MAKERERE UNIVERSITY.

COLLEGE OF BUSINESS AND MANAGEMENT SCIENCES

(COBAMS)

SCHOOL OF STATISTICS AND PLANNING

DETERMINANTS OF HIV PREVALENCE AMONG REPRODUCTIVE AGES 15-49 YEARS IN UGANDA: A MULTIDIMENSIONAL ANALYSIS.

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A DISSERTATION SUBMITTED TO THE SCHOOL OF STATISTICS AND PLANNING IN PARTIAL FULLFILLMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF BACHELOR OF SCIENCE IN POPULATION STUDIES OF MAKERERE UNIVERSITY

JULY 2026

DECLARATION

I, MUSUMBA JONATHAN ERIAKIM, declare that this dissertation titled *"Determinants of HIV Prevalence Among Reproductive Ages 15–49 Years in Uganda: A Multidimensional Analysis"* is my original work and has never been submitted, in whole or in part, to any other institution for any academic award.

I also declare that all sources of information used in this study have been duly acknowledged and properly referenced in accordance with academic standards.

This work has been completed under the guidance and supervision of my supervisor Dr Patricia Ndugga, and I take full responsibility for any errors or omissions contained herein.

Signature: _____

Name: MUSUMBA JONATHAN ERIAKIM

Date: 15/07/2026

APPROVAL

I certify that the student MUSUMBA JONATHAN ERIAKIM 2300723684 (23/U/23684) has been under my supervision and this dissertation has been submitted as an original copy for the final examination with my approval as her supervisor for the award of a degree in Bachelor of Science in population studies.

Date 15/July/2026

Signature .....

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ABSTRACT

The study examined the determinants of HIV prevalence among individuals aged 15–49 years in Uganda using a multidimensional analytical approach. Despite ongoing HIV prevention interventions, HIV remains a major public health challenge in Uganda, particularly among reproductive age populations. The study aimed to identify socio-demographic, economic, behavioral factors associated with HIV prevalence among reproductive age individuals in Uganda. The study utilized secondary data obtained from the Uganda Population-based HIV Impact Assessment and related national survey datasets. A quantitative cross-sectional research design was employed. The study population consisted of men and women aged 15–49 years. Both descriptive and inferential statistical analyses were conducted using Stata. Univariate analysis was used to describe respondents' characteristics, while bivariate analysis examined associations between independent variables and HIV prevalence using chi-square tests. Multivariate logistic regression analysis was conducted to identify significant predictors of HIV prevalence after controlling for other variables.

The findings revealed that HIV prevalence among respondents as 5.61%, while 94.39% of respondents were negative. Bivariate analysis showed that region, age, gender, marital status, condom use, migration history, alcohol use before sex, and male circumcision status were significantly associated with HIV prevalence. HIV prevalence increased with age, and females had higher prevalence compared to males. Respondents not in union also had a higher prevalence compared to those in union.

The multivariate analysis identified age, region, and marital status as significant predictors of HIV prevalence. Individuals aged 25-49 years had higher odds compared to adolescents aged 15-49 years. Respondents not in union were more likely to be disparities in HIV prevalence were also observed, with some regions showing significantly lower odds of HIV prevalence of HIV infection compared to South Buganda.

The study concludes that HIV prevalence among reproductive-age individuals in Uganda is influenced by multiple interacting demographic, region, and behavioral factors. The study recommends strengthening targeted HIV prevention interventions focusing on older age groups, high-risk populations, behavioral change communication, regional HIV programming, and expansion of HIV testing and prevention services.

Key words: HIV prevalence, reproductive age, determinants, multidimensional analysis, Uganda, UPHIA

Table of Contents

LIST OF ABBREVIATIONS

Abbreviation	*Full Meaning*
AIDS	Acquired Immune Deficiency Syndrome
ART	Antiretroviral Therapy
HIV	Human Immunodeficiency Virus
MOH	Ministry of Health
PLHIV	People Living with HIV
STIs	Sexually Transmitted Infections
UBOS	Uganda Bureau of Statistics
UAC	Uganda AIDS Commission
UNAIDS	Joint United Nations Program on HIV/AIDS
UNHS	Uganda National Household Survey
USAID	United States Agency for International Development
VCT	Voluntary Counseling and Testing
WHO	World Health Organization
OR	Odds Ratio
AOR	Adjusted Odds Ratio
CI	Confidence Interval
STATA	Statistics and Data Analysis Software
SDGs	Sustainable Development Goals
SSA	Sub-Saharan Africa
UPHIA	Uganda Population-based HIV Impact Assessment
VMMC	Voluntary Medical Male Circumcision
PrEP	Pre-Exposure Prophylaxis
ART	Antiretroviral Therapy
PTMCT	Prevention of Mother-to-Child Transmission

CHAPTER ONE: INTRODUCTION

1.1 Background to the Study

Human Immunodeficiency Virus (HIV) remains one of the most significant global public health challenges, particularly in Sub-Saharan Africa, which continues to bear the highest burden of the epidemic. Despite considerable progress in prevention, treatment, and awareness, HIV continues to affect millions of people worldwide, with a disproportionate impact on low- and middle-income countries (Joint United Nations Program on HIV/AIDS (UNAIDS), 2024).

Uganda has historically been recognized as a leader in HIV prevention, particularly during the early stages of the epidemic in the 1990s when prevalence rates declined significantly due to aggressive public health campaigns. However, in recent years, the decline in HIV prevalence has slowed, and the country continues to experience a substantial burden of infection, especially among individuals aged 15–49 years, who constitute the most sexually active segment of the population (Ministry of Health, 2023).

Recent national estimates indicate that HIV prevalence among adults aged 15–49 in Uganda is approximately 5.1%, with notable disparities across population groups. Women are disproportionately affected, with prevalence rates nearly double those of men, reflecting underlying gender inequalities, biological susceptibility, and socio-economic vulnerabilities (UNAIDS, 2024; MoH, 2023). Furthermore, HIV prevalence varies significantly by region, residence, and socio-economic status, highlighting the heterogeneous nature of the epidemic.

The persistence of HIV in Uganda is driven by a complex interplay of factors, including socio-demographic characteristics such as age, sex, education, and marital status; economic conditions such as poverty and wealth inequality; behavioral factors such as multiple sexual partnerships, inconsistent condom use, early sexual debut, and alcohol consumption; and environmental or structural factors such as access to healthcare services and regional disparities (World Health Organization, 2023).

In addition, biomedical interventions such as voluntary medical male circumcision (VMMC) and antiretroviral therapy (ART) have been shown to significantly reduce HIV transmission. For instance, male circumcision reduces the risk of female-to-male HIV transmission by approximately 60%, making it a key component of HIV prevention strategies in Uganda

(WHO, 2023). However, the uptake and effectiveness of such interventions are influenced by socio-cultural and economic factors.

Although numerous interventions have been implemented, including HIV testing campaigns, condom distribution, and expansion of treatment services, new infections continue to occur. This suggests that existing strategies may not fully address the underlying determinants of HIV transmission, particularly among vulnerable populations such as women, youth, and individuals in urban areas (UNAIDS, 2024).

Understanding the determinants of HIV prevalence is therefore critical for designing effective, evidence-based interventions. By identifying the key factors associated with HIV infection among Ugandans aged 15–49 years, this study aims to contribute to ongoing efforts to reduce HIV transmission and improve population health outcomes.

1.2 Problem Statement

Despite sustained efforts to combat HIV/AIDS, Uganda continues to experience a considerable burden of HIV infections among individuals aged 15–49 years. The persistence of relatively high HIV prevalence rates, coupled with ongoing new infections, indicates that existing prevention strategies may not sufficiently address the underlying drivers of the epidemic (MoH, 2023; UNAIDS, 2024).

Moreover, HIV prevalence is not evenly distributed across the population. Significant disparities exist based on gender, age, socio-economic status, and geographic location. Women, for example, continue to bear a disproportionate burden of HIV infection, while certain regions and urban areas report higher prevalence rates (UNAIDS, 2024). These inequalities suggest that structural and contextual factors play a critical role in shaping HIV risk.

While previous studies have examined individual determinants of HIV infection, there remains a need for a comprehensive analysis that integrates socio-demographic, economic, behavioral, and environmental factors using recent data. Without such an understanding, interventions may remain fragmented and less effective.

Recent studies indicate that HIV prevalence among urban poor youth is driven by a combination of socioeconomic, behavioral, and environmental factors. Poverty and unemployment increase engagement in high-risk survival strategies such as transactional sex, while low education levels are associated with inadequate knowledge of HIV prevention methods (Sileo et al., 2021). Additionally, risky sexual behaviors including multiple sexual partnerships, inconsistent condom use, and early sexual debut remain prevalent among youth in informal settlements (Maughan-Brown et al., 2020).

Gender inequality and power imbalances further exacerbate vulnerability, particularly among young women who often have limited autonomy in negotiating safe sexual practices. Moreover, substance abuse, including alcohol and drug use, has been linked to increased likelihood of engaging in unprotected sex among urban youth populations (Kabwama et al., 2021). Despite ongoing interventions, access to youth-friendly HIV services in informal settlements remains inadequate, contributing to low testing rates and delayed treatment uptake.

Therefore, this study seeks to examine the determinants of HIV prevalence among Ugandans aged 15–49 years in order to provide evidence that can inform targeted and effective HIV prevention strategies.

