



**MODELING CONTRACEPTIVE USE AMONG UNIVERSITY STUDENTS
USING BINARY LOGISTIC REGRESSION: A CASE OF MZUZU
UNIVERSITY**

BACHELOR OF SCIENCE IN MATHEMATICAL SCIENCES

By

**Misheck Samuel Nzondo
(BSMAT2421)**

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DECLARATION

I, MISHECK NZONDO hereby declare that this dissertation is my own original work which has not been submitted to any other institution for similar purposes. Where other people's work has been used, acknowledgements have been made.

Signature

Date

CERTIFICATE OF APPROVAL

The undersigned certifies that this dissertation represents the student's own work and effort and has been submitted with our approval.

Signature: _____

Date: _____

Henry Mponela (Msc,Lecturer)

Supervisor

Signature: _____

Date: _____

Dr. Musukwa (Senior lecturer)

Co-Supervisor

DEDICATION

This dissertation is dedicated to my family, friends and mentors who have been a constant source of support and inspiration throughout my academic journey.

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ABSTRACT

The aim of this study was to identify determinants of contraceptive method use among undergraduates at Mzuzu University, Malawi. Limited localized data on contraceptive knowledge, attitudes and practices has hindered the design of effective reproductive health interventions in this population.

A cross-sectional design with simple random sampling was employed. Data were collected from 134 students using a structured questionnaire. Quantitative analyses were conducted using SPSS v20 and R under **0.05 significant level of test**.

Findings revealed high awareness (67.9%), with condoms (60.4%) and pills (23.1%) as the most commonly reported methods. However, consistent use was limited, with only 17.2% reporting always using contraceptives. Binary Logistic regression identified **year of study** and **access to contraceptive method services** as significant predictors, both negatively associated with use. Qualitative data highlighted stigma, lack of confidentiality and students' shyness as major barriers, alongside reports of unplanned pregnancies and abortion cases.

The study concludes that knowledge alone is insufficient for sustained contraceptive use. Strengthening youth-friendly, confidential and student-centered services is essential for improving uptake in university settings.

Keywords: Contraceptive use; University students; Injectables; Implants ;Binary logistic regression; SPSS; R; Qualitative insights

TABLE OF CONTENTS

ABSTRACT	iv
TABLE OF CONTENTS	vi
LIST OF TABLES	ix
LIST OF FIGURES	x
LIST OF APPENDICES	xi
LIST OF ABBREVIATIONS AND ACRONYMS	xii
1 Introduction	1
1.1 Background Information	1
1.2 Motivation of the Problem	2
1.3 Problem Statement	2
1.4 Research Objectives	3
1.4.1 Main Objective	3
1.4.2 Specific Objectives	3
1.5 Research Questions	3
1.6 Significance of the Study	4
2 LITERATURE REVIEW	5
2.1 Definitions of Key Terms	5
2.2 Adolescence and Sexual and Reproductive Health	7
2.3 Sexually Transmitted Infections Among Youth	8
2.4 Contraceptive Methods and Practices	8
2.5 Contraceptive Practices Among University Students	8
2.6 Migration, Demographics and Contraceptive Use	9

2.7	Peer-led Interventions and Education	9
2.8	Statistical Models in Contraceptive Research	9
2.9	Application of the Logistic Model	9
2.10	Gaps in the Literature	10
3	DATA AND METHOD	11
3.1	Study Site	11
3.2	Data Source	11
3.3	Sample Size Determination and Sampling Procedure	12
3.4	Ethical Considerations	13
3.5	Study Variables	13
3.6	Statistical Model Used and Its Assumptions	14
3.7	Conceptual Framework	17
4	RESULTS AND FINDINGS	18
4.1	Introduction	18
4.2	Socio-Demographic Characteristics of Respondents	18
4.3	Access to Contraceptives and Sources of Information	18
4.4	Contraceptive Methods Ever Used and Frequency of Use	19
4.4.1	Barriers to Contraceptive Use	19
4.4.2	Suggested Improvements	20
4.4.3	Unwanted Pregnancies and Abortion Cases	21
4.5	Distribution of Contraceptive Use Status	22
4.5.1	Overall Model Fit	23
4.6	Logistic Regression Results	24
5	DISCUSSION	31
5.1	Introduction	31
5.2	Discussion of Predictors of Contraceptive Use	32
5.3	Model Performance	35
5.4	Qualitative Insights from Students and Health Providers	36
5.5	Integration of Quantitative and Qualitative Findings	38

6 CONCLUSION, RECOMMENDATIONS, LIMITATIONS AND AREAS FOR FURTHER RESEARCH	40
6.1 Conclusion	40
6.2 Recommendations	41
6.2.1 Targeted Interventions	41
6.2.2 Reproductive Health Education	41
6.2.3 Contraceptive Service Delivery	41
6.2.4 Policy Development	41
6.3 Limitations	41
6.4 Areas for Further Research	42
References	43
Appendices	51
Appendix A: Consent Form	51
Appendix B: Student Questionnaire	52
Appendix C: Ethical Clearance Form	54
Appendix D: R Code for Data Cleaning and Descriptive Analysis	55

LIST OF TABLES

4.4	Barriers to Contraceptive Use by Gender (N=134)	20
4.5	Suggested Improvements by Gender (N=134)	21
4.6	Perceptions of Unwanted Pregnancies and Abortion Cases by Gender (N=134) .	21
4.7	Overall Model Fit Statistics	23
4.8	Classification Table for Logistic Regression Model (N = 134)	24
4.9	Collinearity Statistics for Independent Variables	26
4.12	Significant Predictors of Contraceptive Use (N = 134)	26
4.1	Socio-demographic characteristics of respondents and contraceptive method use (N=134)	27
4.2	Access to contraceptives, sources of information, knowledge and future use intentions (N=134)	28
4.3	Contraceptive Methods Ever Used and Frequency of Use (N=134)	29
4.10	Logistic Regression Results (Part 1)	29
4.11	Logistic Regression Results (Part 2)	30

LIST OF FIGURES

3.1	Conceptual framework for determinants of contraceptive use.	17
4.1	Distribution of contraceptive use status among university students (N = 134). .	22
4.2	Receiver Operating Characteristic (ROC) Curve for Logistic Regression Model .	25
1	Ethical clearance certificate issued by MZUNIREC.	54

LIST OF APPENDICES

Appendix A: Consent Form	51
Appendix B: Student Questionnaire	52
Appendix C: Ethical Clearance Form	54
Appendix D: R Code for Data Cleaning and Descriptive Analysis	55

LIST OF ABBREVIATIONS AND ACRONYMS

AOR	Adjusted Odds Ratio
CI	Confidence Interval
CM	Contraceptive Method
DHS	Demographic and Health Survey
FP	Family Planning
HIV	Human Immunodeficiency Virus
IUD	Intrauterine device
MDHS	Malawi Demographic and Health Survey
NSO	National Statistical Office
OR	Odds Ratio
SPSS	Statistical Package for the Social Sciences
SRH	Sexual and Reproductive Health
SRHR	Sexual and Reproductive Health and Rights
STI	Sexually Transmitted Infection
WHO	World Health Organization
SDG	Sustainable Development Goal
MZUNIREC	Mzuzu University Research Ethical Committee

CHAPTER 1

INTRODUCTION

1.1 Background Information

Globally, young people constitute a significant part of the population, estimated at about 1.2 billion and projected to increase to 1.3 billion by 2030 [43]. As they grow, they face multiple choices, including sexual behaviors, which directly impact reproductive health and demographic trends. Despite the availability of modern contraceptives, their use among youth remains a major global health concern [32].

Ensuring universal access to contraceptives is central to achieving Sustainable Development Goal (SDG) 3, which promotes healthy lives and well-being for all [53]. The World Health Organization reports that about 23 million young people lack contraceptive access, leading to unintended pregnancies and early childbearing [62]. In 2019 alone, adolescents aged 15–19 in developing countries experience about 21 million pregnancies, with half being unintended and resulting in 12 million births [48].

Notably, about 55% of unintended pregnancies among adolescents end in unsafe abortions [9]. There are approximately 1.3 billion young people worldwide, mostly concentrated in developing regions [42]. By 2050, the adolescent population in sub-Saharan Africa (SSA) is projected to reach 850 million [54].

SSA continues to experience disproportionately high adolescent birth rates and Malawi is among the most affected countries. The Malawi Demographic and Health Survey (2000) reports a national median age at first sex of 17.1 years, with 17.5 years in Karonga District [13]. Recent evidence shows that many girls in Mangochi initiate sex before age 15 [56]. Although modern contraceptives are introduced in Malawi in 1994 [15], uptake among sexually active adolescents

remains low. With youth comprising more than 50% of Malawi's population [14, 36], contraceptive use among unmarried girls aged 15–19 is only about 30% [11]. Alarmingly, 32% of girls in this age group have already experienced pregnancy, placing Malawi among the countries with the highest adolescent pregnancy rates globally [25].

