecological model was used to anchor the study. This model according to Stokols (1992), indicate that the interrelationship between the societal, community, individual and interpersonal factors influence the health outcomes of an individual. The individual factors are the personal biological and history factors that affect the probability of an individual contracting HIV (Stokols, Pelletier, & Fielding, 1996). The relationship level focuses on the interpersonal and relationship factors that enhance the likelihood of contracting HIV. This includes sexual activities, peer influence, family influences and other relationship factors that can impact the likelihood of contracting HIV. An individual's peers, family, and social circles influence their behaviour. This in turn, can influence the possibility of engaging in behaviour which can enhance or reduce their HIV infection risk.

The community level factor considers the community settings such as neighbourhoods, workplaces, colleges and schools where people experience social relationships. These places can have factors or characteristics that can increase or reduce risk of HIV infection for the young people (Stokols et al., 1996). Factors that fall into this category include social economic factors, HIV and AIDS awareness levels and sexual activities among the young people. The societal level focuses on the regulatory, social and policy factors that regulate the climate where awareness and prevention of HIV/AIDS is inhibited or encouraged. The societal factors that pertain to HIV infection risk include cultural and social norms, educational, health, social and economic policies that assist in maintaining social and economic inequalities in the society. o Ziraba et al. (2018) postulate that the social ecological

model has been applied to link the socio-economic and demographic factors with HIV-related risk behaviours that enhance HIV infection risk. This informs the development of preventive interventions for young people in resource-rich and resource-limited settings.

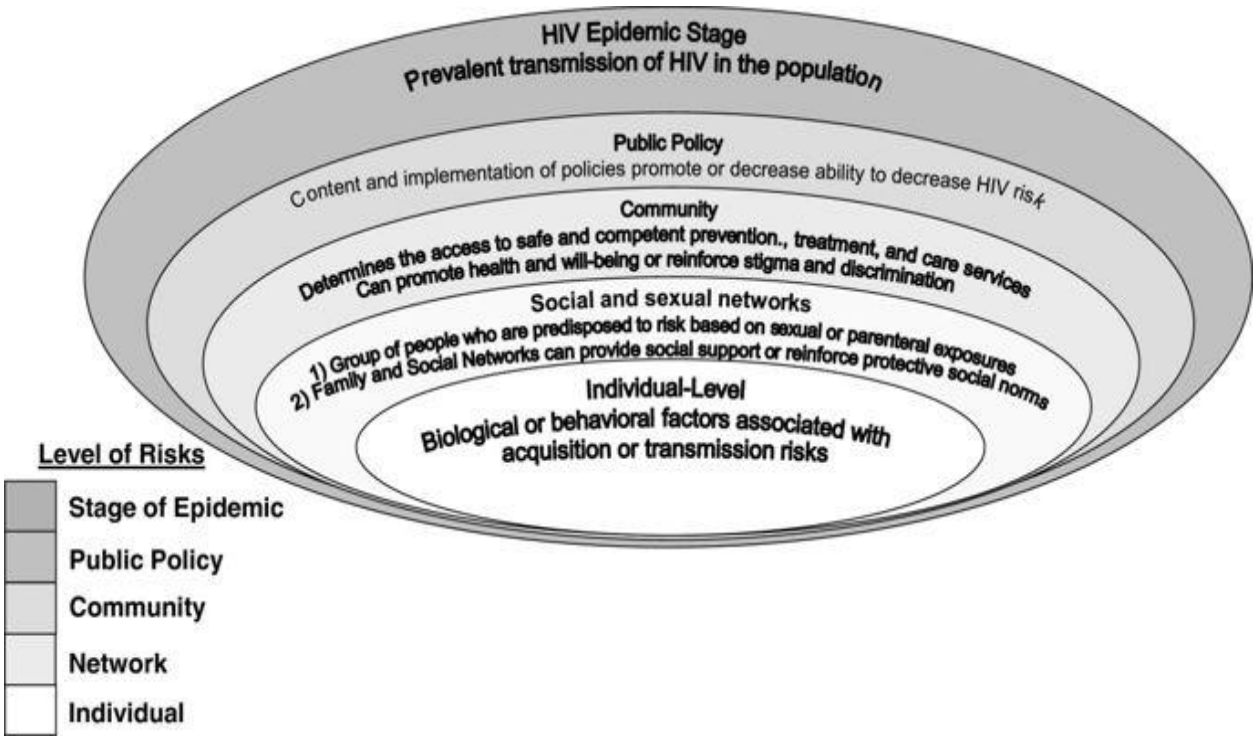


Figure 1. The Social Ecological Model

CHAPTER THREE: METHODOLOGY

3.0 Introduction

This chapter outlines the methodology that was utilized in the study. Contained in the chapter is the study area, the population of the study, research design, case definition, inclusion and exclusion criteria and the procedures that will be applied in sampling. The chapter, additionally, presents the sample size in the study, the instruments applied in gathering data and the procedures for data collection. Moreover, the chapter provides the process followed in conducting the pilot study, testing of reliability and validity of the study questionnaire and the variables of study and their measurement. Lastly, the analysis techniques used in the study and the considerations regarding ethical issues are provided in the chapter.

3.1 Study Area

Mama Lucy Kibaki Hospital is situated in Embakasi Sub County of Nairobi County, it was the study location. This facility provides a variety of inpatient and outpatient services including HIV/AIDS counseling, testing and treatment. Mama Lucy Kibaki Hospital does not only serve the Embakasi sub County of Nairobi County but also serves the whole of Nairobi County as a referral health facility. This facility was selected for this study due to its location in Nairobi, a high youth HIV infection prevalence area. The hospital also has youth friendly policies that make it attractive for many youths seeking HIV/AIDS services.

3.2 Study Design

To determine the variables that affect new HIV infection among the youth (15-24 years), the study applied a case control study that was hospital-based. The selection of the research design was justified by its appropriateness in less time needed to conduct a study because the condition or disease has already occurred and also the suitability of looking at multiple risk

factors simultaneously. Though population-based research is more preferable, the study applied a hospital-based design since it was simple to enroll the young people (cases and controls) who were seeking treatment at the institution. Additionally, controls were chosen from the same facilities outpatient section since it seemed expected that controls chosen from hospitals would behave differently from controls chosen from the public.

3.3 Study Population

The study population was all young people (15-24 years) who visited Mama Lucy Kibaki Hospital seeking health care services from mid-February 2021 to mid-April 2021 when data was gathered for this study. The researcher targeted these participants since they possess the information which is necessary to provide answer to the study's research questions. The selection of controls and cases is as detailed in section 3.5

3.5 Case and Control Definition

Cases definition

A case was a youth aged 15 to 24 years whom had been diagnosed positive for HIV in the last 12 months. Further, a case had to be a resident of the study area seeking medical services at Mama Lucy Kibaki hospital during the two-month study period.

Controls definition

Controls were youths aged 15 to 24 years with similar definition to cases bit who had not contracted HIV. Presenting at Mama Lucy Kibaki hospital during the two month study period

3.6 Inclusion and Exclusion Criteria

3.6.1 Inclusion criteria

The features or aspects that the potential participants had for them to be incorporated in the study is the inclusion criteria. In the current study, the inclusion criteria were;

- A young person of 15 to 24 years
- Those who visit Mama Lucy Kibaki Hospital during the two study period.
- Those young people who will give informed consent
- Those minors who will provide assent

3.6.2 Exclusion Criteria

Exclusion criteria are any characteristics that potential participants may have which disqualifies them for taking part in the study. The exclusion criterion in this study was;

- Any individual aged less than 15 years or above 24 years
- Those sick with opportunistic infections (OI) and unable to participate in the interview
- Those who will decline to give informed consent
- Those minors who will not provide assent

3.7 Sample Size Determination and Sampling Strategy

3.7.1 Sample size determination

The formula by Kelsey et al. (1996) was applied to determine the sample size.

The number of cases (n_1) was determined by;

$$n_1 = \frac{(Z\alpha+Z\beta)^2 pq(r+1)}{r(P_1 - P_2)^2}$$

The number of controls (n_2) was determined by;

$$n_2 = rn_1$$

The variables in the formula are computed as indicated below;

$$P_1 = \frac{P_2 OR}{1 + P_2(OR - 1)}$$

$$p = \frac{P_1 + rP_2}{r + 1}$$

$$q = 1 - p$$

In the formulas, the number of cases is denoted by n_1 while n_2 denotes the number of controls; P_1 is proportion for cases, P_2 is proportion for controls specified at 19.7% from a study by Mafigiri et al. (2017); Zα = 1.96 (for 95% confidence level); Zβ = -0.84 (required for power of 80% in the study); r = 3 is specified to enhance power of the study; And the odds ratio of ratio risk of HIV is estimated at 2 which is universally acceptable)

Using the formula the number of cases (n_1) was determined using the following computations;

$$P_1 = \frac{0.197(2)}{1+0.197(2-1)} = 0.3292$$

$$p = \frac{0.3292+3(0.197)}{3+1} = 0.2301$$

$$q = 1 - 0.2301 = 0.7699$$

$$n_1 = \frac{(1.96-0.84)^2 0.2301*0.7699(3+1)}{3(0.3292-0.197)^2} = 106$$

The total number of cases was hence computed as 106.

The number of controls (n_2) was determined using the following computation;

$$n_2 = 3(106) = 318$$

The total number of controls was 318. This therefore, led to a sample size of 424 (106 cases and 318 controls)

3.7.2 Sampling strategy

Bearing in mind that cases were only those diagnosed with HIV in the last twelve months, all patients (who matched the criterion for eligibility) coming to the hospital throughout the research period were recruited prospectively to attain the calculated sample of 106 cases. Cases were gathered at the MCH/FP clinic and CCC. At the OPD controls were systematically randomly sampled to attain the desired number of controls 318. The OPD serves an average of 2400 patients per month, since our study period was two months, a

population of 4800(N) with a sample size of 318(n) was used to calculate the systematic interval(k) as follows; K=N/n…..4800/318 =15

A random starting point was picked between the start and the interval (1^{st}- 15^{th} control patient) then a fixed periodic interval of fifteen was used subsequently until attainment of the sample size 318. Since this was a hospital based study, the population visiting the facility was considered equal hence both controls and cases were gathered from the same hospital. Control measures of COVID 19 pandemic were strictly observed during recruitment. Distance between the interviewer and the participant were observed at about one meter apart. Hand sanitizers were provided to all the participants and the interviewers. The electronic gadgets for collecting data were well sanitized.

3.8 Study Variables

New HIV infection was the dependent binary variable. Sexual activities (condom use, number of sexual partners, and sexual exposure and types of sexual partners), socio-economic factors (source of income, level of education, residence), demographic factors (age, sex, religion and marital status) and HIV/AIDS knowledge were the independent variables (explanatory). Table 3.1 presents the variables of the study and their measurement.