1.3 Study Objectives

1.3.1 Main Objective

To examine the determinants of HIV prevalence among Ugandans aged 15-49 years.

1.3.2 Specific Objectives

1. To assess the association between socio-demographic factors (age, sex, education level, marital status, employment status) and HIV prevalence among Ugandans aged 15-49 years

2. To examine the influence of economic factors (income level, financial instability, employment status) on HIV prevalence

3. To determine the relationship between behavioral factors (condom use, multiple sexual partnerships, substance use, age at sexual debut) and HIV prevalence

4. To assess the role of structural and social factors (access to HIV services, migration status) in influencing HIV prevalence.

1.4 Conceptual Framework

This study will be guided by the Socio-Ecological Model, which explains how individual behavior and health outcomes are shaped by multiple interacting levels of influence.

1.4.1 Independent Variables

Socio-Demographic Factors

- Age (15–49)
- Sex
- Level of education
- Marital status
- Employment status

Economic

- Household income.
- Employment status
- Income level

Behavioral (Proximate Factors)

These directly influence infection risk.

- Age at first sex.
- Transactional sex
- Multiple sexual partnerships (last 12 months)
- Condom use at last sex

- Alcohol use before sex
- Drug use
- History of STI
- HIV testing history

Environmental

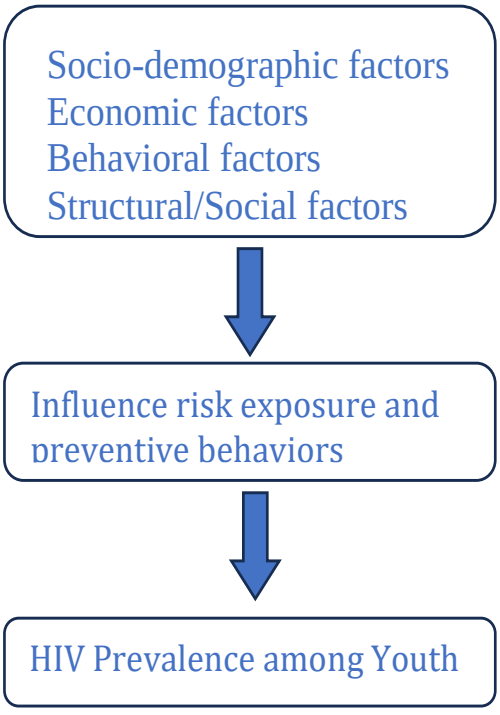
- Housing conditions
- Type of settlement (slum vs non-slum)
- Access to health services
- Peer/social environment
- Exposure to HIV prevention programs
- Migration status (recent migrant or not)
- Exposure to HIV prevention programs

These are key because slum environments increase vulnerability.

Dependent Variable

HIV prevalence/vulnerability

1.5 Diagrammatic Representation.



1.6 Methodology

1. Study design: Cross-sectional quantitative study
2. Population: Ugandans aged 15-49 years
3. Sampling: Stratified or simple random sampling
4. Data collection: Structured questionnaires
5. Analysis:
   - Descriptive statistics
   - Chi-square tests
   - Logistic regression (to identify determinants)
6. Content: Socio-demographic, economic, behavioral, environmental determinants

1.7 Significance of the Study

The findings of this study will:

- Provides evidence-based insights into multidimensional determinants of HIV among youths.
- Assist policymakers and public health planners in designing youth-targeted interventions.
- Contribute to academic knowledge in Population Studies at Makerere University.
- Support NGOs and community organizations working on HIV prevention among youth.
- Contributes to achieving Uganda's HIV reduction goals and global UNAIDS targets.

1.8 Justification of the Study

Urban informal settlements remain understudied despite their high vulnerability to HIV transmission. Youth in these areas face compounded socio-economic and structural challenges that may not be adequately captured in national surveys. Conducting this study will help bridge the evidence gap and ensure that interventions are tailored to the realities of youth living in the Central Region in Uganda.

1.9 Scope of the Study

The study focuses on individuals aged 15–49 years in Uganda, as this age group represents the most sexually active population and bears the highest burden of HIV infection. The analysis considers socio-demographic, economic, behavioral, and environmental determinants using secondary data from nationally representative surveys that is Uganda Population-Based HIV Impact Assessment (UPHIA).

CHAPTER TWO: LITERATURE

2.0 Introduction

This chapter presents a review of related literature on the determinants of HIV prevalence among people aged 15–49 years in Uganda. The chapter reviews theoretical and empirical literature on socio-demographic, socio-economic, behavioral, and health-related factors associated with HIV prevalence. It also identifies gaps in existing literature and presents the conceptual framework guiding the study.

2.1 Overview of HIV Prevalence in Uganda

HIV/AIDS remains a major public health challenge in Uganda despite substantial progress in prevention, treatment, and care services. Uganda has implemented several HIV interventions including antiretroviral therapy (ART), Prevention of Mother-to-Child Transmission (PMTCT), HIV counseling and testing, Voluntary Medical Male Circumcision (VMMC), and Pre-Exposure Prophylaxis (PrEP). Despite these interventions, HIV prevalence remains significant among people aged 15–49 years.

According to the Uganda AIDS Commission (2024), HIV prevalence among adults aged 15–49 years was estimated at 5.1%, with women having a higher prevalence than men. Women accounted for a larger proportion of people living with HIV due to biological vulnerability, gender inequality, and socio-economic challenges. The report further indicated that adolescent girls and young women remain disproportionately affected by HIV infections in Uganda.

UNAIDS (2023) reported that Uganda continues to register new HIV infections annually despite increased ART coverage and HIV awareness campaigns. The persistence of HIV infections is associated with risky sexual behaviors, poverty, stigma, gender-based violence, and inadequate access to healthcare services.

Studies have further shown that HIV prevalence differs across regions and population groups in Uganda. Fishing communities, urban populations, and highly mobile populations often experience higher HIV prevalence compared to rural agrarian communities due to transactional sex, alcohol abuse, and multiple sexual partnerships (World Health Organization [WHO], 2023).

2.2 Theoretical Literature Review

2.2.1 Health Belief Model

The Health Belief Model explains health-related behaviors based on individuals' perceptions regarding susceptibility to disease, severity of disease, benefits of preventive action, and barriers to behavior change. The model suggests that individuals are more likely to adopt HIV preventive measures if they perceive themselves to be at risk of HIV infection.

In relation to HIV prevalence, individuals who believe they are vulnerable to HIV are more likely to engage in safer sexual practices such as condom use, HIV testing, abstinence, and adherence to treatment programs. According to Rosenstock et al. (2021), perceptions of HIV risk strongly influence preventive health behaviors.

The model further suggests that socio-demographic factors such as education, age, and access to HIV information influence perceptions and behavioral decisions related to HIV prevention.

2.2.2 Social Ecological Theory

The Social Ecological Theory explains that HIV prevalence is influenced by interactions between individual, interpersonal, community, and societal factors. The theory recognizes that HIV vulnerability extends beyond individual choices and includes broader environmental and structural determinants. At the individual level, factors such as age, alcohol consumption, and sexual behavior influence HIV risk. At the interpersonal level, peer pressure, family influence, and intimate partner violence affect sexual decision-making. Community-level factors include cultural norms, stigma, poverty, and healthcare accessibility (McLeroy et al., 2022). The theory is relevant to this study because HIV prevalence among people aged 15–49 years in Uganda results from the interaction of multiple socio-economic and behavioral factors.

2.3 Empirical Literature Review

2.3.1 Age and HIV Prevalence

Age is one of the major determinants of HIV prevalence. HIV prevalence tends to increase with age because individuals become exposed to sexual risk behaviors over a longer period of time.

Adults aged 30–49 years often exhibit higher HIV prevalence compared to adolescents and young adults. Grilo et al. (2025) found that HIV prevalence among adolescents and young adults in Rakai, Uganda was associated with early sexual debut, age-disparate relationships, and low HIV testing uptake. Young people aged 15–24 years were found to be particularly vulnerable because of inadequate sexual and reproductive health information and poor access to youth-friendly services. Similarly, WHO (2023) noted that adults aged 15–49 years continue to carry the largest burden of HIV infections globally because they are the most sexually active age group.

2.3.2 Gender and HIV Prevalence

Gender disparities significantly influence HIV prevalence in Uganda. Studies consistently show that women experience higher HIV prevalence compared to men due to biological susceptibility, economic dependence, and unequal gender relations. According to the Uganda AIDS Commission (2024), HIV prevalence among women aged 15–49 years was almost twice as high as that of men. Women's vulnerability to HIV is further increased by gender-based violence, transactional sex, and limited power to negotiate condom use. Kawuma et al. (2025) found that economic vulnerability and exposure to multiple sexual partnerships increased HIV risk among women engaged in transactional sexual relationships. Adolescent girls and young women were identified as one of the most vulnerable groups. Research further indicates that male circumcision contributes to lower HIV prevalence among men because circumcised men have reduced susceptibility to HIV infection (WHO, 2023).

2.3.3 Education Level and HIV Prevalence

Education is an important determinant of HIV prevalence because it influences awareness, access to information, and health-seeking behavior. Individuals with higher levels of education are more likely to understand HIV prevention methods and utilize HIV services. UNAIDS (2023) reported that educated individuals are more likely to access HIV testing, use condoms consistently, and seek early treatment compared to those with low education levels. Education also empowers women socially and economically, reducing dependence on risky sexual relationships. However, some studies suggest that urbanized educated populations may also engage in lifestyles associated

with risky sexual behavior such as alcohol consumption and multiple sexual partnerships (WHO, 2023). Overall, education is considered a protective factor against HIV infection.