1.2 Motivation of the Problem

The transition to university life coincides with increased autonomy, peer influence and exposure to risky behaviors, which heighten students' vulnerability to sexual and reproductive health (SRH) risks [7, 47]. For undergraduates, decisions surrounding contraceptive use are critical, shaping individual well-being and long-term outcomes [46].

Globally, SRH challenges remain a leading concern for women of reproductive age [24]. Access to SRH services, including contraception, is essential in preventing unintended pregnancies, reducing sexually transmitted infections (STIs) and promoting gender equality. However, university students continue to face barriers such as limited knowledge, stigma, misconceptions and systemic health service gaps [10].

Most research focuses on women, neglecting the significant role men play in contraceptive decision-making [3, 44]. Engaging male students is essential for designing comprehensive and equitable interventions [5]. Within the university context, access to accurate SRH information, service availability and prevailing cultural and social norms all influence contraceptive choices [37].

This study attempts to address these gaps by focusing on Mzuzu University, where evidence on contraceptive knowledge, attitudes and practices remains limited.

1.3 Problem Statement

Students' socio-economic backgrounds and on-campus health services significantly influence their contraceptive knowledge, attitudes and practices [12]. While comprehensive knowledge supports contraceptive use, misconceptions and information gaps hinder informed decision-making. Cultural, religious and personal beliefs also shape attitudes and consistency of use [60].

Currently, no localized data exist on contraceptive knowledge, attitudes and practices among Mzuzu University undergraduates. This knowledge gap limits the design of targeted interventions. This study therefore attempts to generate evidence-based insights to inform health programs and services [19], contributing to student well-being, academic success and alignment with Mzuzu University's Strategic Plans (2018–2023; 2021–2030) and global SRH goals [27, 34].

1.4 Research Objectives

1.4.1 Main Objective

This study attempts to determine the factors associated with contraceptive use among university students at Mzuzu University.

1.4.2 Specific Objectives

This study specifically attempts to:

1. Assess the level of contraceptive knowledge among undergraduate students.
2. Examine student attitudes towards contraception.
3. Determine the prevalence of contraceptive use among sexually active students.
4. Identify socio-demographic, knowledge, attitudinal and service access factors associated with contraceptive use.
5. Explore students' sources of information on contraception.

1.5 Research Questions

The study seeks to answer the following:

1. What is the level of contraceptive knowledge among undergraduate students at Mzuzu University?
2. What are students' attitudes towards contraception?

3. What is the prevalence of contraceptive use among sexually active students?
4. What factors are associated with contraceptive use?
5. What are the main sources of contraceptive information among students?

1.6 Significance of the Study

This study provides insights into contraceptive knowledge, attitudes and practices among Mzuzu University undergraduates. The findings inform:

1. **Targeted interventions:** identification of knowledge gaps, misconceptions and barriers to access for improved SRH strategies.
2. **Reproductive health education:** development of peer-led and context-appropriate SRH programs tailored to university students [50].
3. **Contraceptive service delivery:** recommendations for enhancing campus-based services, focusing on affordability, accessibility and confidentiality.
4. **Policy development:** evidence to support university and national policy initiatives on SRH, aligned with SDGs and institutional goals.

By addressing these areas, the study contributes to improved reproductive health outcomes, better academic performance and the achievement of national and international health targets.

CHAPTER 2

LITERATURE REVIEW

2.1 Definitions of Key Terms

Contraceptive Use

Contraceptive use refers to the practice of employing various methods or devices to prevent pregnancy. These include modern methods such as condoms, oral pills, injectables, IUDs, implants and emergency contraceptives, as well as traditional methods such as withdrawal and periodic abstinence. According to the World Health Organization (WHO), contraceptive use is a key indicator of reproductive health outcomes and is essential for family planning and fertility regulation [65].

Key Contraceptive Methods

Oral Pills: Oral contraceptive pills are medications taken daily that contain synthetic forms of estrogen and/or progestin. They work primarily by inhibiting ovulation, thickening cervical mucus to prevent sperm penetration and altering the endometrium to reduce implantation likelihood [39].

Injectables: Injectable contraceptives are hormonal preparations (progestin-only or combined estrogen–progestin) administered intramuscularly or subcutaneously every 1 to 3 months. They prevent pregnancy by suppressing ovulation, thickening cervical mucus and changing the endometrial lining [55].

Intrauterine Devices (IUDs): IUDs are small, T-shaped devices inserted into the uterus by a trained provider. They may be copper-bearing (non-hormonal) or hormone-releasing

(levonorgestrel). IUDs work by impairing sperm mobility and preventing fertilization and in some cases by altering the endometrial environment [40].

Implants: Contraceptive implants are small, flexible rods inserted under the skin of the upper arm that release progestin over a period of 3–5 years. They prevent pregnancy primarily by inhibiting ovulation and thickening cervical mucus [35].

Emergency Contraceptives: Emergency contraception (EC) refers to methods used after unprotected intercourse to prevent pregnancy. The most common are levonorgestrel pills (taken within 72 hours), ulipristal acetate pills (effective up to 120 hours) and insertion of a copper IUD. They act mainly by delaying ovulation or preventing fertilization [20].

Reproductive Health

Reproductive health is defined by WHO as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity, in all matters relating to the reproductive system, its functions and processes ([61]).

Family Planning

Family planning refers to the ability of individuals and couples to anticipate and attain their desired number of children, and the spacing and timing of their births, through the use of contraceptive methods and the treatment of infertility ([57]).

Sexual and Reproductive Health (SRH)

Sexual and reproductive health encompasses services, education and policies that ensure individuals can make informed choices about their sexual and reproductive lives ([63]).

Sexual and Reproductive Health and Rights (SRHR)

Sexual and reproductive health and rights emphasize that access to reproductive health services is a fundamental human right ([58]).

Sexually Transmitted Infections (STIs)

STIs are infections that are primarily transmitted through sexual contact, including chlamydia, gonorrhea, syphilis, human papillomavirus (HPV) and HIV/AIDS ([64]).

Sustainable Development Goals (SDGs)

The Sustainable Development Goals are a set of 17 global goals adopted by the United Nations in 2015 to address social, economic and environmental challenges by 2030. Goal 3 (Good Health and Well-Being) and Goal 5 (Gender Equality) explicitly address reproductive health, family planning and universal access to sexual and reproductive health services ([52]).

Operational Definition of Knowledge Levels of Contraceptive Methods

In this study, students' knowledge of contraceptive methods was measured using a set of items on awareness and correct identification of contraceptives. Based on their scores, respondents were categorized as follows:

- **High knowledge:** Respondents who correctly identified the majority of contraceptive methods.
- **Moderate knowledge:** Respondents who correctly identified a moderate proportion of contraceptive methods.
- **Low knowledge:** Respondents who correctly identified less than half of the contraceptive methods.

These categories allowed the study to capture variations in awareness and understanding of contraceptives among students.

2.2 Adolescence and Sexual and Reproductive Health

Adolescence is a critical stage of development, during which individuals experience physical, psychological and social transitions that influence their reproductive health. Sexual and reproductive health (SRH) challenges during this period include limited access to contraceptives,

exposure to misinformation and stigma around contraceptive use [59]. Adolescents often lack comprehensive SRH information, which contributes to unsafe sexual practices and higher risks of unintended pregnancies and sexually transmitted infections (STIs).

2.3 Sexually Transmitted Infections Among Youth

STIs remain a major global health problem, disproportionately affecting young people. Inadequate knowledge and inconsistent use of contraceptives, particularly condoms, exacerbate the prevalence of STIs in this age group [51]. Effective prevention strategies require increased awareness and access to contraceptive methods tailored to adolescents and young adults.

2.4 Contraceptive Methods and Practices

The use of contraceptives among young people has been widely studied, with evidence highlighting both behavioral and structural challenges. Despite improvements in availability, many barriers persist, including stigma, misconceptions and affordability issues. Lassi et al. [23] emphasized that while modern contraceptive methods are available, usage remains low among young populations in low- and middle-income countries.

2.5 Contraceptive Practices Among University Students

Studies show considerable variation in contraceptive practices among university students globally. A systematic review highlighted diverse factors influencing uptake, such as cultural norms, health service availability and peer influence [45]. Research from Ethiopia indicated that while university students have a relatively high level of knowledge about contraception, gaps remain in attitudes and actual practices [4]. Similarly, in Pakistan, students' understanding of contraceptive risks and associations with other health conditions, such as breast cancer, remains limited [18].

In Uganda, Byamugisha et al. [6] found that Makerere University students were knowledgeable about contraceptives but underutilized them due to stigma and misconceptions. Evidence from Ethiopia also showed that emergency contraceptive use was common among university students, although often inappropriately applied [28]. In Ghana, social media has emerged as

a significant platform shaping contraceptive awareness among students [41].

2.6 Migration, Demographics and Contraceptive Use

Migration patterns influence family planning use, with evidence from Malawi indicating that migration can affect both knowledge and uptake of contraceptives [30]. Broader demographic studies across sub-Saharan Africa also point to the role of socio-economic status, cultural norms and access to health services in shaping contraceptive behaviors. Ahinkorah et al. [1] observed that determinants of adolescent pregnancy in SSA include limited contraceptive use, early sexual debut and weak health systems.