Table 1: Study variables and their measurements

Variable	Measurement
Sex (binary)	Either Male or Female
Marital status (Nominal)	Recorded as; Married or single.
Age (continuous)	Was expressed in years
Religious belief (nominal)	This was expressed as; Christian or non-Christian.
Area of residence	This was classified as either; Formal or informal settlement

(Nominal)	
Education level (ordinal)	Education level was classified as; No formal education, Primary, secondary, higher learning (college and university)
Source of income (nominal)	This was categorized as; none, self-employed, employed
Household Income (ordinal)	This was presented as follows; Less than 10,000 or >10,000 ksh
Age at first sexual encounter. (ordinal)	Was categorized as follows; Below 15 years, Between 15 to 17 years and 18 to 24 years
Risky behavior of HIV (Nominal)	Was categorized as; pornographic material, older partner, high rates of STI
Use of a condom during latest sexual activity (binary)	Was assessed as YES or NO if used in the last sexual encounter
No of sexual partners in the last one year (ordinal)	This was categorized as follows; One, Two, Three, Four, More than 4, as pertaining the last one year.
STI infection in the last one year, (Binary)	Was assessed as YES or NO as per the last one year
Knowledge on HIV (Nominal)	Was assessed using the below listed statements that were rated as strongly disagree, disagree, unsure, agree or strongly agree: HIV/AIDS is a punishment due to bad behavior. You can get AIDS even from one sexual encounter. People who are suspected to have HIV should be tested forcibly. Women who are HIV-positive should not be permitted to bear children. You can contract HIV by hugging a person with AIDS of HIV Having more sexual partners increases one's risk of contracting HIV You can contact HIV by injecting with a syringe or a needle used by someone else.

Sexual partner type (binary)	This was categorized as; Same sex as self and Opposite sex
Health service delivery (binary)	This was assessed in the following category; The health care facilities are friendly and assists on time, The services provided are youth friendly, Confidentiality and privacy is highly maintained, Zero payment of testing, counseling services and ARVs, VCT well integrated within the facility, ARVs are readily available ones you test HIV positive, Short distance to the facility. It was measured in two category , True or False

3.9 Conceptual Framework

Using the socio ecological model, the study was guided by the conceptual framework indicated in Figure 3.1. In the framework, the study envisages that new HIV infection is influenced by the underlying determinants and proximate factors and vice versa through social cohesion and insufficient health system.

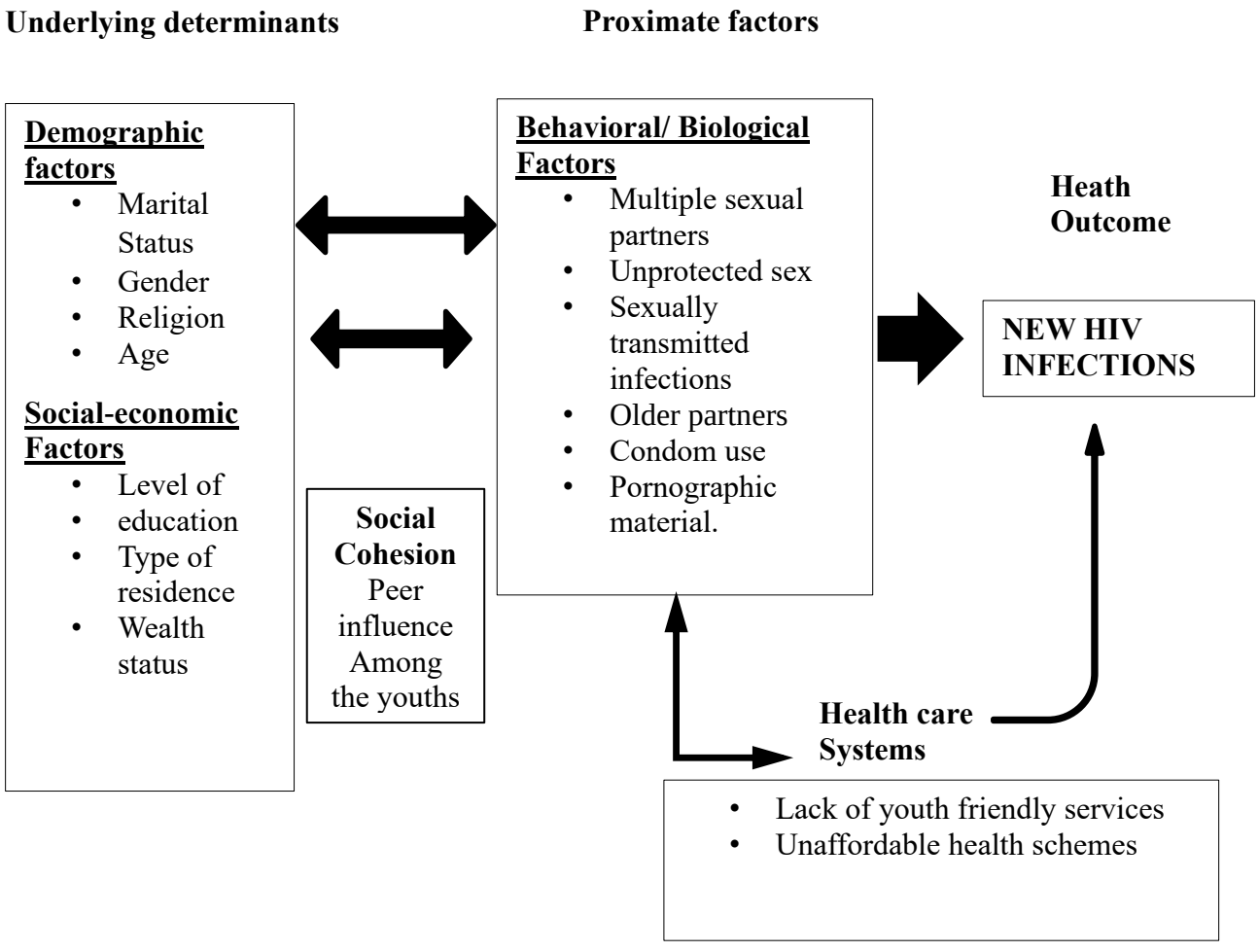


Figure 2: Conceptual Framework

Source: Author 2020.

Figure 2 provides the conceptual framework which shows that demographic factors such as marital Status, gender, religion, and age can influence new HIV infections amongst the youth. Besides, social-economic factors such as wealth status, type of residence and level of education are also hypothesized to influence the risk of new HIV infections amongst the youth. Other factors hypothesized in the framework to contribute towards new HIV infections amongst the youth include behavioral/ biological factors such as unprotected sex, STIs, having many sexual partners, and non- disclosure of HIV status. Healthcare system factors such as lack of youth friendly services, unaffordable health schemes and specialized staff shortage are hypothesized to moderate the association between the dependent and independent variables.

3.10 Data collection procedure.

Questionnaires

The research goals and literature analysis served as the anchors for the design of the study questionnaire in English-language. The phone-based open data kit (ODK) software for data collecting was then used to upload the questionnaire. It was then utilized to gather the data in English and translated into Kiswahili for the purpose of the participants that were having challenges in understanding the English language. The questionnaire had four parts; the first part was for the purpose of collecting demographic and general information regarding the young people. The next three parts collected data on social economic factors, behavioral and biological factors and knowledge of HIV/AIDS. Each of the three parts comprised of closed ended questions and the last part was designed on the 1 – 5 Likert scale. The questions were

adapted from KDHS (2014). The Researcher-administered questionnaire was applied in gathering data from individual respondents.

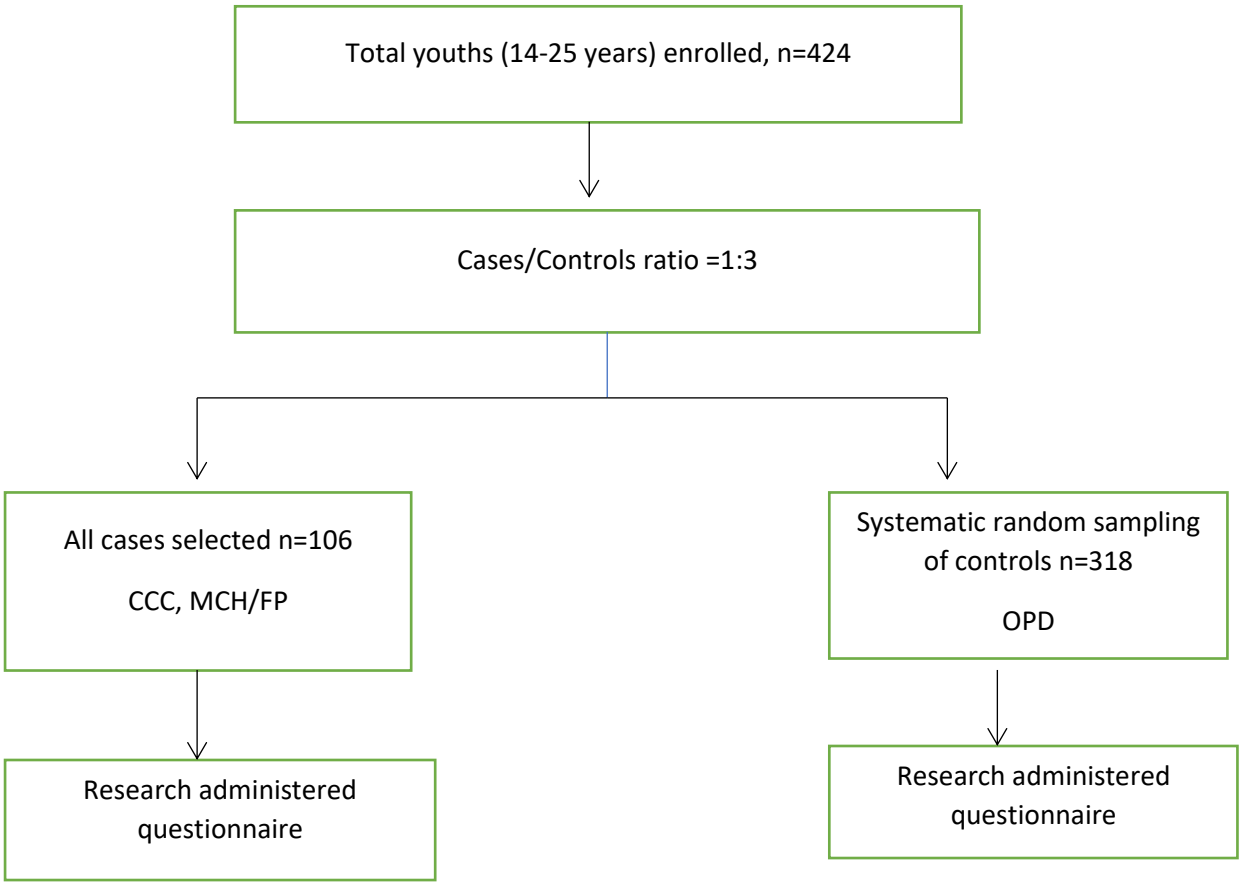
Recruitment and training of the research assistant

The study used two research assistants who were Kenya registered community health nurse (KRCHN) with diploma in nursing supported the research in data collection. They had received thorough training in data collecting methods, how to get willing participants' informed written permission, and study ethics. The primary researcher additionally instructed the research assistants on the study material's content, necessary study methods, correctly filling out and storing the pretested questionnaire, with the purpose of achieving study objectives and ensuring validity.