2.3.4 Marital Status and HIV Prevalence

Marital status has been widely associated with HIV prevalence. Divorced, separated, and widowed individuals often exhibit higher HIV prevalence compared to never-married individuals. According to UNAIDS (2023), married individuals may still face HIV risk due to extramarital sexual relationships and low condom use within marriage. Women in marital unions often experience challenges negotiating condom use because of cultural expectations related to trust and childbearing. Widowed individuals may have lost partners to HIV/AIDS and may subsequently enter new sexual relationships without adequate protection, thereby increasing HIV risk.

2.3.5 Residence and Regional Differences

Residence significantly influences HIV prevalence patterns in Uganda. Urban areas generally report higher HIV prevalence than rural areas due to increased migration, commercial activities, and population mobility. WHO (2023) reported that fishing communities around Lake Victoria continue to record high HIV prevalence due to transactional sex, alcohol abuse, and multiple concurrent sexual partnerships. Urban populations also experience increased exposure to risky sexual networks and nightlife activities. Regional disparities in HIV prevalence are also linked to differences in economic activities, cultural practices, and healthcare access across Uganda.

2.3.6 Wealth Status and HIV Prevalence

Socio-economic status plays a major role in HIV prevalence. Poverty increases vulnerability to HIV through transactional sex, early marriages, migration, and limited access to healthcare services. Uganda AIDS Commission (2024) noted that economically disadvantaged populations often experience barriers in accessing HIV prevention and treatment services. Women from poor households may engage in transactional sexual relationships to meet basic needs. Conversely, some studies have shown that wealthier individuals may also experience higher HIV prevalence due to increased mobility and engagement in multiple sexual partnerships (UNAIDS, 2023).

2.3.7 Sexual Behavior and HIV Prevalence

Sexual behavior remains one of the strongest determinants of HIV prevalence. Risky sexual practices such as multiple sexual partnerships, inconsistent condom use, early sexual debut, and transactional sex significantly increase HIV vulnerability. According to WHO (2023), inconsistent condom use continues to contribute to HIV transmission among sexually active populations. Alcohol and substance abuse further increase risky sexual behavior by impairing judgment and reducing condom negotiation capacity. Grilo et al. (2025) also found that adolescents engaging in age-disparate relationships were more likely to experience HIV infection.

2.3.8 HIV Testing and Counseling

HIV testing and counseling play an important role in reducing HIV prevalence because individuals who know their HIV status are more likely to seek treatment and adopt preventive behaviors. Kalibbala et al. (2022) found that HIV testing uptake among young people in Uganda remained low due to stigma, fear of discrimination, and inadequate youth-friendly services. Low HIV testing contributes to delayed HIV diagnosis and continued transmission within communities. Uganda has expanded community HIV testing and self-testing services to improve early diagnosis and linkage to care (Uganda AIDS Commission, 2024).

2.3.9 Male Circumcision and HIV Prevalence

Voluntary Medical Male Circumcision (VMMC) is recognized as an effective HIV prevention strategy. Studies show that circumcised men are less likely to acquire HIV during heterosexual intercourse. WHO (2023) reported that Uganda has expanded VMMC programs as part of combination HIV prevention strategies. However, cultural beliefs and misconceptions continue to affect uptake in some communities. Higher VMMC coverage has contributed to reduced HIV prevalence among men in Uganda.

2.3.10 Alcohol Consumption and HIV Prevalence

Alcohol consumption is strongly associated with HIV prevalence because it contributes to risky sexual behavior. Individuals under the influence of alcohol are more likely to engage in unprotected sex, transactional sex, and multiple sexual partnerships. UNAIDS (2023) reported that alcohol abuse remains common among fishing communities and entertainment-related occupations where HIV prevalence is also high. Alcohol consumption also affects decision-making and reduces the likelihood of condom use during sexual encounters.

2.4 Knowledge Gap

Several studies have examined determinants of HIV prevalence in Uganda, including age, sex, education, and risky sexual behavior. However, most studies focus on isolated determinants or specific high-risk populations such as fisherfolk, adolescents, and female sex workers

Limited studies have conducted a multidimensional analysis combining socio-demographic, socio-economic, behavioral, and health-related determinants of HIV prevalence among people aged 15–49 years in Uganda.

This study therefore seeks to bridge this gap by examining multiple determinants influencing HIV prevalence among reproductive-age individuals in Uganda.

2.5 Conceptual Framework

The study assumes that HIV prevalence among individuals aged 15–49 years is influenced by socio-demographic, socio-economic, behavioral, and health-related factors.

Independent Variables

Socio-demographic Factors

- Age
- Sex
- Marital status
- Religion

- Residence
- Region

Socio-economic Factors

- Education level
- Wealth status
- Employment status

Behavioral Factors

- Condom use
- Multiple sexual partnerships
- Alcohol consumption
- HIV testing behavior
- Age at first sex

Health-related Factors

- Male circumcision
- Access to HIV services
- PrEP utilization
- ART access

Dependent Variable

- HIV prevalence/status

Intervening Variables

- Government HIV policies
- Healthcare accessibility
- Cultural norms
- HIV stigma and discrimination

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the methodology used in the study. It describes the research design, study area, data source, study population, sampling procedure, variables, data management, and methods of data analysis.

3.2 Research Design, data source and study population.

The study adopted a cross-sectional analytical design using secondary data. The analysis was based on nationally representative survey data from the 2020-2021 Uganda Population based HIV Impact Assessment Survey data.

3.2.1 Data Source

The primary data source for this study was from the Uganda Population- based HIV Impact Assessment Survey (UPHIA) conducted in 2020-2021. The UPHIA is a nationally representative data on HIV in Uganda collecting information on demographic characteristics, socioeconomic indicators, sexual behavior, HIV testing and bio maker data including HIV serostatus.

3.2.2 Study Population

The study population comprised:

- Ugandans aged 15–49 years
- Who had valid HIV test results

3.3 Sample Selection

The sample was restricted to:

- Female and male respondents (Ugandans) aged 15–49 years
- Individuals with complete HIV biomarker data

3.4 Study Variables

3.4.1 Dependent Variable

HIV Sero-status

Measured using laboratory-confirmed HIV test results.

Coding:

- 1 = HIV Positive

- 0 = HIV Negative

3.4.2 Independent Variables

Independent variables were grouped into:

A. Socio-Demographic Variables

- Age (15–19, 20–24)
- Sex
- Marital status
- Religion
- Education level

B. Economic Variables

- Education level
- Wealth index
- Employment status

C. Behavioral Variables

- Age at first sexual intercourse
- Multiple sexual partners (last 12 months)
- Condom use at last sexual intercourse
- Alcohol use before sex
- History of sexually transmitted infections (STIs)

3.5 Data Management

Data were cleaned and analyzed using STATA software.

Procedures included:

- Restricting sample to respondents (15–49 years)
- Recoding categorical variables
- Creating derived variables such as multiple partnerships
- Label variables properly

3.9 Data Analysis

Data analysis was conducted in three stages:

3.9.1 Univariate Analysis.

Descriptive statistics were used to summarize the characteristics of respondents:

- ❖ Frequencies
- ❖ Percentages

3.9.2 Bivariate Analysis

Bivariate analysis was conducted to examine the association between HIV prevalence and each independent variable.

The Chi-square test was used to determine statistical significance between categorical variables at 95% confidence level.

Chi-square tests were used to examine associations between HIV status and each independent variable.

The chi-square formula was:

$$\chi^2 = \sum \frac{(O - E)^2}{E}$$

Where:

- O = Observed frequency
- E = Expected frequency

Variables with p-values less than 0.05 were considered statistically significant and were included in multivariate analysis.

3.9.3 Multivariate Analysis

Binary logistic regression was used to identify determinants of HIV prevalence.

The study will employ a binary logistic regression model to examine the relationship between HIV status and selected independent variables. This model is appropriate because the dependent variable (HIV status) is dichotomous or Two-category variable (HIV positive or HIV negative).

The logistic regression model was specified as:

$$\log\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \cdots + \beta_k X_k$$

Where:

p = Probability that a youth is HIV positive

(1 – p) = Probability that a youth is HIV negative

β0 = Intercept

β1, β2, ..., βk = Regression coefficients

X1, X2, ..., Xk = Independent variables (e.g., age, sex, education, condom use, wealth index)

3.10 Interpretation:

A positive coefficient increases the likelihood of being HIV positive.

A negative coefficient reduces the likelihood of being HIV positive.

Results are interpreted using Odds Ratios (OR).

Odds ratios (OR) and 95% confidence intervals were reported.

3.11 Ethical Considerations

The study used secondary anonymized data from the 2020-2021 Uganda Population-Based HIV Impact Assessment Survey (UPHIA). Permission to use the dataset was granted through The UPHIA Program website. However, ethical standards were maintained by ensuring that the confidentiality and anonymity of survey respondents are preserved.

No personal identifiers were included in the analysis.

CHAPTER FOUR: RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the results of the data analysis conducted for the study on factors associated with HIV status among respondents. The analysis is based on the study objectives and utilizes quantitative techniques to examine the relationships between socio-demographic and behavioral variables and HIV status.