2.7 Peer-led Interventions and Education

Peer-led interventions have been recognized as an effective strategy in improving SRH knowledge and contraceptive uptake among university students. [49] demonstrated that peer education significantly enhanced knowledge and shaped positive attitudes toward contraceptives, making it an important component of university health programs.

2.8 Statistical Models in Contraceptive Research

Quantitative analysis of contraceptive use has increasingly relied on regression models to identify associated factors. Kutner et al. [22] emphasized the role of linear regression in analyzing health behavior data, while logistic regression models are considered the standard for analyzing binary outcomes such as contraceptive use. Hosmer and Lemeshow [16], as well as Hosmer et al. [17], provided foundational methodologies for applied logistic regression in health sciences research.

2.9 Application of the Logistic Model

Several studies across African countries have employed logistic regression to examine factors influencing contraceptive use and reproductive health behaviors. Logistic regression has proven effective in identifying statistically significant associations between demographic, educational and behavioral factors and the likelihood of using modern contraceptive methods. For instance:

In Malawi, [30] examined the association between migration and family planning use among women. Using logistic regression, they found that age, region and level of education were significantly associated with the use of modern contraceptives among both married women and all women of childbearing age, with all factors significant at the 0.05 level.

In Uganda, [6] applied logistic regression in their study of first-year female students at Makerere University. They found that the primary sources of information about contraceptives were friends (34%), media (24.3%) and schools (19.4%). The most commonly used contraceptive methods were condoms (48.9%) and withdrawal (23.4%).

In Ethiopia, [29] conducted a cross-sectional study at Hawassa University and used logistic regression to identify that the use of emergency contraceptive methods among female students was significantly associated with sources of information, marital status, parents' education level and students' batch, with all associations significant at the 0.05 level.

2.10 Gaps in the Literature

Despite existing research on contraceptive knowledge, attitudes and practices among university students, there are gaps in the literature.

First, more studies are needed to explore the experiences and perspectives of students in sub-Saharan Africa, particularly in Malawi. While some studies have looked at contraceptive use in the region [2, 33], few have focused on university students at Mzuzu University.

Second, there is a lack of qualitative research that explores the complex social and cultural factors affecting contraceptive decision-making among university students.

Third, many studies lack the male perspective, focusing only on women's experiences and knowledge. Understanding *male perspectives* is crucial for creating comprehensive and effective interventions.

Finally, more research is needed to evaluate the effectiveness of programs designed to improve contraceptive knowledge, attitudes and practices among university students.

CHAPTER 3

DATA AND METHOD

3.1 Study Site

The study was conducted at Mzuzu University (MZUNI), a public institution of higher learning located in Mzuzu City in northern Malawi. The University operates the main campus in Mzuzu and the Dunduzu campus and has a student population of over 8,000.

Mzuzu University is organized into six faculties: Education; Environmental Sciences; Health Sciences; Humanities and Social Sciences; Science, Technology and Innovation; and Tourism, Hospitality and Management. These faculties house a wide range of academic departments, including disciplines such as Nursing and Midwifery, Fisheries and Aquatic Sciences, Forestry and Environmental Management, Biological Sciences, Information and Communication Technology, Communication Studies and Hospitality Management.

This diversity of academic programs and student backgrounds provided a rich and varied base for the study participants.

3.2 Data Source

Data for this study were obtained through a cross-sectional online survey administered to Mzuzu University students using KoboToolbox. The questionnaire contained both closed-ended items, capturing demographic, socio-economic and reproductive health information and open-ended questions for qualitative insights.

The survey link was distributed via official class WhatsApp groups through class representatives. A pretest involving 20 students was conducted to ensure clarity and reliability of the

instrument and those responses were excluded from the final analysis. In addition, a qualitative survey was carried out among health providers to capture perspectives on contraceptive access and service delivery.

3.3 Sample Size Determination and Sampling Procedure

The target population consists of all undergraduate students at Mzuzu University. This study employs a mixed-methods, cross-sectional design, combining quantitative and qualitative approaches. Quantitative data are collected through a structured, self-administered questionnaire, while qualitative insights are obtained from healthcare providers via semi-structured interviews, included to complement quantitative findings and provide contextual explanations.

The initial sample size is determined using Cochran's formula [8]. For an *infinite* population, the formula is:

$$n_0 = \frac{Z^2 p (1 - p)}{e^2},$$

where Z is the critical value for the desired confidence level (1.96 for 95%), p is the anticipated proportion (set to 0.5 to maximize variability when no prior estimate is available) and e is the margin of error.

Substitution (infinite population):

$$n_0 = \frac{(1.96)^2 \times 0.5 \times (1 - 0.5)}{(0.05)^2} = \frac{3.8416 \times 0.25}{0.0025} = \frac{0.9604}{0.0025} = 384.16 \approx 384.$$

Since the target population is finite ($N = 5000$ students), the finite population correction (FPC) is applied:

$$n = \frac{n_0}{1 + \frac{n_0 - 1}{N}}.$$

Substitution (finite population correction):

$$n = \frac{384.16}{1 + \frac{384.16 - 1}{5000}} = \frac{384.16}{1 + \frac{383.16}{5000}} = \frac{384.16}{1.076632} = 356.8 \approx 357.$$

Thus, the **required sample size is 357** after applying the finite population correction.

Due to practical constraints, the final sampling procedure follows simple randomization through online distribution of the questionnaire link. A total of 157 students respond and after data cleaning in R, **134 valid responses** are retained for analysis.

Although the achieved sample is smaller than the planned 357, it is adequate for binary logistic regression, consistent with guidance that a minimum of about 10 events per predictor variable (EPV) supports reliable estimation [22]. With 134 observations and a reasonable distribution of contraceptive users and non-users, the effective EPV is within acceptable limits. Therefore, the achieved sample size is considered sufficient for the study objectives.

3.4 Ethical Considerations

Ethical clearance for this study was obtained from the **MZUNIREC**. Informed consent was sought from all participants, participation was voluntary and anonymity and confidentiality were strictly maintained. No identifying information was collected. The pretest and main survey adhered to ethical standards of academic research.

The study targeted full-time undergraduate students at Mzuzu University. Inclusion criteria required that participants be consenting and enrolled as full-time students, while exclusion criteria ruled out part-time, postgraduate or students on academic leave.

Copies of the ethical clearance form and the questionnaires used in this study are provided in the Appendices including the consent form and the questionnaire.

3.5 Study Variables

In this study, the dependent variable was contraceptive use among students, measured as a binary outcome (1 = user, 0 = non-user). For respondents who reported ever using contraceptives, frequency of contraceptive use was also recorded.

Independent variables included:

- **Demographic characteristics:** age, sex, marital status and year of study.
- **Socio-economic factors:** parental education, residence and income.

- **Reproductive health factors:** knowledge of contraceptive methods (ever heard of contraceptive methods; level of knowledge categorized as low, moderate or high); attitudes toward contraceptive use (likelihood of future use, yes/no); and experiences with pregnancy or abortion.
- **Barriers and improvement:** challenges faced when accessing contraceptive services and respondents' opinions on how services could be improved.

Variable Coding

For analysis purposes, categorical independent variables were coded in SPSS prior to running the binary logistic regression. For example, age was recoded into three categories: 18–21 years = 1, 22–25 years = 2 and above 25 years = 3. Similarly, other categorical variables such as year of study, residence and access to services were also assigned numerical codes to facilitate analysis.

For the qualitative component, open-ended responses from students and interviews with health providers were analyzed thematically. Codes were developed directly from the data and related codes were grouped into themes representing shared views and perspectives. This analysis complemented the quantitative findings by providing additional context and understanding.

3.6 Statistical Model Used and Its Assumptions

Binary logistic regression was used to examine the determinants of contraceptive use among students. The model is appropriate when the dependent variable is binary in nature (e.g., use vs. non-use of contraception) [16]. The logistic regression function is expressed as:

$$\text{logit}(p) = \ln \left(\frac{p}{1-p} \right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_k X_k$$

where p is the probability of contraceptive use, β_0 is the intercept and β_i are the coefficients of the predictor variables X_i . In this study, the independent variables were defined as follows: X_1 = Gender, X_2 = Age, X_3 = Religion, X_4 = Monthly Income, X_5 = Parent's Education, X_6 = Residence, X_7 = Year of Study, X_8 = Access to Contraceptive Methods (CM) Services and X_9 = Source of Information about CM.

Assumptions of Logistic Regression

Although all explanatory variables in this study are categorical, certain key assumptions of logistic regression still apply:

- The dependent variable must be binary.
- Observations are independent of each other.
- There is no perfect multicollinearity among predictors. This study checked for multicollinearity using the Variance Inflation Factor (VIF). A VIF value less than 10 was considered acceptable.
- Adequate sample size is required. The rule of thumb of at least 10 events per predictor variable (EPV) was applied to ensure reliable estimation.