Recruitment Strategy for Cases and Controls

The study successfully recruited youths aged 15-24 years who visit Mama Lucy Kibaki Hospital for health services both at the outpatient and CCC and MCH/FP clinic. According to Loutfy et al. (2014) when recruiting HIV positive study participants, a strong rapport was cultivated between the study participants and the research personnel. The research assistants provided information on the study procedures, study purpose and eligibility, before requesting for informed consent from the study participants. They were provided with the study information sheet and sought their consent. Participants below the age of 18, assent were sought from them and consent sought from their guardians. This was done within a private room in the facility. The study selected a maximum of three controls for each case. Figure 3 presents the flow chart including enrollment procedures for the study.

Figure 3: Study flow chart



QUALITY ASSURANCE

The study ensured quality of the collected data by engaging in standard procedures in collecting data and conducting the interviews. Besides, the research assistants were trained on quality assurance, and specifically on participant recruitment, administration of the study tools and collecting the required data and safely storing the collected data. The training of the research assistants included a mock data collection session to ascertain that correct procedures and ethics will be adhered to.

3.11.1 PRETESTING

Before the main study, the draft questionnaire uploaded on the ODK was piloted at Bahati Health Center; Nairobi County over a period of three days. The pilot study used 20 young people (15 to 24 years) who visited Bahati Health Center seeking health services. It assisted

in establishing whether the methodology or questionnaire had any limitations which need to be addressed before embarking on the main study. The pilot study's purpose was to evaluate the research design and address any challenges or limitations on time and ensure that the methodology applied was able to support the study in providing answers to the study's research questions and testing the study hypothesis. Once the pilot study was finalized, all the essential modifications in the questionnaire were undertaken. This helped in testing of reliability and validity. Besides, the questionnaire was subjected to expert reviews to ensure construct and content validity

3.12 ETHICAL CONSIDERATIONS

Authorization for this research was sought from the School of Public Health. The study's ethical approval was requested from Mama Lucy Kibaki Hospital, Nairobi County Health Department, and National Commission for Science, Technology and Innovation (NACOSTI) and 'Kenyatta National Hospital and University of Nairobi Ethics and Research Committee (KNH/UON-ERC)'. Information about the research was provided to the targeted participants and they were then requested to provide informed consent formally by signing the consent form. For the participants who were below 18 years, consent was sought from their guardian/care givers, who signed an assent form. Privacy was guaranteed to the research respondents and they were expressly provided with an option of exiting the survey at any point if they so wish. No names or any form of identification were required from the participants in the questionnaires.

3.13 RELIABILITY AND VALIDITY

All the electronic devices for gathering data were password protected and encrypted and the device automatically locked after every 30 seconds for security measure. The filled questionnaires were examined and checked for comprehensiveness then directly sent to the

main server. Thereafter, all responses were sent to excel for validation. The information from the questionnaires was then keyed-in into STATA software for coding and cleaning and to detect missing and outlier values.

3.14 DATA MANAGEMENT AND ANALYSIS

When transmission was feasible, the questionnaires that were completed were forwarded straight to the core server. Excel was then used to record all of the questionnaire replies in order to validate them. To clean and code the data to find out-of-range and missing values, the data was transferred to STATA software version 11.2 for processing.

The study summarized the continuous variables data using descriptive statistics (medians, standard deviation, means, and interquartile range). For categorical variables, percentages and proportions were employed to provide descriptive data.

In the Univariable analysis, a liberal p-value ($p < 0.2$) was used to investigate the relationship between each predictor and the likelihood of new HIV among youths (15–24 years).According to (Dohoo et al., 2012) p value of <0.2 is used so that we don't leave out variables that are negatively confounded. Negatively confounded variables if allowed into the multivariable analysis, they may express themselves after dependent variables have been controlled for(Dohoo, I. R., Martin, S. W., & Stryhn, 2014). However, since the impact of other factors was not controlled, the crude odds ratio and value findings from the univariate analysis might not efficiently indicate the actual effect of the independent variable on the outcome variable.

Multivariable logistic regression was applied to control the effects of all other intervening factors and ensure that certain significant variables were not missed in order to estimate the net impact of each predictor variables on the dependent variable. This was accomplished by incorporating all variables from the Univariable analysis with a p value less than 0.20 (20%).

After being incorporated into the multivariate model that employed a backward step-wise method to exclude variables at less than 5% significance level until the final model was reached, variables that were significant in the univariate models were then added. The important factors that affected new HIV infection among youths (15–24 years old) in Nairobi County were incorporated in this model. The p-value cutoff for statistical significance was 0.05 ($p < 0.05$). In order to further analyze the connections, odds ratio and 95% CI estimations were employed.

3.15 MINIMIZATION OF ERRORS AND BIASES

The questionnaires were visually scanned for correctness and completeness before being forwarded from the ODK to the main server. The principal investigator and the data entry clerk who were both independent, then submitted the data to the main server to reduce data input error. By extensively teaching the research assistants on the data collecting technique to guarantee consistency in eliciting information from the respondents, information bias was reduced.

3.16 DISSEMINATION PLAN

Dissemination of findings is a strategic procedure that encompasses deliberation of target audiences and settings in which the study findings are received and, the process of interacting and communicating with wider health services and policy audiences in ways that will facilitate research uptake in decision-making. This study plans to share a summary of the research findings with Bahati Health Centre, Mama Lucy Kibaki Hospital, and National Aids Control Council (NACC), the director of health services in Nairobi City County and any other healthcare policy or service institution that will show interest. Besides, the results will be published in a peer-reviewed journal and it will also be bound into a book that will be

deposited at the University of Nairobi to ensure the findings are accessible to a wider audience.

LIMITATIONS OF THE STUDY

The study notes that recall of previous exposure was more probable to be complete to respondents who were cases relative to controls, leading to estimates away from null. Sampling bias, the study participants might not represent the general population since a sample was collected from only one health facility (Mama Lucy Hospital) in Nairobi County. Because of the typically retrospective design of this study, the research only established a relationship between the outcomes and hypothesized exposures, but did not establish causation. This study simply determined the association between current state and previous events.

The assumption that all the controls sampled at OPD were HIV negative since they were never tested, hence having some controls as hidden cases.

CHAPTER 4: STUDY RESULTS

4.1 INTRODUCTION

The study results, and interpretation of findings after data collection are provided in this chapter. It represents background information of respondents basically based on study objectives. Descriptive as well as inferential statistics were applied to analyze the data. According to Fisher (2017), logistic regression analysis is an effective data analysis procedure that assist an investigator to establish the likelihood of a certain event occurring based on the occurrence of another variable. Logistic regression has been used to determine the odds ratio of the four factors that could be playing a role in new HIV infection amongst the youth (15-24 years). To enrich the presentation for ease of understanding the output, tables and figures have been utilized to present the research findings from the logistic regression and descriptive analysis.

4.2 DESCRIPTIVE ANALYSIS

A total of four hundred and twenty-four (n=424) participants participated in the research that aimed at looking into the factors influencing new HIV infections among youth (15-24 years) after having been randomly selected and consented. This comprised of 106 cases and 318 controls. The descriptive statistics are summarized in Table 4.1.

Table 2: Descriptive statistics of youths 15- 24 years attending clinic at Mama Lucy Kibaki Hospital, Nairobi. (n=424)

VARIABLE	VALUES	FREQUENCY N=424, n (%)	CASES N=106, n (%)	CONTROLS N=318, n (%)
Demographic Characteristics				
Age				
	15-18 years	102 (24.1)	20(19.6)	82 (80.4)
Median age	19-24 Years	322(75.9)	86 (26.7)	236 (73.3)
	-	21	-	-
Sex	Male	179 (42.2)	43 (24.0)	136 (76.0)
	Female	245 (57.8)	63 (25.7)	182 (74.3)
Marital status	Married	129 (30.4)	20 (15.5)	109 (84.5)
	Single	295 (69.6)	86(29.2)	209 (70.8)

Religious believe	Christian Non-Christians	363 (85.6) 61 (14.4)	87 (24.0) 19 (31.2)	276 (76.0) 42 (68.8)
Socio-economic characteristics **Level of Education**				
	No formal Education *Primary* *Secondary* *Tertiary*	0 (0.0) 56 (13.2) 239 (56.4) 129 (20.4)	0 (0.0) 17 (30.4) 50 (20.9) 39 (30.2)	0(0.0) 39 (69.6) 189 (79.1) 90 (69.8)
Residence	Formal Settlement Informal Settlement	234 (55.2) 190 (44.8)	40 (17.1) 66 (34.7)	194 (82.9) 124 (65.3%)
Source of Income	None Self-employed Employed	189 (44.6) 80 (18.9) 155(36.6)	47(24.9) 14 (17.5) 45(29.0)	142(75.1) 66(82.5) 110 (71.0)
Household Income	Less than 10,000ksh >10,000 ksh	273 (64.4) 151(35.6)	76(27.8) 30(19.9)	197(72.2%) 121(80.1)
Behavioral and Biological factors **Age at first sexual Encounter**				
	Below 15 years Between 15 to 17 years 18- 24 years	80(18.9) 193(45.5) 151(35.6)	27(33.8) 51(26.4) 28(18.5)	53(66.2) 142(73.6) 123(81.5)
Risk behavior of HIV	Pornographic Materials Older partners High rates of STI	97(22.9) 211(49.7) 116(27.4)	16(16.5) 46(21.8) 44(37.9)	81(83.5) 165(78.2) 72(62.1)
Use of condom in last sexual activity	Yes No	201(47.4) 223(52.6)	43(19.3) 63(31.3)	180(80.7) 138(68.7)
Number of Sexual Partners in the last one year	One Two Three Four More than 4	226(53.3) 127(30.0) 44(10.4) 15(3.5) 12(2.8)	52(23.0) 38(29.9) 9(20.4) 3(20.0) 4(33.3)	174(77.0) 89(70.1) 35(79.6) 12(80.0) 8(66.7)
STI Infection in the last one year	Yes No	87(20.5) 337 (79.5)	55(63.2) 51(15.1)	32(36.8) 286(84.9)
Sexual partner Type	Opposite sex Same sex	396 (93.4) 28(6.6)	86(21.7) 20(71.4)	310(78.3) 8(28.6)

DEMOGRAPHIC CHARACTERISTICS

The results of the demographic characteristics indicate that the overall median age is 21, age ranges from 15 to 24, with an inter-quartile range 19-23.