The chapter is structured into three main sections. The first section presents the univariate analysis, which provides a descriptive overview of the characteristics of the study population, including variables such as age, sex, marital status, migration level, alcohol use, condom use, and HIV testing history. This section helps to establish a general understanding of the distribution of key variables in the dataset.

4.2 Analysis.

4.2.1 Univariate analysis.

At the univariate level, the analysis focused on describing the characteristics of the study population. The results show that respondents were distributed across different socio-demographic and behavioral categories such as age groups, regions, marital status, wealth status, and working groups. A considerable proportion of respondents had ever tested for HIV, while others had never tested. Behavioral factors such as alcohol consumption before sex varied, with some respondents reporting that only they drank, only their partner drank, both drank, or neither drank before sexual intercourse. In addition, there were variations in condom use, circumcision status, and levels of migration. Overall, the univariate analysis indicates that the study population is highly diverse in terms of socio-demographic characteristics and HIV-related behaviors, which may influence their risk of infection.

4.2.2 Bivariate analysis

At the bivariate level, the analysis examined the relationship between each independent variable and HIV status. The results show that several factors were significantly associated with HIV infection. Alcohol use before sex was strongly associated with HIV status, particularly among those where both partners consumed alcohol. Migration level also showed a significant relationship with HIV, with differences in prevalence observed between low and high migration groups. Condom use was also associated with HIV status, indicating behavioral influence on

infection risk. Similarly, circumcision status among males showed differences in HIV prevalence between circumcised and uncircumcised respondents. HIV testing history was also associated with HIV status, suggesting that individuals who had ever tested differed in risk profile compared to those who had never tested. However, these bivariate relationships do not account for the influence of other confounding variables.

4.2.3 Multivariate analysis

At the multivariate level, logistic regression was used to determine the independent predictors of HIV status after controlling for other factors. The results indicate that only a few variables remained statistically significant. Alcohol consumption before sex remained a strong predictor of HIV infection even after adjustment for other variables, suggesting its independent effect on risk. Migration level also continued to show influence on HIV status, indicating that mobility may play an important role in exposure to risk environments. However, some variables that were significant at the bivariate level, such as condom use and circumcision status, showed reduced or non-significant effects after adjustment, suggesting that their influence may be explained by other factors in the model. Demographic factors such as age and marital status acted more as confounders in the relationship between behavioral factors and HIV status.

UNIVARIATE ANALYSIS OF HIV PREVALENCE WITH INDEPENDENT VARIABLES

VARIABLE	*CATEGORIES*	*FREQUENCIES*	*PERCENTAGES*
HIV status	Negative	19,743	94.39
	Positive	1,173	5.61
Region	Central 1: South Buganda	2,446	11.43
	Central 2: North Buganda	1,886	8.81
	East Central	1,337	6.25
	Kampala	1,932	9.03
	Mid-Eastern	1,557	7.27
	Mid North	1,964	9.18
	Mid-Western	1,849	8.64
	Northeast: Karamoja	1,845	8.62
	Northeast: Teso	1,772	8.28
	South Western	2,529	11.82
	West Nile	2,287	10.68

Age groups	15-19 years	4,718	22.04
	20-24 years	4,379	20.46
	25-29 years	3,508	16.39
	30-34 years	2,757	12.88
	35-39 years	2,479	11.58
	40-44 years	1,920	8.97
	45-49 years	1,643	7.68
Gender	Male	8,855	41.37
	Female	12,549	58.63
Marital status	In union	11,881	81.14
	Not in union	2,761	18.86
Wealth status	Lowest	6,139	28.69
	Second	3,926	18.35
	Middle	3,895	18.2
	Fourth	3,548	16.58
	Highest	3,888	18.17
Occupation	Agriculture	5,208	44.62
	High mobility jobs	1,456	12.48
	Formal employment	3,930	33.67
	Informal sector	859	7.36
	Student	218	1.87
In school	Yes	15,636	80.35
	No	3,823	19.65
Number of sexual partners	No Partner	2	0.01
	1 Partner	6,060	28.31
	2-3 Partners	6,850	32
	4-5 Partners	2,658	12.42
	6+ Partners	5,834	27.26
Age at first marriage	Very early union	3,991	18.65
	Early adult union	5,706	26.66
	Late union	2,571	12.01
	Late marriage	9,136	42.68
Age at first sex	Early(<=14)	2,144	22.69
	Late(18+)	7,304	77.31
Condom use	Yes	13,298	86.31
	No	2,110	13.69
HIV testing history	Ever tested for HIV	17,347	81.2
	Never tested for HIV	4,017	18.8
Migration History	Low migration	2,276	76.3
	High migration	707	23.7

Alcohol use before sex.	Only respondent drank	1,001	6.57
	Only partner drank	1,703	11.18
	Both drank	838	5.5
	Neither	11,695	76.75
Male circumcision.	Uncircumcised	5,567	51.45
	Circumcised	5,254	48.55

INTERPRETATION

The outcome variable in this study is HIV prevalence, which was found to be 5.61%, with the majority of respondents (94.39%) being HIV negative. This relatively low prevalence provides a baseline against which the influence of other socio-demographic factors can be understood. The variation in HIV prevalence across different characteristics of the population highlights the importance of examining these variables in relation to the outcome.

Regional distribution plays a significant role in shaping HIV prevalence. Respondents were drawn from all regions of Uganda, with slightly higher representation from South Western, South Buganda, and West Nile. Differences in HIV prevalence across regions are often associated with disparities in access to health services, cultural norms, and levels of urbanization. Evidence from the regression results shows that regions such as West Nile, Teso, East Central, and Mid-Eastern have significantly lower odds of HIV infection compared to South Buganda. This suggests that geographical location is an important determinant of HIV prevalence, reflecting underlying structural and behavioral differences across regions.

Age composition is another critical factor influencing HIV prevalence. The sample is predominantly youthful, with over 40% of respondents aged between 15 and 24 years. Younger individuals generally have lower cumulative exposure to HIV compared to older age groups, which may partly explain the relatively low overall prevalence observed in the study. However, this does not imply absence of risk, as young people may still engage in high-risk behaviors. Therefore, the age structure of the sample likely contributes to moderating the observed HIV prevalence.

Gender differences are also important in understanding HIV prevalence. Females constitute the majority of the sample (58.63%), compared to males (41.37%). In many settings within Uganda, women tend to have higher HIV prevalence due to a combination of biological

susceptibility and socio-economic vulnerabilities, including gender power imbalances and limited negotiation capacity in sexual relationships. As a result, the higher proportion of female respondents in the sample may have implications for the level and distribution of HIV prevalence observed.

Marital status is an important determinant of HIV prevalence. The majority of respondents were in union. Respondents in union constituted 81.14% of the study population, while 18.86% were not in union. The high proportion of respondents in union suggests that most participants were in stable sexual relationships. Marital status is an important factor in HIV studies because patterns of sexual behaviors, partner stability, condom use, and exposure to multiple sexual partnerships often differ between individuals in union and those not in union may be more likely to engage in unstable or multiple sexual relationships, which may increase vulnerability too HIV infection.

Wealth status further shapes HIV prevalence through differences in access to resources and health services. A large proportion of respondents fall within the lowest wealth quintile (28.69%), while the rest are fairly distributed across second (18.35%), middle (18.2%), fourth (16.58%), and highest (18.17%) categories. Individuals in lower wealth groups often face barriers to accessing HIV prevention services, testing, and treatment, which can increase vulnerability. Conversely, higher wealth groups may have better access to information and healthcare but may also engage in lifestyles associated with increased mobility and risk. Therefore, the distribution of wealth suggests that socioeconomic inequalities play a role in influencing HIV prevalence.

Occupation is another key factor associated with HIV risk. Most respondents are engaged in agriculture (44.62%), followed by formal employment (33.67%), high mobility jobs (12.48%), informal sector work (7.36%), and a small proportion of students (1.87%). Individuals in agriculture are typically located in rural areas where HIV prevalence may be lower due to reduced exposure to high-risk environments. In contrast, those in high mobility occupations (such as transport or trading) are more likely to experience increased HIV risk due to frequent travel, separation from regular partners, and higher likelihood of multiple sexual partnerships. Formal employment may also increase exposure through urban residence and social networks. Thus, occupation influences HIV prevalence by shaping patterns of movement, income, and social interaction.

Education, as reflected by school attendance, also plays a protective role. A large majority of respondents (80.35%) reported being in school, while a smaller proportion were not. Education is associated with increased awareness of HIV prevention methods, better decision-making, and reduced engagement in risky sexual behaviors. Therefore, the high level of school attendance in the sample may contribute to the relatively moderate HIV prevalence observed.

Sexual behavior, particularly the number of sexual partners, is one of the strongest predictors of HIV prevalence. While 19.65% of respondents reported having no sexual partner, a substantial proportion reported multiple partners: 28.31% had one partner, 32% had 2–3 partners, 12.42% had 4–5 partners, and 27.26% had six or more partners. The likelihood of HIV infection increases significantly with the number of sexual partners due to greater exposure to potential infection. The presence of a considerable proportion of respondents with multiple partners suggests a higher level of behavioral risk within the population, which directly contributes to HIV prevalence.