Interpretation of Odds Ratios

The coefficients of the logistic regression model were exponentiated to obtain odds ratios (OR), which are easier to interpret. An odds ratio greater than 1 indicates that the predictor is associated with higher odds of contraceptive use, while an odds ratio less than 1 indicates lower odds. The formula for the odds ratio is:

$$OR = e^{\beta_i}$$

where β_i is the estimated coefficient of predictor X_i . Odds ratios with their 95% confidence intervals were reported to show the strength and precision of associations.

Predictive Power of the Model

To assess how well the logistic regression model predicted contraceptive use, the model's classification accuracy and predictive power were examined. Predictive power was evaluated using the Receiver Operating Characteristic (ROC) curve and the Area Under the Curve (AUC). The ROC curve plots sensitivity against 1-specificity, while the AUC provides a single measure of model performance. An AUC value of 0.5 suggests no discrimination, whereas values closer to

1.0 indicate excellent discrimination ability.

Software Used

This study used **SPSS version 20** for descriptive statistics and logistic regression analyses. **R software** was used for data cleaning and verification of some analyses.

Modeling Strategy

The analysis was conducted in a structured block-wise manner to ensure robustness and interpretability of the results while avoiding overfitting given the modest sample size. Independent variables were first grouped into conceptually related blocks, namely demographic factors, socio-economic factors and reproductive health factors. Logistic regression models were then fitted sequentially for each block to assess the contribution of variables within the same category.

After assessing block-level models, a final multivariable logistic regression model was constructed. This model incorporated significant predictors from the block analyses, together with theoretically important variables identified in the literature, regardless of their statistical significance at the block stage. This approach ensured that key determinants of contraceptive use were not overlooked, while still maintaining a parsimonious and interpretable model.

Adjusted odds ratios (AORs) with 95% confidence intervals were reported for the final model to provide an interpretable measure of the strength and direction of association between predictor variables and contraceptive use. In addition, the overall performance of the final model was assessed using the Omnibus test of model coefficients, the Hosmer–Lemeshow goodness-of-fit test and predictive power statistics such as the area under the ROC curve (AUC). Model classification accuracy was also examined. To optimize predictive performance, the classification cut-off point was adjusted from the conventional 0.50 to 0.55. This adjustment allowed a better balance between sensitivity and specificity, which is particularly important in studies of contraceptive use where correctly identifying users is a public health priority. The detailed classification results are presented in Chapter Four.

3.7 Conceptual Framework

The conceptual framework guiding this study is illustrated in Figure 3.1. It shows how demographic, socio-economic and reproductive health factors influence contraceptive use among university students. Binary logistic regression was applied to model the relationship between the independent variables and the binary dependent variable (contraceptive use).

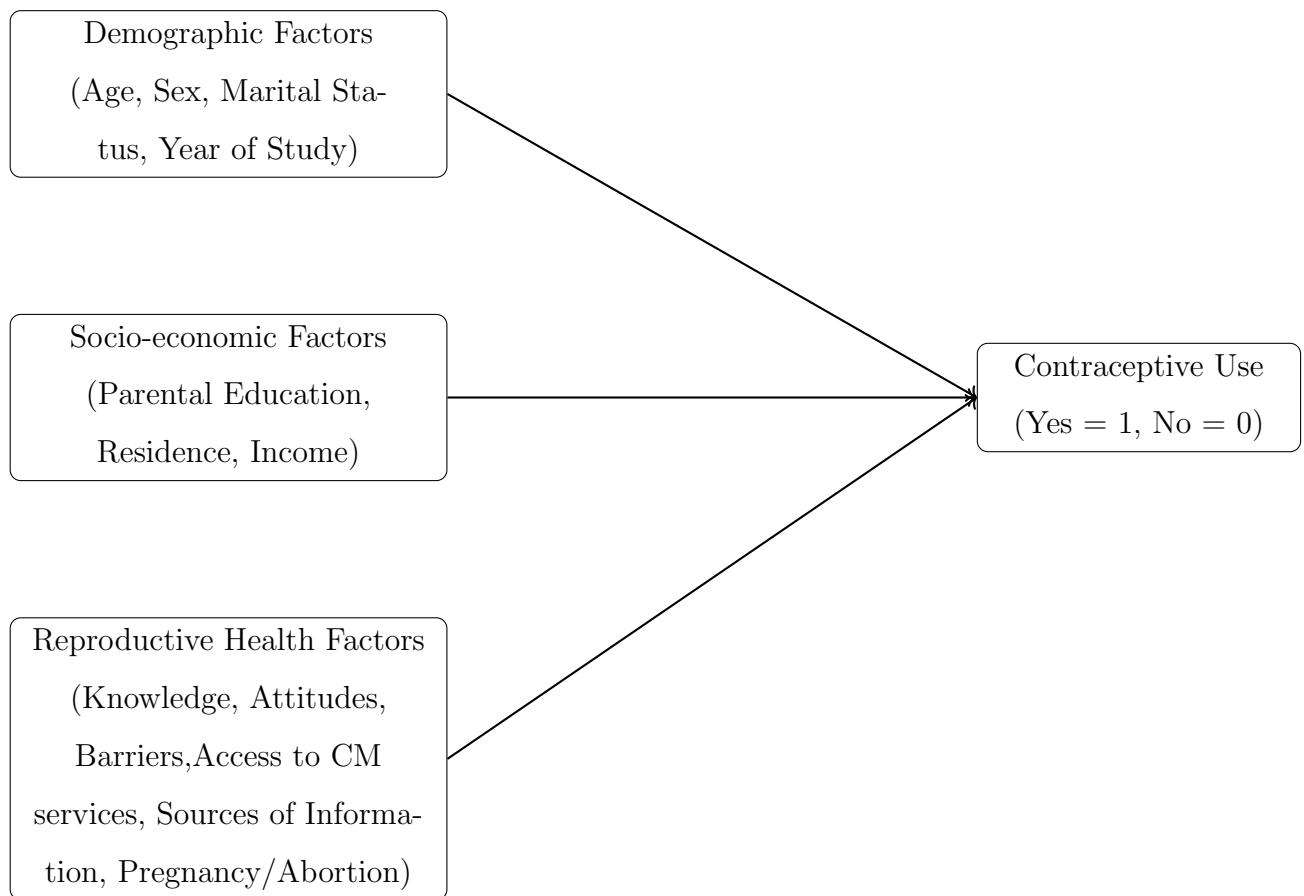


Figure 3.1: Conceptual framework for determinants of contraceptive use.

CHAPTER 4

RESULTS AND FINDINGS

4.1 Introduction

This chapter presents the results of the study in line with the stated objectives. The analysis is organized into descriptive and inferential sections. Descriptive statistics summarized the socio-demographic characteristics, contraceptive knowledge, sources of information and patterns of contraceptive use. Inferential analysis later explored associations and predictors of contraceptive use using binary logistic regression. The significance level was set at $p - value < 0.05$.

4.2 Socio-Demographic Characteristics of Respondents

Table 4.1 presents the socio-demographic characteristics of the respondents and their contraceptive method use status. The study included a total of 134 respondents, the majority of whom were male (58.2%).

4.3 Access to Contraceptives and Sources of Information

Table 4.2 summarizes respondents' access to contraceptive methods and their primary sources of information.

4.4 Contraceptive Methods Ever Used and Frequency of Use

Table 4.3 presents the distribution of contraceptive methods ever used among respondents, as well as the frequency of use. The findings revealed that condoms were the most commonly used contraceptive method (60.4%), followed by pills (23.1%) and withdrawal (21.6%). A smaller proportion reported natural methods (8.2%), injections (3.0%) and implants (1.5%). Intrauterine devices (IUDs) and “other” methods were recorded at 67.9% overall because of aggregation in reporting. In terms of frequency, 20.9% indicated rarely using contraceptives, 19.4% used them sometimes, 10.4% often and 17.2% always. These findings suggest that while awareness and uptake were widespread, consistency of use varied considerably among the student population.

4.4.1 Barriers to Contraceptive Use

Barriers to contraceptive use were assessed to understand the main challenges students faced in accessing contraceptive methods.

Table 4.4: Barriers to Contraceptive Use by Gender (N=134)

Barrier	Category	Male	Female	Total
Didn't know about it	Yes	6 (7.7%)	3 (5.4%)	9 (6.7%)
Couldn't access it easily	Yes	2 (2.6%)	2 (3.6%)	4 (3.0%)
Not allowed by religion	Yes	2 (2.6%)	6 (10.7%)	8 (6.0%)
Not allowed by partner	Yes	0 (0.0%)	1 (1.8%)	1 (0.7%)
Fear of side effects	Yes	11 (14.1%)	12 (21.4%)	23 (17.2%)
Service charge	Yes	26 (33.3%)	26 (46.4%)	52 (38.8%)
Health workers' attitude	Yes	17 (21.8%)	22 (39.3%)	39 (29.1%)
Lack of privacy	Yes	22 (28.2%)	21 (37.5%)	43 (32.1%)
Lack of confidentiality	Yes	20 (25.6%)	14 (25.0%)	34 (25.4%)
Unavailability	Yes	13 (16.7%)	11 (19.6%)	24 (17.9%)
Clinic not user-friendly	Yes	16 (20.5%)	11 (19.6%)	27 (20.1%)
Limited working hours	Yes	12 (15.4%)	11 (19.6%)	23 (17.2%)
No challenge	Yes	11 (14.1%)	10 (17.9%)	21 (15.7%)

4.4.2 Suggested Improvements

Respondents suggested several improvements to enhance contraceptive service delivery.