In this population majority were female 57.8% (n=245) of which 25.7 percent (n=63) were cases and 74.3 percent (n=182) were controls. Regarding marital status 69.6 % (n=295) of the respondents were single and this comprised of 29.2 % (n=86) cases and 70.8 % (n=209)

controls. Regarding religious belief 85.6 % (n=363) of the respondents were Christians with 24 % (n=87) cases and 76% (n=276) controls.

SOCIO-ECONOMIC CHARACTERISTICS

Most of the research participants 56.4 %(n=239) had at least secondary education with20.9 %(n=50) being cases and 79.1 %(n=189) controls. Distinctly most of the respondents leaved in formal settlement area 55.2 %(n=234) among them 17.1% (n=40) cases and 82.9 %(n=194).However majority had no source of income 44.6 %(n=189) of which 24.9 %(n=47) were cases and 75.1 %(n=142) controls. The highest stated household income by the respondents was less than 10,000ksh 64.4 %(n=273) comprising of 27.8 %(n=76) cases and 72.2 %(n=197) controls.

BEHAVIORAL AND BIOLOGICAL FACTORS

Respondents who stated to have experienced their sexual debut between 15 to 17 years were 45.4% (n=193), comprising of 26.4% (n=51) cases and 73.6 % (n=142) controls. On what puts youths at risk of being infected with HIV, sexual relationship with older partners by the youths was the most stated 49.7%(n=211), cases and controls being 21.8%(n=46) and 78.2%(n=165) respectively. About half of the respondents never used condom in their latest sexual activity; 52.6 % (n=223) cases being 31.3 % (n=63) and controls 68.7 %(n=138). 53.3%(n=226)respondents had one sexual partner in the last one year, this comprising of 23%(n=52) cases and 77%(n=174) controls .Majority of the respondents had not contracted STIs in the last one year 79.5%(n=337),15.1%(n=15.1) being cases and 84.9%(n=84.9) controls. On sexual partner type, opposite sex partner was the highly stated 93.4 %(n=396), this comprising of 21.7 %(n=86) cases and 78.3 %(n=310) controls.

Analysis on Knowledge of HIV

The study variables were analyzed using a five-point Likert scale to assess the degree of agreement by respondents with the questionnaire statements. In the scale, 5 is the highest and it represented strongly agree while 1 was the lowest and it represented strongly disagree and were analyzed through standard deviations and means. The mean that was closer to 1 meant that there was disagreement while a mean around 2.5 signified neutrality with a mean around 5 signifying strong agreement. Negative statements were transformed to ensure same direction of analysis in calculating aggregate mean which represent the knowledge level of respondents. The aggregate mean was **4.17** which mean that there was strong agreement among the respondents based on the statements on knowledge.

Table 3: Knowledge on HIV

Statements	**Strong agree**	**Agree**	**Unsure**	**Disagree**	**Strongly Disagree**	**Mean**	**SD**
HIV/AIDS is not a punishment due to bad behavior	109(25.7)	278(65.6)		31(7.3)	6(1.4)	4.07	0.821
You can get AIDS even from one sexual encounter	49(11.6)	337(79.5)	4(0.9)	24(5.7)	10(2.4)	3.92	0.748
People who are suspected to have HIV should not be tested forcibly	68(16.0)	333(78.5)	1(0.2)	20(4.7)	2(0.5)	3.91	0.626
Patients with HIV/AIDS should be provided with the same quality of healthcare provided by other patients.	80(18.9)	332(78.3)	1(0.2)	10(2.4)	1(0.2)	4.22	0.538
Women who are HIV-positive should not be permitted to bear children	198(46.7)	192(45.3)	19(4.5)	14(3.3)	1(0.2)	4.41	0.738
You cannot contract HIV by hugging a person with AIDS or HIV	259(61.1)	161(38.0)	0	3(0.7)	1(0.2)	4.52	0.560
You cannot contract be infected by sitting next to a person with AIDS or HIV?	232(54.7)	188(44.3)	0	3(0.7)	1(0.2)	4.51	0.566
You cannot contract HIV by caring for an individual with HIV or AIDS?	81(19.1)	321(75.7)	9(2.1)	11(2.6)	2(0.5)	3.96	0.590
Having more sexual partners increases one's risk of contracting HIV	74(17.5)	326(76.9)	0	16(3.8)	8(1.9)	4.11	0.861
You can contact HIV by injecting with a syringe or a needle used by someone else	51(12.0)	365(86.1)	3(0.7)	3(0.7)	2(0.5)	4.04	0.703
Aggregate Mean						**4.17**	

The respondents had high knowledge on HIV since all the means are closer to five (strongly agree).

4.4 Assessment of statements on HIV transmission

The findings as shown in Figure 4 below illustrate that 84.7% of the participants stated that HIV cannot be passed through blood transfusion, 90.3% agreed that HIV can be transmitted through breastfeeding, 92.5% agreed that HIV infection risks is reduced by having only one sexual partner. Additionally, 90.3% agreed that circumcision reduces risk of HIV infection, 84.9% agreed that males who engage in sexual activity with other males increase their HIV infection risk. Further 75.2% agreed that a mother can pass HIV to her child, 98.3% supports the idea that unprotected sex increases risk of HIV infection and only 1.9%agrees that HIV can be gotten through handshake. Generally the participants had high knowledge on HIV transmission.

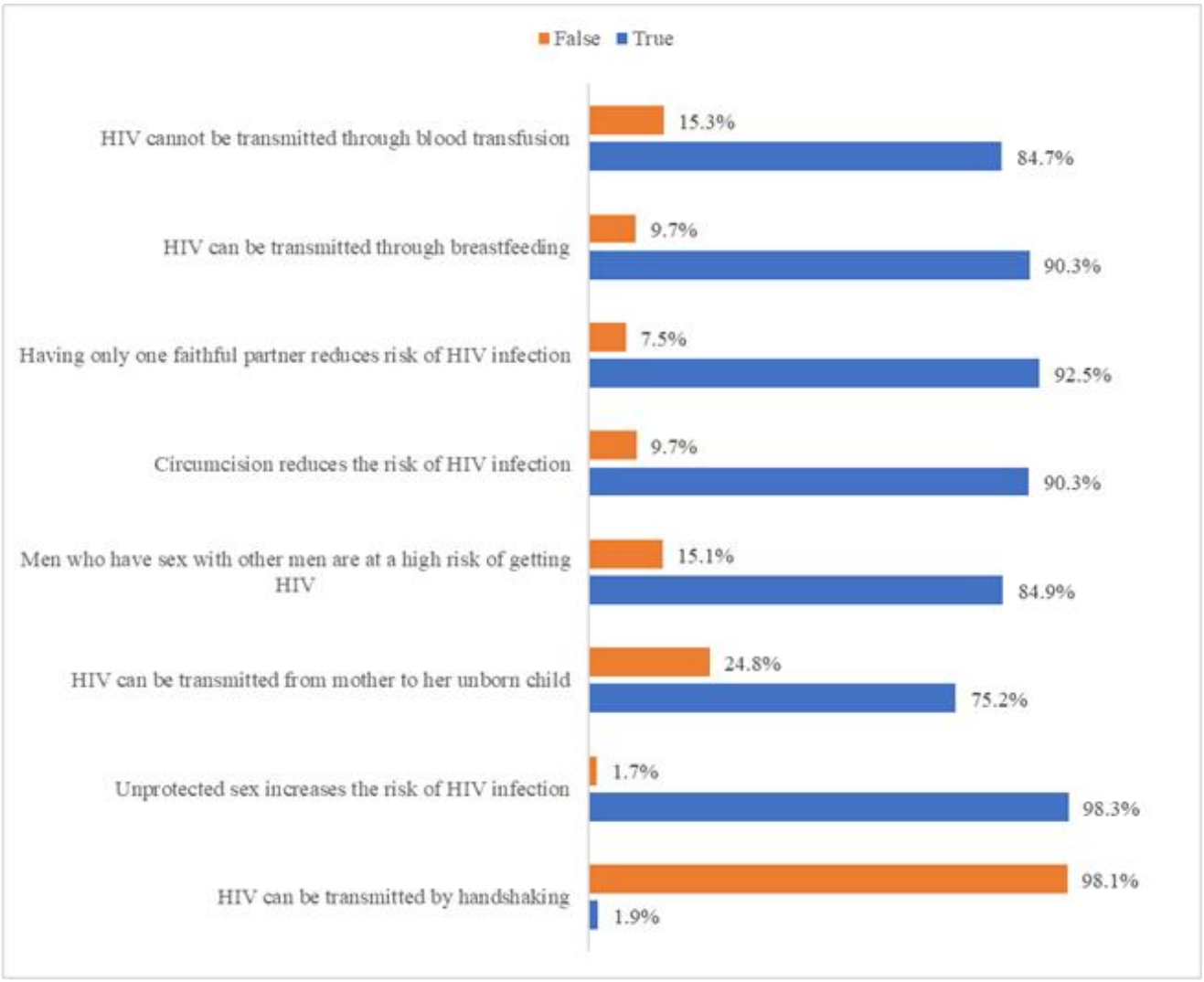


Figure 4: Analysis of statements of knowledge on new HIV infection.

Health service delivery profile

The investigation of health service delivery profile was as indicated in Figure 5. Almost all of the respondents affirmed that the statements on health service delivery were true.