Age at first marriage (or union) is an important factor influencing HIV risk. Respondents were categorized into very early union, early adult union (26.66%), and late union (12.01%), among others. Early entry into unions often exposes individuals to sexual activity at a younger age, increasing lifetime risk of HIV infection. Additionally, early unions may limit educational attainment and economic opportunities, further increasing vulnerability. In contrast, delayed union formation is generally associated with greater maturity, education, and lower HIV risk.

Age at first sex is an important determinant of HIV risk. The findings show that individuals who initiated sexual activity early (≤14 years) had a slightly higher HIV prevalence (7.30%) compared to those who initiated sex later (18+) at 6.80%, although this difference is not statistically significant ($p = 0.428$). Early sexual debut increases lifetime exposure to sexual activity and may be associated with lower levels of knowledge and preparedness, thereby increasing vulnerability to HIV infection. However, the lack of statistical significance suggests that other factors may play a more dominant role in explaining HIV prevalence in this population.

Condom use shows a statistically significant association with HIV prevalence ($p = 0.001$). Interestingly, individuals who reported using condoms had a higher HIV prevalence (7.60%) compared to those who did not (5.70%). This counterintuitive finding may reflect reverse causality, where individuals who are already aware of their HIV-positive status or perceive themselves to be

at higher risk are more likely to use condoms. It may also indicate inconsistent or incorrect condom use. Therefore, while condoms are protective, their reported use in this context reflects underlying risk behavior rather than prevention effectiveness alone.

HIV testing history is strongly associated with HIV prevalence ($p = 0.000$). Those who have ever tested for HIV have a higher prevalence (6.65%) compared to those who have never tested (approximately 1.72%). This pattern is expected because individuals who test are more likely to know their HIV status, including positive diagnoses, while those who have never tested may include undiagnosed cases. Thus, HIV testing increases detection rather than risk, highlighting its importance in identifying and managing HIV infections.

Migration history also shows a significant relationship with HIV prevalence ($p = 0.023$). Individuals with low migration levels have a higher prevalence (5.31%) compared to those with high migration (3.19%). While migration is often associated with increased risk due to mobility and exposure to new sexual networks, this finding suggests that more stable populations may have entrenched patterns of transmission, particularly within communities or long-term relationships. Alternatively, migrants may represent a healthier or more selective population group.

Alcohol use before sex is significantly associated with HIV prevalence ($p = 0.000$). The highest prevalence is observed when only the partner drank (9.92%), followed by situations where both partners drank (7.38%) or only the respondent drank (7.22%), while the lowest prevalence is among those where neither partner drank (5.22%). Alcohol consumption impairs judgment and reduces the likelihood of safe sexual practices such as condom use, thereby increasing the risk of HIV transmission. The particularly high prevalence when only the partner drinks may reflect power imbalances and reduced ability to negotiate safe sex.

Male circumcision is also significantly associated with HIV prevalence ($p = 0.000$). Uncircumcised men have a higher HIV prevalence (5.81%) compared to circumcised men (2.95%). This finding is consistent with extensive evidence that male circumcision reduces the risk of heterosexual HIV transmission by lowering biological susceptibility to infection. Therefore, circumcision emerges as a strong protective factor in this population.

In summary, behavioral factors play a critical role in shaping HIV prevalence. Early sexual debut slightly increases risk, while condom use patterns reflect underlying exposure rather than pure

protection. HIV testing improves detection of cases, migration patterns influence exposure dynamics, and alcohol use significantly increases risky behavior. Male circumcision stands out as a key protective factor. Together, these findings demonstrate that HIV prevalence is not only determined by demographic characteristics but is also heavily driven by behavioral and preventive practices, underscoring the importance of targeted interventions focusing on behavior change and risk reduction.

BIVARIATE ANALYSIS OF HIV PREVALENCE WITH INDEPENDENT VARIABLES

VARIABLE	*CATEGORIES*	*HIV STATUS*		*P-VALUES*
		NEGATIVE	**POSTIVE**	
Region	Central 1: South Buganda	91.25	8.75	0.000
	Central 2: North Buganda	93.78	6.22	
	East Central	95.73	4.27	
	Kampala	93.68	6.32	
	Mid-Eastern	95.22	4.78	
	Mid North	92.57	7.43	
	Mid-Western	93.86	6.14	
	Northeast: Karamoja	97.47	2.53	
	Northeast: Teso	95.96	4.04	
	South Western	93.46	6.54	
	West Nile	96.86	3.14	
Age groups	15-19 years	99.07	0.93	0.000
	20-24 years	97.17	2.83	
	25-29 years	94.59	5.41	
	30-34 years	92.18	7.82	
	35-39 years	89.95	10.05	
	40-44 years	90.32	9.68	
	45-49 years	88.41	11.59	
Gender	Male	96.1	3.9	0.000
	Female	93.19	6.81	
Marital status	In union	94.46	5.54	0.000
	Not in union	87.42	12.58	
Wealth status	Lowest	95.92	4.08	0.000
	Second	94.95	5.05	
	Middle	93.47	6.53	

	Fourth	92.67	7.33	
	Highest	93.91	6.09	
Occupation	Agriculture	94.16	5.84	0.003
	High mobility jobs	94.81	5.19	
	Formal employment	93.12	6.88	
	Informal sector	96.13	3.87	
	Student	96.28	3.72	
In_school	Yes	93.35	6.65	0.000
	No	98.96	1.04	
Number of sexual partners	No Partner	100	0	0.000
	1 Partner	97.33	2.67	
	2-3 Partners	92.87	7.13	
	4-5 Partners	91.08	8.92	
	6+ Partners	94.64	5.36	
Age at first marriage	Very early union	91.45	8.55	0.000
	Early adult union	93.14	6.86	
	Late union	93.45	6.55	
	Late marriage	96.74	3.26	
Age at first sex	Early(<=14)	92.7	7.3	0.428
	Late(18+)	93.2	6.8	
Condom use	Yes	92.4	7.6	0.001
	No	94.3	5.7	
.HIV testing history	Ever tested for HIV	93.35	6.65	0.000
	Never tested for HIV	98.88	1.12	
Migration History	Low migration	94.69	5.31	0.023
	High migration	96.81	3.19	
Alcohol use before sex.	Only respondent drank	92.78	7.22	0.000
	Only partner drank	90.08	9.92	
	Both drank	92.62	7.38	
	Neither	94.78	5.22	
Male circumcision.	Uncircumcised	94.19	5.81	0.000
	Circumcised	95.58	2.95	

INTERPRETATION

The bivariate analysis examines the relationship between HIV prevalence and each independent variable separately. The results show that HIV prevalence varies significantly across several socio-demographic characteristics, as indicated by the p-values, most of which are statistically

significant ($p < 0.05$). This suggests that these variables are important determinants of HIV prevalence in Uganda.

Regional differences in HIV prevalence are evident and statistically significant ($p = 0.000$). The highest prevalence is observed in South Buganda (8.75%), followed by Mid North (7.43%) and South Western (6.54%), while the lowest prevalence is recorded in Karamoja (2.53%) and West Nile (3.14%). These differences reflect variations in socioeconomic conditions, cultural practices, and access to health services across regions. Urbanized and economically active regions tend to have higher prevalence due to increased mobility and interaction, while more remote regions tend to have lower prevalence.

Age is strongly associated with HIV prevalence ($p = 0.000$), with a clear increasing trend across age groups. The youngest group (15–19 years) has the lowest prevalence (0.93%), while the oldest group (45–49 years) has the highest (11.59%). This pattern reflects cumulative exposure to risk over time, as older individuals have had longer periods of sexual activity and potential exposure to HIV infection. The results indicate that age is one of the strongest predictors of HIV prevalence.

Gender differences are also observed, with females having a higher HIV prevalence (6.81%) compared to males (3.90%). This aligns with established evidence in Uganda, where women are disproportionately affected due to biological susceptibility and social vulnerabilities such as gender inequality and limited negotiation power in sexual relationships. Although the p-value is not explicitly shown here, the difference is substantial and consistent with broader patterns.

Marital status shows a significant relationship with HIV prevalence ($p = 0.000$). Respondents not in union had higher HIV prevalence compared to those not in union. This may be because individuals not in union are more likely to engage in unstable relationships, casual sexual partnerships, and risky sexual behaviors that increase exposure to HIV infection.

Wealth status also exhibits variation in HIV prevalence, although the pattern is not strictly linear. The lowest wealth group has the lowest prevalence (4.08%), while prevalence increases in the middle (6.53%) and fourth (7.33%) quintiles before slightly declining in the highest group (6.09%). This suggests a complex relationship between wealth and HIV, where both poverty and relative affluence can influence risk through different pathways. For example, wealthier

individuals may have greater mobility and social interaction, while poorer individuals may face structural vulnerabilities.

Occupation shows a significant association with HIV prevalence ($p = 0.003$). Individuals engaged in agriculture have a prevalence of 5.84%, while those in informal employment (3.87%) and students (3.72%) show relatively lower prevalence. In contrast, individuals in high mobility and formal employment categories exhibit higher prevalence levels (around 5.19% and 6.88% respectively). This pattern suggests that occupations involving mobility, urban exposure, and wider social networks may increase the likelihood of HIV exposure, while more stable or less mobile occupations such as agriculture and schooling may reduce risk.

The number of sexual partners is one of the strongest predictors of HIV prevalence, with a highly significant association ($p = 0.000$). Individuals with no sexual partners report no HIV cases (0.00%), while prevalence increases with the number of partners: 2–3 partners (7.13%), 4–5 partners (8.92%), and remains relatively high among those with six or more partners (5.36%). This demonstrates a clear relationship between multiple sexual partnerships and increased HIV risk, as greater number of partners increases exposure to potential infection sources.