Table 4.5: Suggested Improvements by Gender (N=134)

Improvement	Category	Male	Female	Total
No service charge	Yes	23 (29.5%)	22 (39.3%)	45 (33.6%)
Improve health workers' attitude	Yes	24 (30.8%)	25 (44.6%)	49 (36.6%)
Improve privacy	Yes	27 (34.6%)	28 (50.0%)	55 (41.0%)
Improve confidentiality	Yes	25 (32.1%)	19 (33.9%)	44 (32.8%)
Improve opening hours	Yes	13 (16.7%)	13 (23.2%)	26 (19.4%)
Clinic user-friendly (improved)	Yes	29 (37.2%)	27 (48.2%)	56 (41.8%)
Improve service availability	Yes	23 (29.5%)	18 (32.1%)	41 (30.6%)

4.4.3 Unwanted Pregnancies and Abortion Cases

Students were also asked about their perceptions of unwanted pregnancies and abortion cases within the university community.

Table 4.6: Perceptions of Unwanted Pregnancies and Abortion Cases by Gender (N=134)

Outcome	Category	Male	Female	Total
Unwanted pregnancies	Very common	23 (29.5%)	18 (32.1%)	41 (30.6%)
	Rare	13 (16.7%)	17 (30.4%)	30 (22.4%)
	Not common	16 (20.5%)	11 (19.6%)	27 (20.1%)
	Not sure	26 (33.3%)	10 (17.9%)	36 (26.9%)
Abortion cases	Very common	27 (34.6%)	16 (28.6%)	43 (32.1%)
	Rare	9 (11.5%)	13 (23.2%)	22 (16.4%)
	Not common	8 (10.3%)	6 (10.7%)	14 (10.4%)
	Not sure	34 (43.6%)	21 (37.5%)	55 (41.0%)

4.5 Distribution of Contraceptive Use Status

Figure 4.1 shows the distribution of contraceptive use among the 134 respondents. Out of the total, 91 students (67.9%) reported using contraceptive methods, while 43 students (32.1%) reported non-use. This indicates that the majority of respondents were contraceptive users.

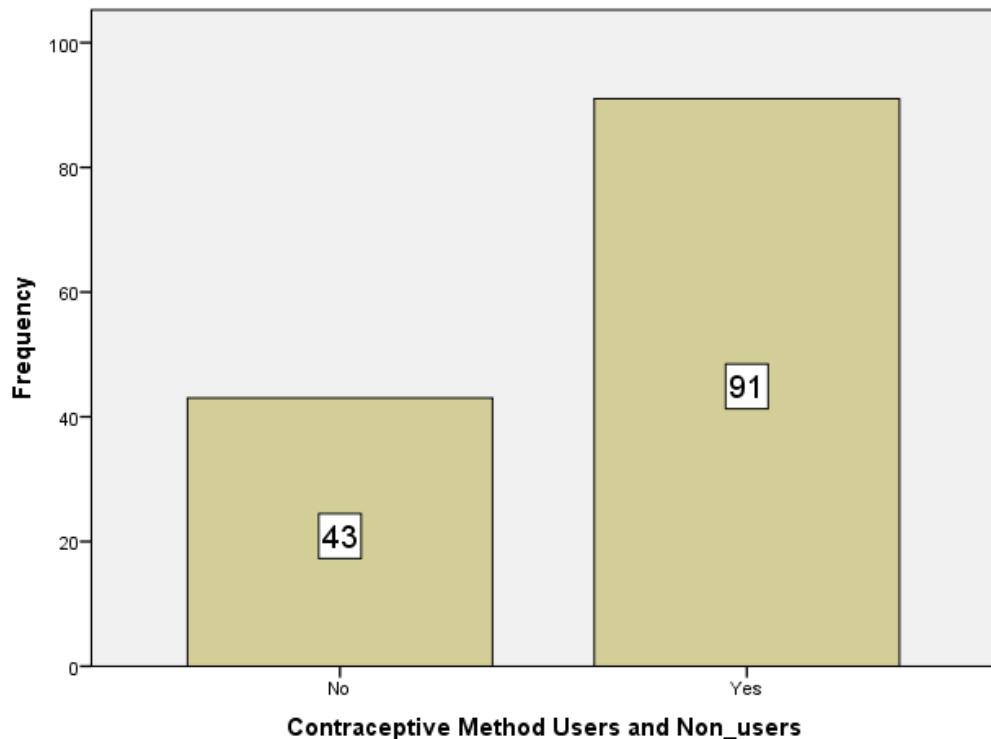


Figure 4.1: Distribution of contraceptive use status among university students ($N = 134$).

4.5.1 Overall Model Fit

The omnibus test of model coefficients was statistically significant ($\chi^2(18) = 38.942$, $p\text{-value} = 0.003$), indicating that the set of predictor variables collectively improved the prediction of contraceptive use compared to the null model. The pseudo- R^2 values (Cox & Snell $R^2 = 0.252$; Nagelkerke $R^2 = 0.353$) suggest that approximately 25–35% of the variation in contraceptive use was explained by the predictors included in the model.

Table 4.7: Overall Model Fit Statistics

	Chi-square	df	p-value.
Omnibus test of model coefficients	38.942	18	0.003
-2 Log likelihood	129.239		
Cox & Snell R^2	0.252		
Nagelkerke R^2	0.353		

4.6 Logistic Regression Results

The logistic regression model was statistically significant overall ($\chi^2(18) = 38.94$, $p - value = 0.003$), indicating that the predictors collectively improved classification of contraceptive use compared to the null model. The model explained between **25.2%** (Cox & Snell R^2) and **35.3%** (Nagelkerke R^2) of the variance in contraceptive use.

The Hosmer–Lemeshow test was non-significant ($\chi^2 = 4.77$, $p - value = 0.782$), confirming acceptable model fit.

As shown in Table 4.8, the model correctly classified **74.6%** of cases, with good sensitivity (83.5%) but lower specificity (55.8%). This suggests the model was more effective in identifying contraceptive users than non-users.

Table 4.8: Classification Table for Logistic Regression Model (N = 134)

Observed	Predicted Ever Used CM		Percentage Correct
	No	Yes	
No (n = 43)	24	19	55.8
Yes (n = 91)	15	76	83.5
Overall %			74.6

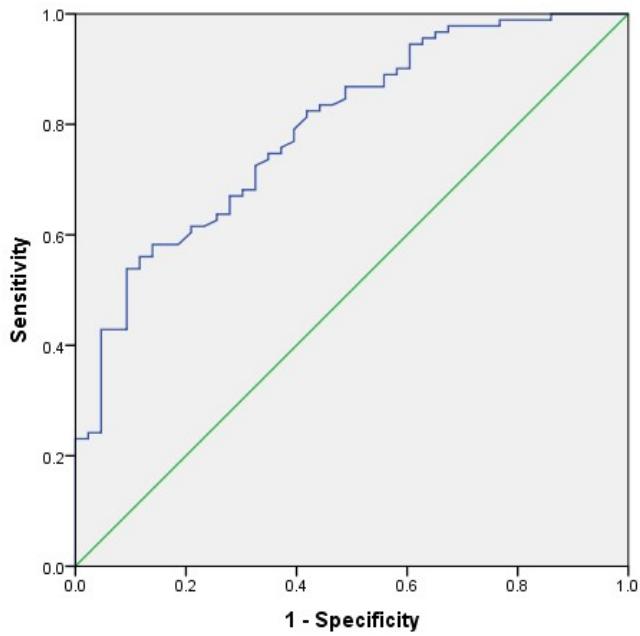


Figure 4.2: Receiver Operating Characteristic (ROC) Curve for Logistic Regression Model

As shown in Figure 4.2, the Receiver Operating Characteristic (ROC) curve demonstrates the diagnostic ability of the logistic regression model in distinguishing contraceptive users from non-users. The curve lies well above the diagonal reference line, indicating good model performance. The Area Under the Curve (AUC) value further confirms that the model provides reliable discrimination between the two groups. As shown in Table 4.9, all tolerance values are greater than 0.1 and all VIF values are well below 10. This indicates that multicollinearity is not a concern among the independent variables included in the model.

Table 4.9: Collinearity Statistics for Independent Variables

Variable	Tolerance	VIF
Gender	0.845	1.184
Age of Student	0.673	1.485
Marital status	0.844	1.184
Year of study	0.688	1.453
Religion	0.881	1.135
Residence of Students	0.947	1.056
Education level of parents	0.774	1.293
Student monthly income	0.716	1.397
Access to CM services	0.807	1.240
Source of Information on CM	0.770	1.298

Note. * $p - value < .05$.