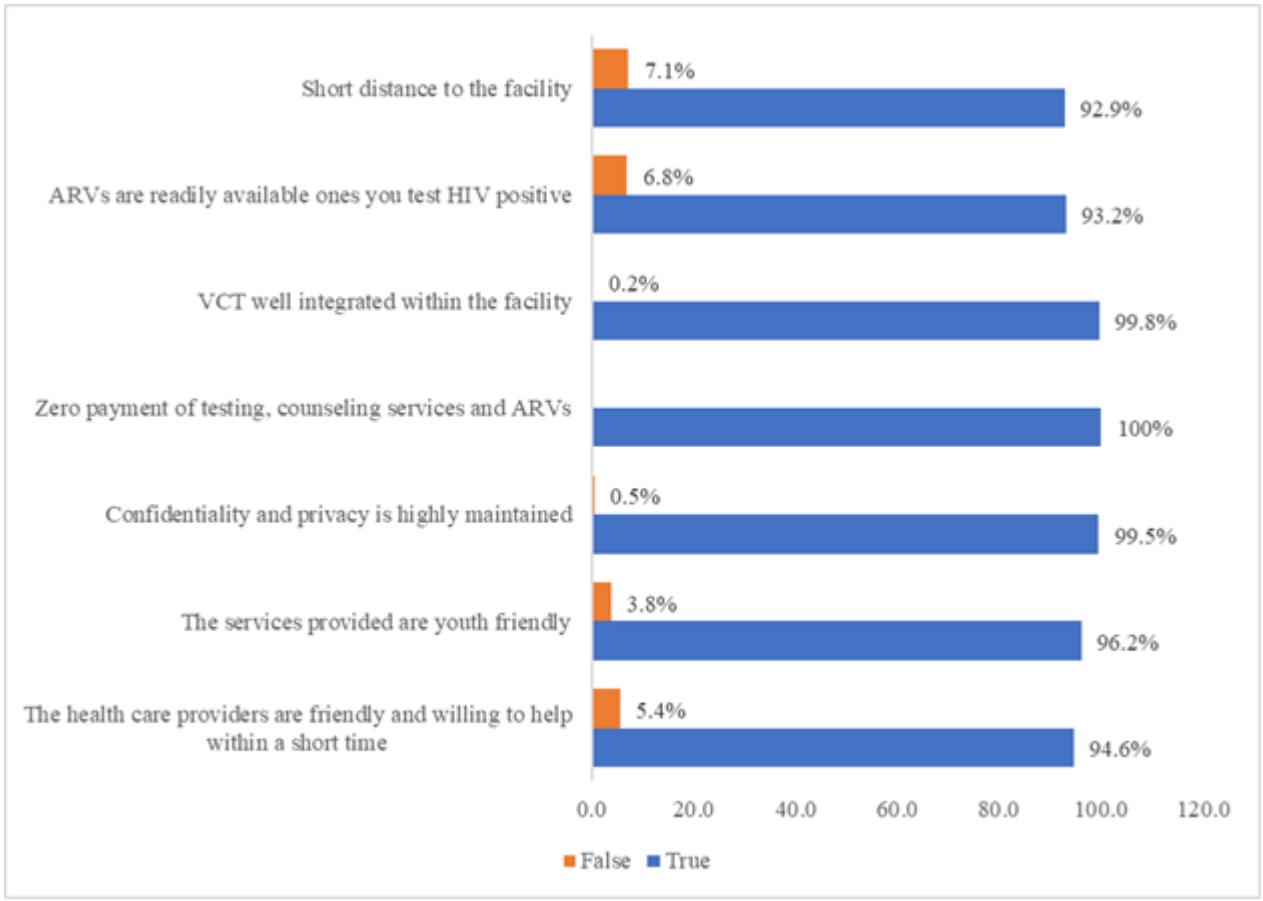


Figure 5: Analysis on health service delivery profile.

4.5results of Univariable regression analysis

The study established that demographic factors had a significant relationship with new HIV infection among adolescents and young adults (15-24 years) included religious belief ($p<0.001$), marital status ($p<0.001$) and age ($p=0.14$). All the socio-economic factors were significantly associated with new HIV infection among adolescents and young adults (15-24 years); household income ($p=0.18$), source of income ($p=0.092$), area of residence ($p<0.001$), and level of education ($p=0.089$). The biological and behavioral factors that were significantly related with new HIV infection among adolescents and young adults (15-24 years) were use of condom in latest sexual activity ($p=0.0041$), age of sexual debut ($p=0.032$), risk behavior of HIV ($p<0.001$), STIs in the last one year ($p<0.001$) and sexual partner type ($p<0.001$) were found to be significantly associated with new HIV infections

among the youths (15-24 years). The analysis was conducted on 20% of level of significance. These variables were afterwards incorporated into the multivariate analysis.

Table 4: Univariable analysis of factors influencing new HIV infection among youth (15-24 years) at Mama Lucy Kibaki Hospital, Nairobi County. (N=424)

VARIABLE	VALUES	Odds ratio	95% CI Lower-Upper	HIV p-value
Age	15-18 years	ref	-	**0.14***
	19 – 24 years	1.5	0.8-2.6	
Sex	Male	0.9	0.5-1.4	0.69
	Female	ref	0.5-1.4	
Marital status	Married	ref	-	**0.0021***
	Single	2.24	1.31-3.84	
Religious belief	Christian	ref		0.24
	Non-Christians	1.4	0.8-2.6	
Level of Education	*No formal Education*	-	-	**0.089***
	Primary	ref	-	
	Secondary	0.6	0.3-1.2	
	Tertiary	0.9	0.9-2.0	
Area of Residence	Formal Settlement	ref	-	**<0.001***
	Informal Settlement	2.6	1.6-4.1	
Source of Income	None	1.6	1.0-3.7	**0.14***
	Self-employed	ref	-	
	Employed	1.9	0.8-3.0	
Household Income	Less than 10,000	ref	-	**0.07***
	>10,000	0.6	0.4-1.0	
Age at first sexual Encounter	Below 15 years	2.2	1.2-4.2	**0.032***
	Between 15 to 17 years	1.5	0.9-2.7	
	18- 24 years	ref	-	
Risk behavior of HIV [h]	Pornographic Materials	0.7	0.3-1.3	**0.0006***
	Older partners	ref	-	
	High rates of STI	2.2	1.3-3.6	
Use of condom in the latest sexual activity	Yes	ref	-	**0.0041***
	No	1.9	1.2-2.9	
Number of sexual Partners in the past year	One	ref	-	0.53
	Two	1.4	0.8-2.3	
	Three	0.8	0.3-1.9	
	Four	0.8	0.2-3.0	
	More than 4	1.7	0.4-5.8	
STI in the last one year [k]	Yes	9.6	5.6-16.3	**<0.001***
	No			

Sexual Partner Type	Opposite sex	ref	-	**<0.001***
	Same sex	9.0	3.8-21.16	

Eligible variables to be incorporated in the multivariable analysis (p<0.20)

The use of p<0.20 in Univariable analysis is liberal so that we don't leave out variables that are negatively confounded. Some variables may be negatively confounded by other variables so that when we allow them into the multivariable analysis they can express themselves after having been controlled for other variables.(*Veterinary Epidemiologic Research*, 2004)

4.6Results of Multivariable Regression analysis

Study findings from the multivariable analysis indicated that age, area of residence, use of condom in the latest sexual activity, sexual partner type and STIs in the last one year were e statistically significant predictors of new HIV infection among youths (15-24years) at 5% significant level (Table 3). Regression coefficients of the incorporated variables did not change by more than 30% as a result of the non-significant variables being removed from the model.

Relative to respondents whose age was between 15-18 years, those that were aged 19-24 years had 2.7 times the odds (aOR-=2.7; 95% CI 1.1-6.2) of new HIV infection controlling for their area of residence, , STIs in the last one year, use of condom in the latest sexual activity and sexual partner type.

Respondents that lived in informal settlement had 2.1 times the odds of new HIV infection (aOR=2.1; 95% CI 1.2-3.7) as those that lived in formal settlement controlling for age, STIs in the last one year, use of condom in the latest sexual activity and the sexual partner type.

Participants that failed to use a condom in the latest sexual activity had 2.1 times odds of getting newly infected with HIV (aOR=2.1; 95% CI 1.2-3.8) relative to those that used

condom in the last sexual encounter holding age, area of residence, STIs in the last one year and sexual partner type constant.

Compared to those who did not suffer STIs in the last one year, those that had suffered STIs in the last one year had 7.5 times odds (aOR=7.5; 95% CI 4.1-13.7) of new HIV infection controlling for age, area of residence, sexual partner type and use of condom in the latest sexual activity.

Respondents with same sexual partner type had 5.4 times odds (aOR=5.4; 95% CI 1.8-16.5) of new HIV infection relative to those with opposite sexual partner type controlling for age, area of residence, use of condom in the last sexual encounter and STIs in the last one year.

Table 5: Multivariable Analysis of Factors associated with new HIV infection among youths (15-24 years) at mama Lucy Kibaki hospital, Nairobi County (N=424)

VARIABLES	VALUES	aOR	95% CI Lower –Upper	HIV p-Value
Age	15-18 years	ref	-	0.0241
	19-24 years	2.7	1.1-6.2	
Area of Residence	Formal Settlement	ref	-	0.01
	Informal Settlement	2.1	1.2-3.7	
Use of condom in the latest sexual activity	Yes	ref	-	0.009
	No	2.1	1.2-3.8	
STIs in the last one year	Yes	7.5	4.1-13.7	<0.001
	No	ref	-	
Sexual Partner Type	Opposite sex	ref	-	0.0028
	Same sex	5.4	1.8-16.5	

aOR, adjusted odds ratio.

CHAPTER 5: DISCUSSION, CONCLUSION AND RECOMMENDATION.

5.1Introduction

This chapter addresses the study's findings in connection to the purpose and goals as well as pertinent evaluations with the results of other studies from the literature. The main objective of this research was to determine factors affecting new HIV infections among the youths aged 15 to 24 years in Nairobi County.

Key findings

1) Age was a significant risk factor influencing new HIV infection among youths (15-24years), with youths aged 19-24 years having 2.7 times higher odds of new HIV infection relative to youths aged 15-18 years.
2) Area of residence was linked with new HIV infection, with those living in informal settlement having 2.1 times higher odds of new HIV infection relative to those living in formal settlement.
3) Use of condom use in the latest sexual encounter was highly related with new HIV infection with those who failed to use a condom in their latest sexual activity having 2.1 times odds of new HIV infection relative to the ones who used a condom.
4) STI infection in the last one year was statistically related with new HIV infection with those who were infected with STIs in the last one year having 7.5 odds of new HIV infection relative to the ones who never contracted STIs
5) Sexual partner type was found to be statistically significant predictor for new HIV infections among the youth, with those sexual partners of the same sex having odds of 5.4 of new HIV infection compared to those with same sex sexual partners.
6) Demographic characteristics; sex, marital status and religious belief. Socio economic characteristics; level of education, source of income and household income. Behavioral and biological factors; age at first sexual encounter, risk behavior of HIV

and number of sexual partners in the last one year, were not statistically significant in this study.