Age at first union is also significantly associated with HIV prevalence ($p = 0.000$). Individuals who entered unions very early show the highest prevalence (8.55%), followed by those in early adult unions (6.86%) and late unions (6.55%). Early entry into unions often increases exposure to sexual activity at a younger age, reduces opportunities for education, and may limit access to HIV prevention information, thereby increasing vulnerability to infection.

Age at first sexual intercourse shows a weaker and non-significant association ($p = 0.428$), although individuals who initiated sex early (≤14 years) have a slightly higher prevalence (7.30%) compared to those who initiated later (6.80%). This suggests that while early sexual debut may contribute to increased risk, its effect may be mediated by other behavioral or contextual factors.

Condom use is significantly associated with HIV prevalence ($p = 0.001$). Surprisingly, individuals who reported condom use have a higher prevalence (7.60%) compared to those who did not use condoms (5.70%). This may reflect reverse causality, where individuals who perceive

themselves at higher risk or are already aware of their HIV status are more likely to use condoms. It may also indicate inconsistent or incorrect use of condoms, rather than effective protection.

HIV testing history is also strongly associated with HIV prevalence ($p = 0.000$). Individuals who have ever tested for HIV show a higher prevalence (6.65%) compared to those who have never tested (1.12%). This is expected, as testing increases the likelihood of identifying existing HIV infections, whereas those who have never tested may include undiagnosed cases. Therefore, testing status reflects awareness and detection rather than actual exposure risk.

Migration history is significantly associated with HIV prevalence ($p = 0.023$). Individuals with low migration levels have a higher prevalence (5.31%) compared to those with high migration (3.19%). This finding suggests that HIV transmission may be more concentrated among less mobile populations, possibly due to stable but risky sexual networks within communities. Although migration is often associated with increased HIV risk due to exposure to new partners and mobility, this result indicates that transmission dynamics may also be influenced by localized behavioral patterns and long-term relationships within non-migratory populations.

Alcohol use before sex shows a strong and highly significant association with HIV prevalence ($p = 0.000$). The highest prevalence is observed among individuals where only the partner drank alcohol (9.92%), followed by cases where both partners drank (7.38%) and where only the respondent drank (7.22%). The lowest prevalence is recorded among those where neither partner consumed alcohol (5.22%). This pattern suggests that alcohol consumption before sexual activity increases vulnerability to HIV infection by impairing judgment, reducing condom use, and increasing engagement in risky sexual behavior. The particularly high prevalence when only the partner drinks may also reflect power imbalances that limit negotiation of safe sex.

Male circumcision status is also significantly associated with HIV prevalence ($p = 0.000$). Uncircumcised males have a higher HIV prevalence (5.81%) compared to circumcised males (2.95%). This finding is consistent with established biomedical evidence showing that male circumcision reduces the risk of heterosexual HIV transmission by lowering biological susceptibility. Therefore, circumcision appears to be a strong protective factor against HIV infection in this population.

In summary, the findings demonstrate that HIV prevalence is significantly influenced by migration patterns, alcohol use before sexual activity, and male circumcision status. Lower migration is associated with slightly higher prevalence, suggesting localized transmission patterns, while alcohol use before sex substantially increases risk due to behavioral disinhibition. Male circumcision emerges as a protective factor, reducing HIV prevalence significantly. These results emphasize that HIV transmission is driven by a combination of behavioral, social, and biological factors, highlighting the need for integrated prevention strategies that address lifestyle behaviors, mobility patterns, and biomedical interventions.

MULTIVARIATE ANALYSIS OF HIV PREVALENCE WITH INDEPENDENT VARIABLES.

VARIABLE	*CATEGORIES*	*ODDS RATIO.*	*P.VALUES*	*95% C I*
Region	Central 1South Buganda©			
	Central 2:North Buganda	1.01	0.956	0.61- 1.68
	East Central	0.50	0.031	0.27-0.93
	Kampala	1.53	0.192	0.81- 2.89
	Mid-Eastern	0.54	0.039	0.30-0.96
	Mid North	1.12	0.687	0.63- 2.01
	Mid-Western	0.67	0.177	0.38- 1.19
	Northeast: Karamoja	0.69	0.528	0.22- 2.14
	Northeast: Teso	0.45	0.033	0.22-0.94
	South Western	0.90	0.735	0.50- 1.61
	West Nile	0.38	0.004	0.19- 0.74
Age groups	15-19 years©			
	20-24 years	2.72	0.107	0.80-9.21
	25-29 years	4.72	0.012	1.41-15.80

	30-34 years	7.27	0.001	2.18-24.23
	35-39 years	8.38	0.001	2.52-27.84
	40-44 years	10.51	0.000	3.13-35.25
	45-49 years	9.93	0.000	2.91-33.93
Gender	Male ©			
	Female	1.93	0.282	0.58-6.39
Marital status	In union ©			
	Not in union	2.92	0.000	2.56-3.33
Wealth status	Lowest©			
	Second	3.43	0.109	0.76-15.51
	Middle	1.75	0.508	0.33-9.29
	Fourth	2.05	0.391	0.39- 10.71
	Highest	2.53	0.346	0.36-17.62
Occupation	Agriculture	1.63		
	High mobility jobs	1.76		
	Formal employment	1		
	Informal sector	1		
	Student	1		
In_school	Yes	1		
	No©			
Number of sexual partners	No Partner©			
	1 Partner			
	2-3 Partners	1.93	0.579	0.18-19.74
	4-5 Partners	4.26	0.245	0.36-49.25
	6+ Partners	3.19	0.369	0.25-40.31
Age at first marriage	Very early union©			
	Early adult union	0.89	0.824	0.32- 2.44
	Late union	0.68	0.598	0.17-2.74
	Late marriage	0.22	0.081	0.04-1.20
Age at first sex	Early (<=14) ©			
	Late(18+)	0.61	0.296	0.24- 1.54

Condom use	No ©			
	Yes	2.54	0.116	0.79-8.12
HIV testing history	Ever tested for HIV©			
	Never tested for HIV	1.10	0.909	0.19-6.13
Migration History	Low migration©			
	High migration	0.56	0.353	0.17-1.87
Alcohol use before sex.	Only respondent drank©			
	Only partner drank	0.56	0.480	0.11-2.75
	Both drank	1.00	0.992	0.17-5.84
	Neither	0.59	0.417	0.16-2.09

KEY © = Reference Category

INTERPRETATION

The logistic regression results show variation in the odds of the outcome across different regions compared to a reference category (South Buganda/Central, depending on the model coding). The odds ratios (OR), p-values, and 95% confidence intervals (CI) were used to assess both the direction and statistical significance of these regional differences.

Region.

North Buganda shows an odds ratio of 1.01 with a p-value of 0.956 and a confidence interval of 0.61–1.68. This indicates that individuals in North Buganda have almost the same odds of experiencing the vulnerability to HIV infection as those in the Central 1: South Buganda region. However, since the p-value is far above 0.05 and the confidence interval includes 1, this difference is not statistically significant, meaning there is no meaningful variation between the two regions.

East Central exhibits an odds ratio of 0.50 with a p-value of 0.031 and a confidence interval of 0.27–0.93. This suggests that individuals in East Central have 50% lower odds of experiencing the outcome compared to the Central 1: South Buganda. Since the p-value is less

than 0.05 and the confidence interval does not include 1, this result is statistically significant, indicating a real protective effect of living in this region.

Kampala shows an odds ratio of 1.53 with a p-value of 0.192 and a confidence interval of 0.81–2.89. Although this suggests higher odds of the outcome compared to the Central 1 : South Buganda the result is not statistically significant because the p-value is greater than 0.05 and the confidence interval includes 1. Therefore, no strong evidence exists that Kampala differs from the reference category in terms of the outcome.

Mid-Eastern region has an odds ratio of 0.54 with a p-value of 0.039 and a confidence interval of 0.30–0.96. This indicates that individuals in this region have 46% lower odds of the outcome compared to the reference group. The result is statistically significant, suggesting a meaningful protective association between residing in Mid-Eastern region and the outcome.

Mid North shows an odds ratio of 1.12 with a p-value of 0.687 and a confidence interval of 0.63–2.01. Although there is a slight increase in odds, the result is not statistically significant, indicating no meaningful difference from the Central 1: South Buganda

Mid-Western region has an odds ratio of 0.67 with a p-value of 0.177 and a confidence interval of 0.38–1.19. This suggests lower odds of the outcome, but the association is not statistically significant, as the p-value exceeds 0.05 and the confidence interval includes 1.

In the **Northeast region**, Karamoja has an odds ratio of 0.69 with a p-value of 0.528 and a confidence interval of 0.22–2.14. This indicates lower odds, but the wide confidence interval and high p-value show that the result is not statistically significant. Similarly, Teso shows an odds ratio of 0.45 with a p-value of 0.033 and a confidence interval of 0.22–0.94. This result is statistically significant and indicates that individuals in Teso have 55% lower odds of the outcome compared to the Central 1: South Buganda

South Western region has an odds ratio of 0.90 with a p-value of 0.735 and a confidence interval of 0.50–1.61. This shows no statistically significant difference from the Central 1: South Buganda.