Table 4.12: Significant Predictors of Contraceptive Use (N = 134)

Variable	B	S.E.	Wald	df	P-value	Exp(B)	95% CI for Exp(B)
Year of study							
1st year (Ref.)	—	—	—	—	—	—	—
2nd year	-1.823	0.888	4.219	1	0.040*	0.161	[0.028, 0.920]
3rd year	-1.877	0.863	4.723	1	0.030*	0.153	[0.028, 0.832]
4th/5th year	-1.640	0.822	3.978	1	0.046*	0.194	[0.039, 0.972]
Access to CM services							
No access (Ref.)	—	—	—	—	—	—	—
Have access	-2.924	1.328	4.850	1	0.028*	0.054	[0.004, 0.725]

Note. * $P - value < .05$.

The results indicate that students in 2nd year (AOR = 0.16), 3rd year (AOR = 0.15) and 4th/5th year (AOR = 0.19) were significantly less likely to have used contraceptives compared to 1st year students. Additionally, students with access to information about contraceptives had significantly lower odds of contraceptive use (AOR = 0.05).

Table 4.1: Socio-demographic characteristics of respondents and contraceptive method use (N=134)

Characteristic	Total (N)	Never Used n (%)	Ever Used n(%)	Overall %
Gender				
Male	78	22 (28.2)	56 (71.8)	58.2
Female	56	21 (37.5)	35 (62.5)	41.8
Age				
18-21	45	24 (53.3)	21 (46.7)	33.6
22-25	75	16 (21.3)	59 (78.7)	56.0
Over 25	14	3 (21.4)	11 (78.6)	10.4
Marital Status				
Single	74	28 (37.8)	46 (62.2)	55.2
Relationship	54	14 (25.9)	40 (74.1)	40.3
Married	6	1 (16.7)	5 (83.3)	4.5
Year of Study				
1st Year	37	18 (48.6)	19 (51.4)	27.6
2nd Year	26	11 (42.3)	15 (57.7)	19.4
3rd Year	37	11 (29.7)	26 (70.3)	27.6
4th/5th Year	34	3 (8.8)	31 (91.2)	25.4
Religion				
Christian	121	37 (30.6)	84 (69.4)	90.3
Islamic	10	4 (40.0)	6 (60.0)	7.5
Other	3	2 (66.7)	1 (33.3)	2.2
Residence				
Rural	28	8 (28.6)	20 (71.4)	20.9
Urban	50	17 (34.0)	33 (66.0)	37.3
Semi-urban	56	18 (32.1)	38 (67.9)	41.8
Parent Education				
Primary	49	17 (34.7)	32 (65.3)	36.6
Secondary	40	12 (30.0)	28 (70.0)	29.9
Tertiary	45	14 (31.1)	31 (68.9)	33.6
Monthly Income (MWK)				
0–50,000	82	30 (36.6)	52 (63.4)	61.2
51,000–150,000	34	9 (26.5)	25 (73.5)	25.4
Over 150,000	18	4 (22.2)	14 (77.8)	13.4

Table 4.2: Access to contraceptives, sources of information, knowledge and future use intentions (N=134)

Characteristic	Total (N)	Never Used n (%)	Ever Used n (%)	Overall %
Access: Clinic				
No	38	12 (31.6)	26 (68.4)	28.4
Yes	96	31 (32.3)	65 (67.7)	71.6
Access: Hospital				
No	86	32 (37.2)	54 (62.8)	64.2
Yes	48	11 (22.9)	37 (77.1)	35.8
Access: Pharmacy				
No	84	33 (39.3)	51 (60.7)	62.7
Yes	50	10 (20.0)	40 (80.0)	37.3
Access: Condom Distribution Sites (CDS)				
No	116	39 (33.6)	77 (66.4)	86.6
Yes	18	4 (22.2)	14 (77.8)	13.4
Access: Peers				
No	94	31 (33.0)	63 (67.0)	70.1
Yes	40	12 (30.0)	28 (70.0)	29.9
Source of Information: Parents				
No	121	39 (32.2)	82 (67.8)	90.3
Yes	13	4 (30.8)	9 (69.2)	9.7
Source of Information: Media				
No	41	19 (46.3)	22 (53.7)	30.6
Yes	93	24 (25.8)	69 (74.2)	69.4
Source of Information: Health Professionals				
No	73	19 (26.0)	54 (74.0)	54.5
Yes	61	24 (39.3)	37 (60.7)	45.5
Source of Information: Friends				
No	59	24 (40.7)	35 (59.3)	44.0
Yes	75	19 (25.3)	56 (74.7)	56.0
Source of Information: Lecturers				
No	113	37 (32.7)	76 (67.3)	84.3
Yes	21	6 (28.6)	15 (71.4)	15.7
Source of Information: Others				
No	113	35 (31.0)	78 (69.0)	84.3
Yes	21	8 (38.1)	13 (61.9)	15.7
Ever Heard of Contraceptive Methods				
No	7	6 (85.7)	1 (14.3)	5.2
Yes	127	37 (29.1)	90 (70.9)	94.8
Knowledge Level on Contraceptives				
None/0	7	6 (85.7)	1 (14.3)	5.2
Low	25	10 (40.0)	15 (60.0)	18.7
Moderate	72	21 (29.2)	51 (70.8)	53.7
High	30	6 (20.0)	24 (80.0)	22.4
Future Use of Contraceptives				
No	30	17 (56.7)	13 (43.3)	22.4
Yes	104	28 (25.0)	78 (75.0)	77.6

Table 4.3: Contraceptive Methods Ever Used and Frequency of Use (N=134)

Characteristic	Total (N)	Never Used n (%)	Ever Used n (%)	Overall %
Contraceptive Method Ever Used				
Used				
Condom	81	0 (0.0)	81 (100.0)	60.4
Pills	31	0 (0.0)	31 (100.0)	23.1
Withdrawal	29	0 (0.0)	29 (100.0)	21.6
Natural	11	0 (0.0)	11 (100.0)	8.2
IUD	134	43 (32.1)	91 (67.9)	100.0
Implants	2	0 (0.0)	2 (100.0)	1.5
Injections	4	0 (0.0)	4 (100.0)	3.0
Other	134	43 (32.1)	91 (67.9)	100.0
Frequency of Use				
Rarely				
Rarely	28	0 (0.0)	28 (100.0)	20.9
Sometimes				
Sometimes	26	0 (0.0)	26 (100.0)	19.4
Often				
Often	14	0 (0.0)	14 (100.0)	10.4
Always				
Always	23	0 (0.0)	23 (100.0)	17.2

Table 4.10: Logistic Regression Results (Part 1)

Variable	B	S.E.	Wald	df	p-value	Exp(B)	95% CI
Gender							
Female vs Male	0.585	0.497	1.389	1	0.239	1.795	[0.678, 4.751]
Age							
22–25 vs 18–21	-2.245	1.271	3.120	1	0.077	0.106	[0.009, 1.279]
>25 vs 18–21	-1.179	1.248	0.893	1	0.345	0.308	[0.027, 3.548]
Marital Status							
Relationship vs Single	0.087	1.384	0.004	1	0.950	1.091	[0.072, 16.433]
Married vs Single	0.913	1.424	0.411	1	0.521	2.492	[0.153, 40.596]
Year of Study							
2nd Year vs 1st Year	-1.823	0.888	4.219	1	0.040*	0.161	[0.028, 0.920]
3rd Year vs 1st Year	-1.877	0.863	4.723	1	0.030*	0.153	[0.028, 0.832]
4th/5th Year vs 1st Year	-1.640	0.822	3.978	1	0.046*	0.194	[0.039, 0.972]

Table 4.11: Logistic Regression Results (Part 2)

Variable	B	S.E.	Wald	df	p-value	Exp(B)	95% CI
Religion							
Islamic vs Christian	3.594	1.848	3.782	1	0.052	36.391	[0.972, 1361.932]
Other vs Christian	3.065	2.039	2.259	1	0.133	21.424	[0.394, 1165.251]
Residence							
Urban vs Rural	-0.126	0.628	0.040	1	0.841	0.882	[0.258, 3.018]
Semi-urban vs Rural	-0.559	0.537	1.082	1	0.298	0.572	[0.200, 1.639]
Parents' Education							
Secondary vs Primary	0.380	0.632	0.362	1	0.547	1.463	[0.424, 5.048]
Tertiary vs Primary	0.827	0.656	1.592	1	0.207	2.287	[0.633, 8.267]
Income							
51,000–150,000 vs 0–50,000	-1.161	0.868	1.790	1	0.181	0.313	[0.057, 1.710]
>150,000 vs 0–50,000	-1.066	0.961	1.232	1	0.267	0.344	[0.052, 2.263]
Access to CM service							
Have Access vs No Access	-2.924	1.328	4.850	1	0.028*	0.054	[0.004, 0.725]
Sources of Information							
Have Source vs No Source	-18.420	40192.970	0.000	1	1.000	0.000	[0.000, .]
Constant	0.528	2.107	0.063	1	0.802	1.696	—

CHAPTER 5

DISCUSSION

5.1 Introduction

This chapter presents a discussion of the findings in relation to the study objectives and relevant literature. The main objective of the study was to determine the factors associated with contraceptive use and method choice among university students at Mzuzu University. Specifically, the study aimed to: (i) assess the level of contraceptive knowledge among undergraduate students, (ii) examine students' attitudes towards contraception, (iii) determine the prevalence of contraceptive use among sexually active students, (iv) identify socio-demographic, knowledge, attitudinal and service-access factors associated with contraceptive use and (v) explore students' sources of information on contraception.