5.2 DISCUSSION

Age was a significant risk factor influencing new HIV infection among youths (15-24 years), with youths aged 19-24 years having 2.7 times higher odds of new HIV infection relative to youths aged 15-18 years (Table 3). A study by (Ziraba et al., 2018) in Nairobi found similar results that the older youths were highly predisposed to new HIV infection because the likelihood of engaging in "high risk" sexual risk behavior was higher among older youths (19–23 years). The study by (Winston et al., 2015) had similar findings after conducting analysis of the data gathered from the 2005–06 Zimbabwe Demographic and Health Survey. The findings from the study determined that people aged 21–24-year age group, are linked with a significant 0.379 times higher risk of HIV infection compared to their counterparts aged 15-17 years ($p < 0.000$). This also has a similar finding by (Mabaso et al., 2021) that the older youths have higher risk to HIV infection, with possible explanation that lengthy survival of older youths who contracted HIV infection through mother to child has posed challenges leading to onward transmission ones they start engaging in unprotected sex. This can be explained further that those aged less than 18 years were likely to be unmarried thus lesser risk of HIV infection compared to those above 19 years that were likely to be married, cohabiting or divorced (Ibrahim et al., 2019). This is also collaborated by the results of a study from Gambia (Sonko, Chung, Hou, Chen, & Chang, 2022) which found that older youths are prone to new HIV infection since they are more probable to be active sexually and economically empowered meanwhile teenagers between the ages of 15 and 19 years have a lower risk of contracting HIV.

Living in informal settlement was found to be having 2.1 times higher odds of new HIV infection relative to living in formal settlement. These findings are comparable to findings from a study in Kenya by (J. Madise et al., 2018) that determined that there is heightened risk of new HIV infection in slum dwellers compared to other urban residence. This is explained by poor lifestyle leading to immoral lifestyle to earn a living. Youths brought up in such environment and lifestyle tends to adopt the same lifestyle. A Nairobi Slum HIV Prevalence Survey by(J. Madise et al., 2018) had similar results that the likelihood of contracting HIV for males who reside in informal settlements is significantly higher compared to those for males who do not reside in informal settlements in urban areas (OR=0.51). Another similar finding by (Kabiru, Beguy, Crichton, & Zulu, 2019) in Kenyan slum supports this findings too. This can be explained further by the fact that lack of adequate, secure, and stable housing is a substantial hindrance to appropriate and consistent medical care, adherence and access to antiretroviral medication which could lead to risk of forward transmission due to lack of sustained viral suppression (Stokols, 1992).

Condoms use linked with new HIV infection among youths, with those who used condom in their last sexual encounter having 2.1 times higher odds of new HIV infection. This finding support the findings from a report on a study in Kenya among youths in Kibera slums which determined that due to the youth's perception of reduced risk of HIV infection, many youths (51%) who were engaging in sexual activity were not using condoms (Nganda, Komen, & Mbogoh, 2020). Another study with similar findings was undertaken in sub Saharan Africa between 2015-2019 and reported that around 60% of young women between the ages of 15 and 24 years who engaged in sex with many sexual partners had not used a condom in their latest sexual activity in 19 out of 23 nations that were included in the study (Points & Hiv, 2019). A similar study in Taiwan showed that the overall use of condoms during the latest

sexual activity reduced to 25.72% from 57.07% (Hin & Siu, 2021). The likely explanation is that youths consider themselves invulnerable to HIV, fear of being dropped by sexual partners; it's a source of income hence non-disclosure of HIV positive sexual partners. According to a recent assessment by the Kenyan Ministry of Health, despite condom usage being one of the main preventative strategies for HIV/AIDS, STDs, and unintended pregnancies, the tendency is still extremely strong and condom adoption remains low in Kenya. Here in Kenya, data shows that usage is 14.3 condoms per man per year, which is below the worldwide aim of 40 condoms per man per year. This demonstrates that, with respect to sex education and HIV prevention, particularly among young people, there is still more work to be done by several stakeholders, including the Ministry of Education and the religious sector. There is a need for persistent emphasis on condom usage since the fundamentals of HIV prevention, such as ABC (Abstain, Be Faithful, and/or Condom Use), have been disregarded.

Having suffered STIs was statistically related with new HIV infection with those who were infected with STIs in the last one year having 7.5 times higher odds of new HIV infection. These findings are collaborate the findings from a study in western Kenya that found out that out of the adolescent that were HIV positive, of the ones that had been tested for STIs, 28% (55/194) had more than 1 positive test (Winston et al., 2015). These results are consistent with research in the US by (Newbern et al., 2013), that HIV risk doubled for those who had STI during adolescent and risk increased with increasing number of adolescent STI episode. Similarly, research by (Mabaso et al., 2018) in South Africa reported a significant relationship between new HIV infection among youths and STIs, it further explained that HIV and both non-ulcerative and ulcerative STIs share the same route of transmission. Also sexual behavior that puts a person at risk for acquiring STI are same as HIV; unprotected sexual activity, multiple sexual partners and concurrent partnership.

Sexual partner type was found to be statistically significant predictor for new HIV infections among the youth, with those sexual partners of the same sex having 5.4 times higher odds of new HIV infection. This finding is consistent with a meta-analysis study in sub Saharan African that showed that MSM had 8.62 times higher HIV infection risk relative to other males (Hessou et al., 2019). This could be because there is a likelihood of condom less sex increasing among same sex partners. There is also increased condom less sexual activity frequency due to alcohol or and drug use (Morgan et al., 2017). A larger proportion of the same sex partners have higher educational attainment and no employment. Another explanation would be that the nature of the sexual network itself makes HIV transmission more likely. If a portion of MSM find partners online, the likelihood that their partner has HIV is already two to three times higher than it is for MSM in other networks (Bhattacharjee et al., 2020)

After accounting for the above variables, the following variables were not significantly associated with new HIV infection among youths (14-25 years): Demographic characteristic (sex, marital status and religious belief), socio economic characteristics (level of education, source of income and household income) and behavioral and biological factors (age at first sexual encounter, number of sexual partners in the preceding one year, and risk behavior of HIV).

Demographic characteristic: sex, marital status and religious belief.

Religious belief was not significant to new HIV infection among youths(15-24yrs). This is consistent with study results from a by (Muula et al., 2012) in Malawi which reported that there is no association between religious affiliation and HIV prevalence although other sexual behaviors, such as use of condom use during first sexual activity, and engagement in

premarital sex increase the risk of contracting HIV. Nevertheless, there are studies with contradicting findings which have established that religious beliefs significantly influence risk of new HIV infection. A study result by (Vigliotti, Taggart, Walker, Kusmastuti, & Ransome, 2020), revealed that many Tanzanians' attitudes about HIV/AIDS are profoundly influenced by their religious beliefs. A significant portion of those polled said that persons who have HIV had not obeyed God's Word, and that HIV may be treated via prayer. The study also determined that some participants were of the opinion that HIV is a punishment because of disobeying God. Religious views about God's judgment and adherence to His Word were highly associated with HIV-related shame (Zou et al., 2009)

Sex was not statistically significant, though in other studies (Magadi, 2011), women had 60% greater average risks of contracting HIV than males did. When controlling for background demographic/socioeconomic characteristics and HIV/AIDS awareness variables, this remains the same, indicating that women have an infection risk that is, on average, 60% greater than that of males with comparable background characteristics and HIV/AIDS knowledge. The differing impacts of HIV/AIDS risk factors on women and men may be used to explain the gender differences in HIV/AIDS prevalence (Sia et al., 2016).

Marital status was not significantly linked to new HIV infection among youths (15-24years). This results concurred with the findings of a retrospective study conducted using DHSs from the Demographic and Health Surveys conducted in seven sub-Saharan African nations by (Tenkorang, 2014). Married or unmarried women had equal chances of getting HIV infection; hence marital status had no influence on HIV infection. The association between contracting HIV and marital status multifaceted, the risk is dependent on numerous sexual behavior practices and demographic factors.

However, a another study that was conducted in south Africa (Shisana et al., 2004) showed that unmarried individuals had a greater rate of HIV infection (15.70%) than married

individuals (10.48%) (P-value 0.001). Unmarried persons had a 1.59 (95% CI: 1.58 - 1.60) greater risk of contracting HIV than married people. Interesting findings came from further investigation on the connection between HIV status and marital status. Men who were married or single did not have a different risk of contracting HIV (11.59% vs. 11.41%, p-value 0.891). But compared to married women (9.82%), unmarried women (18.53%) had a considerably higher likelihood of being infected with HIV (P-value 0.001). Unmarried women had nearly a two-fold greater chance of contracting HIV compared to married women (OR 2.09, 95% CI: 1.70 - 2.57). Compared to married women, married males had a substantially increased risk of contracting HIV (OR 1.34; 95% CI: 1.02 - 1.77). In addition, unmarried women had a statistically significant higher risk of contracting HIV than unmarried males (OR 1.74, 95% CI: 1.43 - 2.11).

Socio economic characteristics: level of education, source of income and household income.

Educational level of participants was not significantly related with new HIV infection among youths (15-24 years) this could be due to the fact that all the participants were all educated at different levels. However, other studies found a relationship between HIV infection and level of education. A study results in Uganda by (Igulot & Magadi, 2018) found that among men and women in urban areas at the population level, greater educational attainment was adversely correlated with having HIV. Overall, higher and secondary education was linked to a 37% lower risk of contracting HIV than no education. Using data from nine sub-Saharan African nations, the Demographic and Health Survey (Mee et al., 2018) discovered that the strength of the link between being enrolled in school and health differed by country. In Uganda (aOR: 0.48; 95%CI: 0.29-0.80), Swaziland (aOR: 0.32; 95%CI: 0.17-0.59), and Lesotho (aOR: 0.37; 95%CI: 0.17-0.79), there evidence showed that enrollment in school was strongly related with a reduced risk of contracting HIV. However, there was no evidence

supporting this relationship in Malawi, Zimbabwe, Kenya, Tanzania, Mozambique, or Zambia. Another Demographic and Health Survey, however, found a low but significant individual-level link between women's risk of contracting HIV and educational inequalities in partnerships. This survey was conducted in seven SSA nations with broad HIV epidemics. The ordinary person's education was linked to a greater risk of contracting HIV, often increasing with elementary schooling before peaking and declining for advanced attainment levels. Between surveys, the relative risk of HIV infection decreased for those that had attained higher education levels practically everywhere, and this fall generally was significant (Harling & Bärnighausen, 2016).

Source of income and household income were both not significantly associated with new HIV infection among youths (15-24). This can be explicated by the mere fact that majority of the study population were youths and basically dependent on their parents. However, after adjusting for country-level effects, a study correlated multi-national data from DHS and individual HIV test results from 16 countries from sub-Saharan Africa (Fox, 2012) showed that wealthier people had, on average, higher odds of contracting HIV than poorer people did (OR 1.03, p 0.01). Additionally, research that combined personal wealth with regional wealth (whether a person lived in a wealthy or a poor location) revealed that HIV prevalence grew in poor regions with wealth whereas HIV prevalence reduced in affluent regions. As a result, those who were affluent were more likely to get the disease in the poorest districts, and people who were poor were more likely to contract it in the wealthiest ones. Similar results were found in research conducted in Uganda (Igulot & Magadi, 2018) showing that women, rural regions, and family income status all significantly positively correlate with HIV infection.