Finally, West Nile shows an odds ratio of 0.38 with a p-value of 0.004 and a confidence interval of 0.19–0.74. This indicates a strong and statistically significant protective effect, with individuals

in this region having 62% lower odds of experiencing the outcome compared to the Central 1: South Buganda.

Overall, the results suggest that while some regions do not differ significantly from the reference category, regions such as West Nile, Teso, East Central, and Mid-Eastern show significantly lower odds of the outcome, indicating important regional disparities that may reflect differences in socioeconomic conditions, access to health services, or behavioral factors.

Age groups

For age groups, there is a clear increasing trend in the odds of the outcome with increasing age compared to the 15–19 years group. Individuals aged 20–24 years have higher odds (OR = 2.72), but this effect is not statistically significant (p = 0.107, CI: 0.80–9.21). However, starting from age 25–29 years, the association becomes statistically significant (OR = 4.72, p = 0.012, CI: 1.41–15.80), indicating that individuals in this age group are about 4.7 times more likely to experience HIV infection compared to adolescents aged 15–19 years. The odds increase further in the 30–34 years group (OR = 7.27, p = 0.001, CI: 2.18–24.23) and remain high in the 35–39 years group (OR = 8.38, p = 0.001, CI: 2.52–27.84). The highest odds are observed in the 40–44 years group (OR = 10.51, p < 0.001, CI: 3.13–35.25) and 45–49 years group (OR = 9.93, p < 0.001, CI: 2.91–33.93). These results indicate a strong and statistically significant positive relationship between increasing age and the likelihood of the outcome, suggesting that older individuals are at substantially higher risk compared to younger adolescents.

Gender

For gender, females have higher odds of the HIV infection compared to males (OR = 1.93), but this association is not statistically significant (p = 0.282, CI: 0.58–6.39). This means that although females appear to have higher odds, there is insufficient evidence to conclude a real difference between males and females in relation to the HIV prevalence.

Marital status

Regarding marital status, individuals not in union had higher odds of HIV infection compared to individuals in union (OR = 2.92, p = 0.000, CI: 2.56-3.33), indicating a statistically significant association because p value is less P= 0.05. However, individuals who are not in a union have significantly higher odds of the outcome This suggests that individuals not in union are more likely to engage in unstable sexual relationships, casual partnerships, and risky sexual behaviors that increase exposure to HIV infection.

Wealth status

For wealth status, none of the categories show statistically significant associations with HIV prevalence when compared to the lowest wealth group. Although the odds ratios for the second (OR = 3.43), middle (OR = 1.75), fourth (OR = 2.05), and highest (OR = 2.53) wealth categories suggest varying levels of increased risk, all p-values are above 0.05 and the confidence intervals include 1. This indicates that there is no strong evidence that wealth status independently influences HIV infection prevalence in this model.

Number of sexual partners

For the number of sexual partners, the results indicate increasing odds of the outcome with more partners, although none of the associations are statistically significant. Individuals with 2–3 partners have higher odds (OR = 1.93, p = 0.579, CI: 0.18–19.74), those with 4–5 partners show even higher odds (OR = 4.26, p = 0.245, CI: 0.36–49.25), and those with 6 or more partners also show elevated odds (OR = 3.19, p = 0.369, CI: 0.25–40.31). However, all p-values are above 0.05 and the confidence intervals are very wide and include 1, indicating that these results are not statistically significant. This suggests a possible trend of increased risk with multiple partners, but the evidence is not strong enough to confirm a real association in this model.

Age at first marriage

For age at first marriage, early adult union shows no significant difference compared to very early union (OR = 0.89, p = 0.824, CI: 0.32–2.44). Late union also shows no significant association (OR

= 0.68, p = 0.598, CI: 0.17–2.74). Late marriage shows a lower odds ratio (OR = 0.22), suggesting a potential protective effect, but this is not statistically significant at the 5% level (p = 0.081, CI: 0.04–1.20). Although not significant, this result suggests a possible trend where delaying marriage may reduce the likelihood of HIV prevalence / infection.

Age at first sexual intercourse

For age at first sexual intercourse, individuals who initiated sex at age 18 years or older have lower odds of the outcome (OR = 0.61) compared to those who had early sexual debut (≤14 years). However, this association is not statistically significant (p = 0.296, CI: 0.24–1.54). This suggests that while later sexual debut may have a protective effect, the evidence is not strong enough to confirm a significant relationship.

Condom use.

Regarding **condom use**, individuals who reported using condoms have higher odds of the HIV infection (OR = 2.54, p = 0.116, CI: 0.79–8.12) compared to those who did not use condoms. However, this result is not statistically significant, and the confidence interval is wide and includes 1. This indicates that although condom users appear to have higher odds in this model, the finding is not reliable and may be influenced by confounding factors or reverse causality (for example, individuals at higher risk being more likely to use condoms).

HIV testing history

For HIV testing history, individuals who have never tested for HIV have slightly higher odds of HIV prevalence (OR = 1.10, p = 0.909, CI: 0.19–6.13) compared to those who have ever tested. However, this association is not statistically significant, suggesting no meaningful difference in risk based on HIV testing history in this model.

Migration history

Regarding migration history, individuals with high migration show lower odds of HIVprevalence (OR = 0.56, p = 0.353, CI: 0.17–1.87) compared to those with low migration. However, this result is not statistically significant, indicating that migration status does not have a confirmed effect on the HIV infection in this analysis.

Alcohol use before sex

For alcohol use before sex, individuals whose only partner drank alcohol show lower odds of the outcome (OR = 0.56, p = 0.480, CI: 0.11–2.75), while those where both partners drank alcohol show no difference (OR = 1.00, p = 0.992, CI: 0.17–5.84). Those where neither partner drank also show lower odds (OR = 0.59, p = 0.417, CI: 0.16–2.09). However, none of these associations are statistically significant, as all p-values are above 0.05 and all confidence intervals include 1. This suggests that alcohol use before sex does not show a clear independent relationship with HIV prevalence in this model.

Overall, the results in this section show no statistically significant associations between the examined behavioural factors and the outcome. Although some variables such as condom use and early sexual debut show elevated or reduced odds, the wide confidence intervals and non-significant p-values indicate weak evidence. This suggests that while behavioural factors may influence risk in theory, they do not independently explain the outcome in this particular model after controlling for other variables.

CHAPTER FIVE: DISCUSSION, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the major findings of the study, conclusions drawn from the findings, recommendations, limitations of the study, and areas for further research. The chapter is based on the study objectives and findings obtained from the univariate, bivariate, and multivariate analyses on the determinants of HIV prevalence among individuals aged 15–49 years in Uganda

5.2 Summary of Findings

The study examined the determinants of HIV prevalence among reproductive-age individuals (15–49 years) in Uganda using data from the Uganda Population-Based HIV Impact Assessment (UPHIA). The study specifically assessed the influence of socio-demographic, economic, and behavioral factors on HIV prevalence.

At the univariate level, the findings showed that HIV prevalence among respondents was 5.61%, while the majority of respondents (94.39%) were HIV negative. The study population was predominantly female (58.63%) and youthful, with a large proportion aged between 15–24 years. Most respondents were married, while others were living together or not in union. The findings also revealed variations in behavioral characteristics such as condom use, alcohol consumption before sex, migration history, HIV testing behavior, and male circumcision status.

The bivariate analysis established significant associations between HIV prevalence and several independent variables. Region was significantly associated with HIV prevalence, with the highest prevalence observed in South Buganda (8.75%) and the lowest in Karamoja (2.53%). Age was also significantly associated with HIV prevalence, where prevalence increased steadily from 0.93% among individuals aged 15–19 years to 11.59% among those aged 45–49 years.

Gender differences were also observed, with females having higher HIV prevalence (6.81%) compared to males (3.90%). Marital status showed significant association with HIV prevalence, with respondents not in union recording the highest prevalence (14.82%). Wealth status and occupation were also significantly associated with HIV prevalence. Individuals engaged in formal employment and high-mobility jobs exhibited relatively higher prevalence compared to students and those in informal employment.

Behavioral factors also showed strong associations with HIV prevalence. Respondents with multiple sexual partners had higher HIV prevalence compared to those with one or no sexual partners. Condom use was significantly associated with HIV prevalence, although respondents reporting condom use had higher prevalence than non-users, possibly reflecting reverse causality and higher risk awareness among condom users. HIV testing history was also significantly associated with HIV prevalence, with individuals who had ever tested showing higher prevalence than those who had never tested.

Alcohol use before sex showed a strong association with HIV prevalence. The highest prevalence was observed among respondents whose partners consumed alcohol before sex. Male circumcision was found to be significantly associated with HIV prevalence, with uncircumcised men showing higher prevalence compared to circumcised men.

At the multivariate level, logistic regression analysis identified independent predictors of HIV prevalence after controlling for other variables. Regional differences remained significant, particularly for East Central, Mid-Eastern, Teso, and West Nile regions, which showed significantly lower odds of HIV infection compared to South Buganda.

Age remained one of the strongest predictors of HIV prevalence. Individuals aged 25–49 years had significantly higher odds of HIV infection compared to adolescents aged 15–19 years. The odds increased progressively with age, reaching the highest levels among respondents aged 40–44 years and 45–49 years.

Marital status also remained statistically significant. Respondents not in union were more than three times more likely to be HIV positive compared to married individuals.