The results presented in Chapter Four showed that most respondents were young (18–25 years), with a higher proportion of males, the majority being single and predominantly Christian and urban residents. Although awareness of contraceptive methods was generally high, actual access to services was more limited and student attitudes were shaped by cultural and religious considerations.

Inferential analysis using logistic regression indicated that year of study and access to contraceptive services were statistically significant predictors of contraceptive use. Other socio-demographic and contextual variables such as gender, age, marital status, parental education, residence, income, religion and source of information did not show significant associations. The classification table demonstrated that the model correctly classified 74.6% of cases, with relatively high sensitivity (83.5%) but lower specificity (55.8%). The ROC curve confirmed that the model had acceptable discriminatory power and variance inflation factor (VIF) results

indicated no problems of multicollinearity.

Qualitative insights from health providers at Mzuzu University Clinic supported and extended the quantitative results. Providers noted that the most commonly used contraceptives among students were condoms and emergency contraceptives. However, they also emphasized the persistent risk of unplanned pregnancies, pointing to barriers such as students' shyness in seeking services and experiences of forced intimate relationships. These insights highlight both behavioral and structural challenges in contraceptive access and use.

The following sections of this chapter provide a detailed discussion of these findings, comparing them with previous studies and outlining their implications for contraceptive programming among university students.

5.2 Discussion of Predictors of Contraceptive Use

The socio-demographic results (Table 4.1) showed that the study included 134 respondents, the majority of whom were male (58.2%), aged between 22–25 years (56.0%) and single (55.2%). Most were Christian (90.3%) and a higher proportion resided in semi-urban areas (41.8%) compared to urban (37.3%) and rural (20.9%). Over one-third (36.6%) of respondents reported parents with primary-level education and the largest group (61.2%) came from households earning between 0–50,000 MWK per month. Descriptive findings suggested that contraceptive use was more common among older students, those in higher years of study and those from families with higher income levels.

Access and information factors (Table 4.2) indicated that most respondents obtained contraceptives from hospitals (76.1

The logistic regression analysis (corresponding to Tables 4.10 and 4.11 in Chapter Four) confirmed that **year of study** and **access to contraceptive services** were statistically significant predictors of contraceptive use. Compared to first-year students, those in higher years of study had significantly lower odds of contraceptive use (AOR = 0.16 for 2nd year, 0.15 for 3rd year and 0.19 for 4th/5th year; all $p < 0.05$). Similarly, students who reported access to contraceptive services were less likely to report use (AOR = 0.05, $p - value = 0.028$). These negative associations were contrary to the descriptive trends, which suggested higher uptake among ad-

vanced students and those with access. This inconsistency may reflect barriers such as stigma, shyness to seek services or negative experiences with providers, which could discourage actual use despite availability. It may also suggest that unmeasured contextual factors play a role in shaping students' reproductive health behaviors.

Insights from health providers at Mzuzu University clinic helped to explain these paradoxical findings. Providers reported that condoms and emergency contraceptives were the most commonly used methods, yet there remained a persistent risk of unplanned pregnancies among students. They highlighted barriers such as students' shyness to seek contraceptive services and experiences of forced intimate relationships, both of which could contribute to underutilization even when services were available. Furthermore, providers noted that although contraceptives were supplied by government, organizational interventions to support student use remained limited. They recommended more student-centered programs, confidential access points and peer-led awareness campaigns to normalize contraceptive use and reduce stigma.

Other variables—including gender, age, marital status, religion, residence, parental education, income and sources of information—were not significant predictors of contraceptive use in the regression model. However, their descriptive variations suggest that these factors may still influence behaviors indirectly and could warrant further investigation.

Finally, regarding **attitudes**, more than three-quarters (77.6%) of respondents expressed willingness to use contraceptives in the future (Table 4.2). This indicates that despite the negative coefficients for access and year of study, students generally hold positive intentions toward contraceptive use, which may provide opportunities for interventions that reduce barriers and enhance service uptake.

The findings of this study align and contrast in important ways with recent evidence from the Southern and Eastern African region. In Zimbabwe, a comparative study among female university students found that, although knowledge levels were high, actual uptake remained low, particularly among younger students, with only 12

Similarly, a Kenyan study of university students reported that higher contraceptive knowledge and being in a relationship were strong predictors of use, whereas fear of side effects and stigma reduced uptake [21]. These results resonate with our qualitative findings, where health

providers noted shyness and stigma as barriers to seeking services.

In Rwanda, contraceptive use among female university students was reported at 34

Further evidence from Tanzania demonstrated that university students' contraceptive intentions were strongly influenced by access to youth-friendly services and privacy concerns [31]. This is consistent with our regression results, which showed that access to contraceptive services was a significant predictor of use, albeit with a negative coefficient.

At the national level, the 2015–16 Malawi Demographic and Health Survey (MDHS) reported a modern contraceptive prevalence of 58

Taken together, these regional studies reinforce the interpretation that although awareness and intentions are relatively high among university students, consistent and equitable use of contraceptives is moderated by contextual factors such as stigma, relationship dynamics, access to confidential services and the broader institutional environment.

Beyond the significant predictors, it is important to reflect briefly on the variables that were not statistically significant in the regression model. Factors such as gender, marital status, religion, residence, parental education, income and sources of information did not show independent effects on contraceptive use in this study. However, descriptive variations suggest that these characteristics still influence behavior indirectly. For instance, male students reported slightly higher contraceptive use than females and students from higher-income households also showed greater uptake. The lack of statistical significance may reflect the modest sample size or it may indicate that these factors operate through more proximal determinants such as access, knowledge and social attitudes.

Importantly, attitudes toward future contraceptive use were generally positive, with 77.6

In summary, the predictors of contraceptive use among Mzuzu University students reflect a complex interplay of individual, social and institutional factors. The findings emphasize that knowledge and awareness are necessary but not sufficient for consistent uptake and that barriers such as stigma and service accessibility remain central challenges. This naturally leads to the next section, where the overall **performance of the logistic regression model** is assessed in terms of classification accuracy, sensitivity, specificity and discrimination ability.

5.3 Model Performance

The overall logistic regression model demonstrated a good fit to the data. The Omnibus test of model coefficients was statistically significant ($\chi^2 = 38.942$, $df = 18$, $p - value = 0.003$), indicating that the predictors jointly contributed to explaining variation in contraceptive use (Table 4.7). The pseudo- R^2 values, Cox and Snell $R^2 = 0.252$ and Nagelkerke $R^2 = 0.353$, suggest that the model accounted for approximately 25–35% of the variance in contraceptive use. While this represents a moderate explanatory power, it also reflects the reality that human behaviors such as contraceptive use are influenced by many unobserved psychological, cultural and relational factors that extend beyond the scope of the study.

The classification results (Table 4.8) showed that the model achieved an overall predictive accuracy of 74.6%. Sensitivity (the ability to correctly classify contraceptive users) was relatively high at 83.5%, while specificity (correctly classifying non-users) was lower at 55.8%. This imbalance indicates that the model was more effective at identifying users than non-users, which is not unexpected in reproductive health research, where stigma, underreporting and hidden barriers often complicate the prediction of non-use. Nevertheless, the overall classification rate suggests that the model performed reasonably well in distinguishing users from non-users.

In terms of assumptions, all predictors were categorical; hence, linearity of the logit was not applicable. Independence of observations was assured, as data were collected from individual respondents. Multicollinearity was assessed using Variance Inflation Factor (VIF) values, all of which were below the conventional threshold of 2, indicating no serious collinearity among predictors. Thus, the estimates of regression coefficients can be considered stable and reliable.

The discriminative ability of the model was further supported by the **ROC** curve, which yielded an Area Under the Curve (AUC) of approximately 0.74. This falls within the range of acceptable discrimination, meaning the model was able to distinguish between users and non-users of contraceptives better than chance.

When compared to other studies, the explanatory power of the present model was slightly lower. For instance, Mekonen et al. (2017) in their study of contraceptive use among Hawassa University students reported Cox and Snell $R^2 = 0.334$ and Nagelkerke $R^2 = 0.455$, indicating stronger predictive performance. Differences in sample size, study setting and included predic-

tors may partly explain this variation. Nonetheless, both models converge in demonstrating that contraceptive use can be predicted with moderate accuracy, while still being shaped by unmeasured contextual and behavioral factors.