Behavioral and biological factors: number of sexual partners in the last one year, age at first sexual encounter, and risk behavior of HIV.

There was no statistical significant association between new HIV infection among youths (15-24 years) and participants' age at first sexual encounter. This could be because majority of the participants who had sex in their early age were HIV negative. However other studies (Roman, Pramila, & Michael, 2017) are associating HIV infection with earlier sexual debut. Results from research in Mombasa among young women (Becker et al., 2018) showed an relationship between HIV infection and early sexual debut.

The risky behavior (pornographic material, older partners and high rates of STI) was established to be statistically related with new HIV infection among youths. This could be due to other stronger risky behavior factors that were never listed in the study.

The number of sexual of partners in the last one year was found not to be statistically related with new HIV infection among youths(15-24 years),nonetheless, a study in Malawi (Wilson Chialepeh & Sathiyasusuman, 2015)showed an association between multiple sexual partners and STI/HIV infection. According to the study's findings, numerous sexual relationships are characterized by a higher number of partners over the course of a lifetime, more frequent coitus, early sexual behavior, and unprotected coitus. Additionally, people who have more than one sexual relationship use condoms less often than those who only have one partner, which encourages the spread of HIV and STDs.

5.3 CONCLUSIONS

The conclusion recapitulates the study results based on the specific objective of the study. This study established that participant's age was the only demographic factor that was associated with new HIV infection among youths (15-24 years). Older youths (19-24 years) are at a high risk of new HIV infection compared to the younger youths. The risk factor for new HIV infection among the younger and older youths seems to defer.

The study also provided evidence that area of residence is also a risk factor to new HIV infection among youths. It is the only socio-economic factor that was significantly associated with new HIV infection among youths. Compared to youths who lived in formal settlements, the odds of new HIV infection among youths who lived in the informal settlement was roughly twice higher.

Behavioral and biological factors produced the highest risk for new HIV infection among youths. Use of a condom during the last sexual activity, STI in the last one year and partner type were the behavioral risk factors that were related with new HIV infection among the youth in Nairobi County. According to this study about 53% of the participants failed to use a condom in their last sexual activity and yet condom use is the major method of HIV prevention. The odds of new HIV infection among youths who failed to use a condom in their last sexual activity were slightly more than twice higher.

About 80% of the participants had suffered STI in the last one year. This is a very high number, however, since majority of the participants failed to use a condom in their last sexual activity, this could be a contributing factor since the main route for STIs and HIV transmission is majorly through sexual intercourse. The odds of new HIV infection among the youths who suffered STI were 7.5 times higher.

The odds of new HIV infection among participants who had same sex partners was 5.4 times higher.

5.4 RECOMMENDATIONS

The study makes the following recommendations based on the findings to help enhance several programs and policies that have been put in place to help reduce the risk of new HIV infection among youths in Nairobi County (15-24 years).

1. The government to ensure that preventive programs (condom use) and provision of health care services on HIV are well designed and specifically geared towards the youth. Intensified health messages on proper condom use to the youths.

2. Routine STI screening should be carried out among youths at different departments within hospitals. The government through the ministry of education should also introduce policies on routine STI screenings at all secondary schools and higher learning institutions.

3. Different stakeholders including the Ministry of Education and the religious sector should enhanced methods of modifying HIV risk behavior regarding sex education, behavior modification and HIV prevention among the youth.

4. The government should come up with strategies (economic stipulates) to improve the livelihood of the youths living in informal settlement areas.

5. Other studies on risk factors of new HIV infection among youths should be carried on different youth category that is the younger youths and older youths.

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APPENDICES

APPENDIX A: Consenting /Assenting Explanation Form

TITLE OF THE STUDY: FACTORS INFLUENCING NEW HIV INFECTIONS AMONG YOUTH (15-24 YEARS) IN NAIROBI COUNTY: A CASE STUDY OF MAMA LUCY KIBAKI HOSPITAL

INTRODUCTION TO THE STUDY

I am **Catherine A. Gwada,** a student in the school of public health in The University of Nairobi. This study is a requirement the award of a Master's degree in Public Health of The University of Nairobi. The purpose of this study is to determine the aspects playing a role in new HIV infection among the youth aged 15 to 24 years in Nairobi County.

You have been selected because you satisfy the conditions for participants for the study and you will provide important information for. You are therefore invited to take part in filling the questionnaires.

VOLUNTARY PARTICIPATION AND WITHDRAWAL

Your participation in this research is completely voluntary. There is no penalty whatsoever, if you choose not to participate in the study or take part in the study but withdraw anytime during the study period, there is no penalty for such decision. Even when you consent to the study, you are not compelled to respond to a question that you are not comfortable with. Some questions maybe personal, but confidentiality is assured and the information provided by you will not be connected to you since names will not be recorded anywhere.

BENEFITS AND RISKS

As a voluntary participant in the study, there is no direct benefit, although; your ideas will be

very helpful to the stake holders to provide more friendly and effective information that can help reduce new HIV infection among youths. There are no major risks for taking part in the study; however some of the questions asked may make you uncomfortable, you have the right to refuse to answer them. Refusal to participate in the research will not affect the services you are entitled to in this facility. We will give you a copy of this form for your records.

PROCEDURE

As a voluntary participant in the study, you will be requested to either participate in giving important information for the study through key informant interview or focused group discussion or to fill a questionnaire

The interview will roughly take 20 minutes.

CONFIDENTIALITY

You will be provided with a consent form which you will be requested to sign, and you will be left with a copy. Your name is not required and should not be written anywhere in the study documents. Moreover, do not give any personal identification in the questionnaire. All the questionnaires will be kept safely and destroyed after the study. There shall be no way to identify individual participants.

KIAMBATISHO A: FOMU ya Ufafanuzi kuhusu dodoso hili

KICHWA CHA UTAFITI: MAMBO YANAYOSHAWISHI MAAMBUKIZI MAPYA YA HIV MIONGONI MWA VIJANA (MIAKA 15-24) KATIKA KAUNTI YA NAIROBI: UTAFITI WA KESI YA HOSPITALI YA MAMA LUCY KIBAKI

UTANGULIZI WA UTAFITI

Mimi ni **Catherine A. Gwada,** mwanafunzi katika shule ya afya ya umma katika Chuo Kikuu cha Nairobi. Utafiti huu ni sharti la tuzo ya shahada ya uzamili katika Afya ya Umma

ya Chuo Kikuu cha Nairobi. Madhumuni ya utafiti huu ni kuamua vipengele vinavyo jukumu la maambukizi mapya ya HIV miongoni mwa vijana wenye umri wa miaka 15 hadi 24 katika kaunti ya Nairobi.

Umechaguliwa kwa sababu unakidhi masharti kwa washiriki kwa ajili ya utafiti na utatoa habari muhimu. Kwa hiyo unaalikwa kushiriki katika kuyajibu maswali.

USHIRIKI WA HIARI NA KUJIONDOA KUTOSHIRIKI

Ushiriki wako katika utafiti huu ni wa hiari kabisa. Hakuna adhabu yoyote, ikiwa unachagua kutoshiriki katika utafiti au kushiriki katika utafiti. Ukiamua kujiondoa wakati wowote katika kipindi cha utafiti, hakuna adhabu ya uamuzi kama huo. Hata unapokubali utafiti, hulazimiki kujibu swali ambalo unahisi halipo sawa kulingana na msimam wako. Maswali mengine labda ni ya kibinafsi, lakini usiri unahakikishiwa na habari iliyotolewa na wewe haitaunganishwa na wewe kivyovyote kwani majina hayatarekodiwa mahali popote kwenye dodoso hili.

FAIDA NA HATARI KWA KUKUBALI KUHUSIKA

Kama mshiriki wa hiari katika utafiti huu, hakuna faida ya moja kwa moja, ingawa; mawazo yako yatasaidia sana kwa washika kigingi kutoa taarifa zaidi na bora ambazo zinaweza kusaidia kupunguza maambukizi mapya ya HIV miongoni mwa vijana. Hakuna hatari kubwa za kushiriki katika utafiti; hata hivyo baadhi ya maswali yanayoulizwa yanaweza kukufanya udhani unalenwa kibinafsi lakini usiwe na wasiwasi, una haki ya kukataa kuyajibu. Kukataa kushiriki katika utafiti hakutaathiri huduma unazostahili katika kituo hiki. Tutakupa nakala ya fomu hii kwa rekodi zako.

Utaratibu

Kama mshiriki wa hiari katika utafiti, utaombwa ama kushiriki katika kutoa habari muhimu

kwa ajili ya utafiti kupitia mahojiano muhimu ya habari au majadiliano ya kikundi yaliyolenga au kujaza kidodokezo

Mahojiano yatachukua takriban dakika 20.

Usiri

Utapatiwa fomu ya idhini ambayo utaombwa kusaini, na utaachwa na nakala. Jina lako halihitajiki na halipaswi kuandikwa mahali popote katika nyaraka za utafiti. Aidha, usitoe kitambulisho chochote cha kibinafsi katika dodoso. Maswali yote yatahifadhiwa salama na kuharibiwa baada ya utafiti. Hakutakuwa na njia ya kutambua washiriki binafsi.

APPENDIX A: Consenting Form

STUDY NUMBER----------

I have read and been explained to what the study entails, purpose and nature of the study. The confidentially measures, benefits and risks involved and I do here by agree/do not agree to participate in the study.

Signature of participant/respondent---------- Date ----------

Signature of researcher/research assistant ---------- Date ----------

.

Kiambatisho A: Fomu ya Idhini

NAMBARI YA KUJIFUNZA----------

Nimesoma na kuelezwa kwa kile utafiti unaonyesha, kusudi na asili ya utafiti. Hatua za siri, faida na hatari zinazohusika na ninafanya hapa kwa kukubaliana / hazikubaliani kushiriki katika utafiti.

Sahihi ya mshiriki / mhojiwa---------- Tarehe ----------

Sahihi ya msaidizi wa mtafiti / mtafiti ----------Tarehe ----------

APPENDIX B: Assenting Form

STUDY NUMBER----------

I have read and been explained to what the study entails, purpose and nature of the study. The confidentially measures, benefits and risks involved and I do here by agree/do not agree to participate in the study.

Signature of participant/respondent---------- Date ----------

Signature of the guardian ……Date……

Signature of researcher/research assistant ---------- Date ----------

Contact information

If you have any questions now or in the future about the study, you are free to contact me on the mobile phone number 0726272953 or the secretary, Kenyatta National Hospital/University of Nairobi – Ethics and Research Committee (Tel; 0202726300-9 ext. 44102).