However, gender, wealth status, migration history, condom use, alcohol use before sex, HIV testing history, and number of sexual partners did not remain statistically significant after controlling for other variables.

Overall, the findings indicate that HIV prevalence among reproductive-age individuals in Uganda is influenced by multiple interacting socio-demographic, regional, and behavioral factors.

5.2 Conclusion

The study concludes that HIV prevalence among individuals aged 15–49 years in Uganda remains a significant public health concern influenced by a combination of demographic, regional, marital, and behavioral factors.

The study established that age is a major determinant of HIV prevalence, with older individuals experiencing significantly higher risk of HIV infection compared to younger age groups. This suggests cumulative exposure to sexual risk behaviors over time.

Regional disparities in HIV prevalence were also evident, indicating that HIV infection patterns differ across regions due to variations in socioeconomic conditions, access to healthcare services, mobility patterns, and cultural practices. Regions such as West Nile, Teso, East Central, and Mid-Eastern demonstrated significantly lower odds of HIV infection compared to South Buganda.

The findings further show that marital status plays an important role in HIV prevalence. Individuals not in union were found to be significantly more vulnerable to HIV infection than married individuals, possibly due to unstable sexual relationships and increased likelihood of engaging in risky sexual behaviors.

Behavioral factors such as alcohol use before sex, multiple sexual partnerships, condom use, and male circumcision were associated with HIV prevalence at the bivariate level, although some lost significance after adjusting for other variables. Male circumcision emerged as an important protective factor against HIV infection.

The study therefore concludes that HIV prevalence in Uganda is multidimensional and cannot be explained by a single factor. Effective HIV prevention requires integrated interventions that simultaneously address demographic vulnerabilities, risky sexual behaviors, regional disparities, and access to prevention services

5.3 Recommendations

Based on the findings of the study, the following recommendations are proposed:

- ❖ Strengthen HIV Prevention Programs Among Older Age Group

Since HIV prevalence increased significantly with age, the Ministry of Health and HIV implementing partners should strengthen HIV prevention programs targeting adults aged 25–49 years. Interventions should focus on regular HIV testing, condom promotion, behavioral counseling, and treatment adherence.

- ❖ Expand Regional HIV Interventions

Government and development partners should design region-specific HIV prevention strategies, especially in high-prevalence regions such as South Buganda, Mid North, and Kampala. These interventions should address local drivers of HIV transmission including mobility, urbanization, and risky sexual networks.

- ❖ Promote Stable Sexual Relationships and Behavioral Change

Behavioral change communication programs should emphasize reduction of multiple sexual partnerships, delayed sexual debut, and promotion of stable relationships. Public health campaigns should particularly target individuals not in union who were found to be at higher risk of HIV infection.

- ❖ Strengthen Alcohol and Substance Abuse Control Programs

Since alcohol consumption before sex was associated with higher HIV prevalence, the government and community organizations should strengthen alcohol control measures and increase awareness about the relationship between alcohol abuse and risky sexual behavior.

- ❖ Promote Male Circumcision Services

The Ministry of Health should continue scaling up Voluntary Medical Male Circumcision (VMMC) programs, especially in regions with low circumcision coverage. Community sensitization should also be strengthened to address cultural misconceptions surrounding circumcision.

- ❖ Improve Access to HIV Testing and Counseling Services

Efforts should be intensified to improve access to HIV testing and counseling services, particularly among underserved populations. Community-based testing, self-testing services, and youth-friendly HIV services should be expanded to increase early detection and linkage to treatment.

- Address Socioeconomic Vulnerabilities

Government and stakeholders should strengthen socioeconomic empowerment programs, particularly for women and vulnerable populations. Improving education, employment opportunities, and economic stability may reduce engagement in risky survival strategies associated with HIV infection

5.4 Limitations of the Study

The study used secondary cross-sectional data from the UPHIA survey, which limited the ability to establish causal relationships between independent variables and HIV prevalence. The study relied on self-reported behavioral information such as condom use, alcohol consumption, and number of sexual partners, which may be affected by recall bias and social desirability bias. Additionally, some potentially important variables influencing HIV prevalence may not have been captured in the dataset. Despite these limitations, the study provides important insights into the determinants of HIV prevalence among reproductive-age individuals in Uganda.

5.5 Areas for Further Research

Future studies should:

- Conduct longitudinal studies to establish causal relationships between behavioral factors and HIV infection.
- Explore the influence of cultural and social norms on HIV prevalence across different regions of Uganda.
- Examine determinants of HIV prevalence among specific vulnerable groups such as adolescents, fisherfolk, migrants, and urban informal settlement populations.
- Investigate the effectiveness of behavioral interventions such as alcohol reduction programs and HIV awareness campaigns in reducing HIV transmission.
- Assess barriers to consistent condom use and uptake of HIV prevention services among high-risk populations in Uganda.

REFERENCES

Biraro, S., & El-Sadr, W. M. (2025). Progress in the HIV response in Uganda: Findings from two sequential population-based HIV impact assessment surveys, 2017–21. *The Lancet HIV*. Advance online publication. https://doi.org/10.1016/S2352-3018(25)00100-6

Chang, L. W., Khalifa, A., Malden, D., & Santelli, J. S. (2025). Declines in HIV incidence and prevalence and predictors among adolescents and young adults in Rakai, Uganda. *medRxiv*.

Farahani, M., Kirungi, W. L., Farley, S. M., Mugisha, V., Hoos, D., Smart, T. F., Reid, G. A.,

Grilo, S. A., Thompson, J., Chen, I. S., Nalugoda, F., Lutalo, T., Wei, Y., Spindler, E., Hoffman, S., Kreniske, P., Serwadda, D., Kagaayi, J., Grabowski, M. K., Wawer, M. J., Ssewamala, F. M.,

HIV among young people in Uganda: A nested explanatory-sequential study. *PLOS Global Public Health*, *2*(12). https://doi.org/10.1371/journal.pgph.0000870

Ministry of Health Uganda. (2023). Uganda HIV/AIDS country progress report 2023. Kampala: MoH.

Ministry of Health, Uganda. (2024). Uganda Population-based HIV Impact Assessment 2020-2021 (UPHIA 2020-2021) final report. https://phia.icap.columbia.edu/wp-content/uploads/2024/09/280324-UPHIA-EN-RR5.pdf.

Kalibbala, D., Mpungu, S. K., Ssuna, B., Muzeyi, W., Mberesero, H., Semitala, F. C., Katahoire, A., Armstrong-Hough, M., Kalyango, J. N., & Musiime, V. (2022). Determinants of testing for

Kalibbala, D., Mpungu, S. K., Mukisa, J., Nakanwagi, L. J., Ssekamatte, T., Isunju, J. B., & Wanyenze, R. K. (2022). Determinants of testing for HIV among young people in Uganda: A nested, explanatory-sequential study. *PLOS Global Public Health, 2*(3), Article e0000870. https://doi.org/10.1371/journal.pgph.0000870

Kasamba, I., Mugisha, J., Abaasa, A., Makanga, R., Ruzagira, E., Kaleebu, P., Seeley, J., Newton, R., & Kyamulibwa General Population Cohort team. (2023). Thirty years of change in HIV incidence among adults in the Kyamulibwa General Population Cohort in rural southwest Uganda,

1989–2021. *International Journal of Infectious Diseases*, *128*, 97–105. https://doi.org/10.1016/j.ijid.2023.01.028

Kawuma, S., Katwesigye, R., Walusaga, H., Akatukunda, P., Nangendo, J., Kabugo, C., Kamya, M. R., & Semitala, F. C. (2025). Determinants of continuation on HIV pre-exposure prophylaxis among female sex workers at a referral hospital in Uganda. *BMC Public Health, 25*(143).

McLeroy, K. R., Bibeau, D., Steckler, A., & Glanz, K. (2022). An ecological perspective on health promotion programs. *Health Education Quarterly*.

Ministry of Health, Uganda. (2024). *Uganda Population-based HIV Impact Assessment 2020-2021 (UPHIA 2020-2021) final report*. https://phia.icap.columbia.edu/wp-content/uploads/2024/09/280324-UPHIA-EN-RR5.pdf

Rosenstock, I. M., Strecher, V. J., & Becker, M. H. (2021). The Health Belief Model and HIV preventive behavior. *Health Education Monographs*.

Slaymaker, E., et al. (2026). Individual and population-level risk factors for new HIV acquisitions in East and Southern Africa: A multi-cohort analysis. *Nature Communications*. https://doi.org/10.1038/s41467-025-67966-0

Uganda AIDS Commission. (2024). HIV & AIDS factsheet 2023 (based on data ending 31st December 2022). https://uac.go.ug/media/attachments/2024/01/23/hiv-aids-factsheet-2023.pdf.

Uganda Bureau of Statistics (UBOS) & ICF. (2023). *Uganda Demographic and Health Survey 2022*. Kampala, Uganda, and Rockville, Maryland, USA: UBOS and ICF.

UNAIDS. (2023). *Global AIDS update 2023*. Geneva, Switzerland.

UNAIDS. (2024). Global AIDS update 2024: The path that ends AIDS. Geneva: UNAIDS.

World Health Organization. (2023). *Global HIV programme report 2023*. Geneva, Switzerland.

Voetsch, A. C., et al. (2023). Risk factors for recent HIV infections among adults in 14 African countries. Emerging Infectious Diseases, 29(11), 2325–2335. https://doi.org/10.3201/eid2911.230703