Kiambatisho B: Fomu ya Kuomba mshiriki

NAMBARI YA UTAFITI HUU----------

Nimesoma na kuelezwa kwa kile utafiti unaonyesha, kusudi na asili ya utafiti. Hatua za siri, faida na hatari zinazohusika na ninafanya hapa kwa kukubaliana / hazikubaliani kushiriki katika utafiti.

Sahihi ya mshiriki / mhojiwa---------- Tarehe ----------

Sahihi ya mlezi ..... Tarehe.....

Sahihi ya msaidizi wa mtafiti / utafiti ---------- Tarehe ----------

Maelezo ya mawasiliano

Ikiwa una maswali yoyote sasa au katika siku zijazo kuhusu utafiti huu, uko huru kuwasiliana nami kwenye nambari ya simu ya rununu 072627272953 au katibu, Hospitali ya Taifa ya Kenyatta / Chuo Kikuu cha Nairobi - Kamati ya Maadili na Utafiti (Tel; 0202726300-9 ext. 44102).

APPENDIX C: Questionnaire

Instructions

- Kindly provide response to all the questions
- Interviewer ID……..
- Participant ID……
- Has consent been obtained? YES[ ] NO[ ]
- If NO, END THE SURVEY

SECTION A: DEMOGRAPHIC INFORMATION

1. What is your age in years? ……

2. Sex : Male [ ] Female [ ]

3. What is your current marital status:

a) Married [ ]

b) Single [ ]

4. What is your religious belief?

a) Christian [ ]

b) Non-Christian [ ]

SECTION B: SOCIO-ECONOMIC INFORMATION

5. Indicate your highest level of education?

a) No formal education [ ]

b) Primary [ ]

c) Secondary [ ]

d) Tertiary(College/university)[ ]

6. Indicate the one of the following that best defines your area of residence?

a) Formal settlement [ ]

b) Informal settlement [ ]

7. Indicate your source of income

a) None [ ]

b) Self-employed[ ]

c) Employed [ ]

8. What is the income of your household (KSH)?

a) Less than 10,000 [ ]

b) >10,000 [ ]

SECTION C: BEHAVIORAL AND BIOLOGICAL FACTORS

9. What was your age at first sexual encounter?

a) Below 15 years [ ]

b) Between 15 to 17 years [ ]

c) 18 to 24 years [ ]

10. What puts youths at risk of HIV?

a) Pornographic material [ ]

b) Older partners [ ]

c) High rates of STI [ ]

11. In your last sexual encounter, did you use a condom?

Yes [ ]

No [ ]

12. How many sexual partners have you had during the last one year?

One [ ]

Two [ ]

Three [ ]

Four [ ]

More than 4 [ ]

13. Have you suffered from any sexually transmitted infection in the past one year

Yes [ ]

No [ ]

SECTION D: KNOWLEDGE OF HIV

14. You are requested to indicate whether you strongly disagree, disagree, unsure, agree or strongly agree with every statement provided below:

Statement	**Strongly agree**	**agree**	**unsure**	**disagree**	**Strongly disagree**

HIV/AIDS is a punishment due to bad behavior					
You can get AIDS even from one sexual encounter					
People who are suspected to have HIV should be tested forcibly					
Those with HIV need to be blamed for getting the virus					
Patients with HIV/AIDS should not be provided with the same quality of healthcare provided by other patients.					
HIV-positive women should not be allowed to have children					
You can contract HIV by hugging a person with AIDS or HIV					
You can contract be infected by sitting next to a person with AIDS or HIV?					
You can contract HIV by caring for an individual with HIV or AIDS?					
You increase the risk of contracting HIV by having more sexual partners					
You can contact HIV by injecting with a syringe or a needle used by someone else					

15. What type of sexual partner do you have?

a) Same sex as self [ ]

b) Opposite sex [ ]

16. The statements provided below are either true or false?

statement	True	False
HIV can be transmitted by handshaking		
Unprotected sex increases the risk of HIV infection		
HIV can be transmitted from mother to her unborn child		
Men who have sex with other men are at a high risk of getting HIV		
Circumcision reduces the risk of HIV infection		
Having only one faithful partner reduces risk of HIV infection		
HIV can be transmitted through breastfeeding		
HIV cannot be transmitted through blood transfusion		

17. Health service delivery profile.

Kindly indicate whether the statements provided below are true or false.

statement	**True**	**False**
The health care providers are friendly and willing to help within a short time		
The services provided are youth friendly		
Confidentiality and privacy is highly maintained		
Zero payment of testing, counseling services and ARVs		
VCT well integrated within the facility		
ARVs are readily available ones you test HIV positive		
Short distance to the facility		

KIAMBATISHO D: Dodoso

Maelekezo

- Tafadhali unaombwa kutoa majibu kwa maswali yote
- Kitambulisho cha Mhojiwa.....
- Kitambulisho Mshiriki...
- Je, idhini imepatikana? NDIO [ ] HAPANA [ ]
- IKIWA HAPANA, MALIZA UCHUNGUZI

SEHEMU YA A: TAARIFA TENDETI KUMHUSU MHUSIKA

17. Una umri wa miaka mingapi? .....

18. Jinsia : Mwanaume [ ]Mwanamke [ ]

19. Hali yako ya sasa ya ndoa:

a)Nipo kwenye ndoa [ ]

b)Siko kwenye ndoa [ ]

20. Imani yako ya kidini ni nini?

a)Kikristo [ ]

b) Sio kikristo[ ]

SEHEMU B: TAARIFA ZA KIJAMII NA KIUCHUMI

21. Onyesha kiwango chako cha juu cha elimu?

e) Sina elimu rasmi [ ]

f) Msingi [ ]

g) Sekondari [ ]

h) Elimu ya juu (Chuo) [ ]

22. Onyesha mojawapo ya yafuatayo ambayo yanafafanua vyema eneo lako la makazi?

c) Makazi rasmi [ ]

d) Makazi duni [ ]

23. Onyesha chanzo chako cha mapato

a)Hakuna [ ]

b)Kujiajiri[ ]

c)Ajira rasmi [ ]

24. Mapato ya familia yako (KSH) ni nini?

c) Chini ya 10,000 [ ]

d) >20,000 [ ]

SEHEMU C: MAMBO YA KITABIA NA KIBIOLOJIA

25. Umri wako ulikuwa gani wakati wa kufanya ngono kwa mara ya kwanza?

d) Chini ya miaka 15[ ]

e) Kati ya miaka 15 hadi 17[

f) Miaka 18 hadi 24 [ ]

26. Nini kinawaweka vijana katika hatari ya HIV?

d) Nyenzo za ponografia[ ]

e) Mtazamo mdogo wa hatari[ ]

f) Kua na uhusiano na walio na umri mkubwa [ ]

g) Viwango vya juu vya STI [ ]

27. Katika kushiriki ngono kwako kwa mara ya mwisho, je, ulitumia kondomu?

Ndiyo[ ]

Hapana]

28. Ni wapenzi wangapi wa ngono ambao umewahi kuwa nao katika mwaka mmoja uliopita?

Mmoja [ ]

Wawili [ ]

Watatu [ ]

Wanne [ ]

Zaidi ya 4 [ ]

29. Umeathirika na maambukizi yoyote ya zinaa katika mwaka mmoja uliopita

Ndiyo[ ]

Hapana]

SEHEMU YA D: UFAHAMU ULIO NAO KUHUSU hiv

30. Unaombwa kuonyesha kama haukubaliani sana, kutokubaliana, hauna uhakika, unakubaliana au kukubaliana sana na kila taarifa iliyotolewa hapa chini:

Taarifa	**Kubaliana kwa nguvu**	**Kukubaliana**	**Uhakika**	**Hawakubaliani**	**Kutokubaliana vikali**
hiv/UKIMWI ni adhabu kutokana na tabia mbaya					
Unaweza kupata UKIMWI hata kutoka kwa kukutana kingono mara moja pekee					
Watu wanaoshukiwa kuwa na HIV wanapaswa kupimwa kwa nguvu					
Wale wenye HIV wanahitaji kulaumiwa kwa kupata virusi					
Wagonjwa wenye HIV/UKIMWI hawapaswi kupatiwa ubora sawa wa huduma za afya zinazotolewa na wagonjwa wengine.					
Wanawake wenye HIV hawapaswi kuruhusiwa kupata watoto					
Unaweza kuambukizwa VVU kwa kumkumbatia mtu mwenye UKIMWI au VVU					
Unaweza kuambukizwa kwa kukaa karibu na mtu mwenye UKIMWI au HIV?					

Unaweza kuambukizwa HIV kwa kumtunza mtu mwenye HIV au UKIMWI?					
Unaongeza hatari ya kuambukizwa HIV kwa kuwa na wapenzi wengi wa ngono					
Unaweza kuambukizwa na HIV kwa kuingiza sindano au sindano inayotumiwa na mtu mwingine					

31. Una mpenzi wa aina gani?

c) Jinsia moja kama nafsi [ ]

d) Jinsia tofauti [ ]

32. Kauli zilizotolewa hapa chini ni za kweli au za uongo?

Taarifa	Kweli	Uongo
Virusi vya UKIMWI vinaweza kuambukizwa kwa kupeana mikono		
Ngono bila kinga huongeza hatari ya maambukizi ya HIV		
Virusi vya UKIMWI vinaweza kuambukizwa kutoka kwa mama kwenda kwa mtoto wake ambaye hajazaliwa		
Wanaume wanaofanya mapenzi na wanaume wengine wako katika hatari kubwa ya kupata HIV		
Tohara hupunguza hatari ya maambukizi ya HIV		
Kuwa na mpenzi mmoja tu mwaminifu hupunguza hatari ya maambukizi ya HIV		
Virusi vya UKIMWI vinaweza kuambukizwa kupitia unyonyeshaji		
Virusi vya Ukimwi haviwezi kuambukizwa kupitia utoaji wa damu		

33. Wasifu wa utoaji wa huduma za afya.

Tafadhali onyesha kama taarifa zinazotolewa hapa chini ni za kweli au za uongo.

Taarifa	**Kweli**	**Uongo**
Watoa huduma za afya ni rafiki na wako tayari kusaidia ndani ya muda mfupi		
Huduma zinazotolewa ni za kirafiki kwa vijana		
Usiri na faragha hudumishwa sana		
Hamna malipo ya upimaji, huduma za ushauri nasaha na ARV		
VCT imeunganishwa vizuri ndani ya kituo		
Arvs zinapatikana kwa urahisi zile unazopima HIV		
Umbali mfupi hadi kituoni		

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