Overall, the findings indicate that while the model provides a meaningful explanation of contraceptive use among Mzuzu University students, further studies incorporating psychological, cultural and relational variables may help capture the unexplained variance and strengthen predictive accuracy.

5.4 Qualitative Insights from Students and Health Providers

The qualitative and descriptive evidence deepen understanding of contraceptive use dynamics on campus and help explain patterns observed in the regression results.

Sources of Information and Access

Students most frequently cited peers and health professionals as information sources (each 67.9%), with media and lecturers mentioned less often. Access pathways were dominated by hospitals (76.1%) and clinics (67.9%), while pharmacies (37.3%) and condom distribution sites (35.8%) were less commonly used. This partially aligns with [20], where health professionals and mass media were central channels, but it also indicates a stronger peer influence at Mzuzu. Comparable university-based studies in Kenya likewise emphasize peers and social networks as key vectors for information alongside formal services [21], suggesting that interventions should leverage trusted peer networks while strengthening structured health education.

Methods Used and Consistency

Condoms were the most widely reported method (60.4%), followed by pills (23.1%) and withdrawal (21.6%). Despite this, consistent use remained limited: only 17.2% of respondents reported “always” using contraceptives, while 20.9% used them “rarely” and 19.4% “sometimes.” Health providers corroborated that condoms and emergency contraceptives predominate on campus but warned of a persistent risk of unplanned pregnancy. Similar patterns of method mix and inconsistent use have been reported among female university students in Zimbabwe and Tanzania, where condoms are common but sustained, routine use is hindered by social and service constraints [26, 31].

Barriers to Uptake

Students highlighted multiple barriers: 38.8% reported service charges as a constraint, 32.1% cited lack of privacy, 29.1% mentioned negative provider attitudes and 25.4% pointed to lack of confidentiality. Fear of side effects (17.2%) and religious restrictions (6.0%) were also noted. Providers added that many students are *too shy* to seek services and that some face forced or coercive relationships—factors that depress demand even when services exist. These themes mirror university studies in Kenya and Rwanda, where privacy concerns, stigma and provider interactions consistently limit uptake despite awareness [21, 38]. They also echo ?], reinforcing the cross-setting salience of confidentiality and respectful care for students.

Suggested Improvements

Students called for concrete service improvements: 41.0% requested stronger privacy protections, 41.8% wanted more user-friendly clinics and 36.6% urged better provider attitudes. Around one-third (33.6%) recommended eliminating service charges and 32.8% emphasized confidentiality. Health providers similarly recommended student-centred and stigma-free services, more peer-led education and additional confidential access points. These recommendations align with recent regional evidence that youth-friendly, privacy-protecting delivery models are pivotal for closing the intention–behavior gap among university populations [21, 31].

Consequences Perceived on Campus

Around one-third of students reported that unwanted pregnancies (30.6%) and abortion cases (32.1%) were “very common” on campus, while many others expressed uncertainty. These perceptions underscore the real-world costs of inconsistent contraceptive use and the urgency of remedying service and social barriers. This campus picture is consistent with broader national and regional concerns about unmet need and episodic use among young people in higher education settings [26, 38].

Synthesis. Across student and provider perspectives, awareness and nominal access are high, yet uptake is constrained by stigma, privacy/confidentiality concerns, service costs and provider attitudes. These qualitatively identified barriers help explain why, in the multivariable model, formal “access to services” did not translate into higher use and why consistent use remains limited. The convergence with recent evidence from Kenya, Zimbabwe, Tanzania and Rwanda

strengthens the case for campus-based, youth-friendly models that normalize contraceptive use, safeguard privacy and leverage peer networks [21, 26, 31, 38].

These patterns also help to interpret the paradoxical regression results, where reported access to services was associated with lower odds of use. For instance, 32.1% of students cited lack of privacy, 25.4% reported lack of confidentiality and 29.1% highlighted negative provider attitudes as barriers. Such experiences may mean that “access” in name does not equate to “access” in practice, thereby depressing uptake despite service availability. This triangulation shows that structural and interpersonal barriers are as critical as physical access points in shaping contraceptive behaviors.

In summary, qualitative insights from both students and health providers complement and contextualize the quantitative findings. They reveal that although contraceptives are available and knowledge levels are high, students’ lived experiences with stigma, service environments and peer dynamics critically shape actual use. These insights provide a crucial bridge to the next section, which integrates the quantitative and qualitative strands to offer a more holistic understanding of contraceptive use among university students.

5.5 Integration of Quantitative and Qualitative Findings

The integration of quantitative and qualitative findings provides a more comprehensive understanding of contraceptive use among Mzuzu University students. While the logistic regression analysis highlighted that year of study and access to contraceptive services were statistically significant predictors, their negative coefficients appeared counterintuitive when compared with the descriptive trends. The qualitative evidence helps to clarify this paradox.

For instance, although 67.9% of respondents reported high knowledge of contraceptives and strong intentions to use them in the future, health providers noted that students were often too shy to seek services and lacked confidence in the confidentiality of service points. This corresponds with quantitative findings where 32.1% of students cited lack of privacy, 25.4% cited lack of confidentiality and 29.1% reported negative health worker attitudes as barriers to use. Thus, ”access” in a structural sense does not necessarily translate into ”utilization” in practice, as perceived stigma and interpersonal barriers undermine actual uptake.

Similarly, the lower odds of contraceptive use among students in higher years of study—despite their greater maturity and exposure—can be better understood in light of the qualitative reports of service fatigue, stigma and the persistence of unplanned pregnancies on campus. Providers emphasized that condoms and emergency contraceptives were the most commonly used methods, often in inconsistent ways, which aligns with student reports of irregular use (20.9% rarely, 19.4% sometimes and only 17.2% always using contraceptives). This indicates that availability and knowledge alone are insufficient to ensure consistent use.

The integration also highlights alignment with regional studies. Similar to findings in Kenya and Tanzania, where stigma and privacy concerns reduced contraceptive uptake [21, 31], Mzuzu students reported that health worker attitudes, limited confidentiality and service charges discouraged use. At the same time, the persistence of unwanted pregnancies and abortion cases, described as “very common” by over 30% of respondents, echoes broader evidence of unmet need despite formal availability. Comparable results were also reported in Zimbabwe and Rwanda, where high knowledge levels did not necessarily translate into consistent contraceptive uptake [26, 38].

In conclusion, combining the quantitative and qualitative strands shows that the determinants of contraceptive use at Mzuzu University are shaped not only by socio-demographic and access-related factors, but also by contextual barriers embedded in students’ lived experiences. These findings make sense in the Mzuzu University context, where services are formally available and knowledge is high, but the absence of youth-friendly, confidential and stigma-free service environments constrains effective uptake. This underscores the importance of designing interventions that go beyond mere availability to address the social and institutional dynamics influencing contraceptive use among university students.

CHAPTER 6

CONCLUSION, RECOMMENDATIONS, LIMITATIONS AND AREAS FOR FURTHER RESEARCH

6.1 Conclusion

This study examined contraceptive use among undergraduate students at Mzuzu University using a mixed-methods approach, integrating quantitative survey data ($N=134$) with qualitative insights from health providers. The multivariable logistic regression identified two statistically significant predictors of contraceptive use: **year of study** and **reported access to contraceptive services**. Notably, both exhibited *negative* associations, with students in higher years and those reporting access showing lower odds of use. This counterintuitive pattern is consistent with qualitative accounts of **shyness**, **stigma** and **privacy concerns** that can depress actual uptake despite formal availability of services.

Other factors (gender, age, marital status, religion, residence, parental education, income and sources of information) were not statistically significant in the adjusted model, although descriptive results suggested meaningful variation across subgroups. Overall model performance was acceptable: the model was statistically significant, the ROC curve indicated acceptable discrimination and the classification accuracy at the conventional 0.50 cut-off was **74.6%** (with higher accuracy observed at alternative thresholds). Multicollinearity was not a concern (all VIFs $\approx 1-1.5$) and independence of observations was satisfied by design.

Significance of the study. This work makes three contributions. First, it addresses a campus setting with direct relevance to service planning at Mzuzu University. Second, it includes *both male and female* students, broadening a literature that often focuses exclusively on women. Third, by triangulating provider perspectives with student data, it translates statistical results

into concrete, student-centered actions for improving confidentiality, trust and continuity of use.

6.2 Recommendations

6.2.1 Targeted Interventions

Design focused interventions that directly address the barriers identified (shyness, stigma, lack of privacy/confidentiality, concerns about side effects). Normalize contraceptive discussions and promote informed, voluntary use among *both* male and female students.

6.2.2 Reproductive Health Education

Strengthen peer-led and context-specific SRH education (e.g., orientation modules, residence-hall talks, student society events and responsible use of social media). Emphasize correct, consistent use and method mix—including emergency contraception.

6.2.3 Contraceptive Service Delivery

Enhance campus services to be student-friendly: extend opening hours, streamline client flow, ensure private spaces and train providers on confidentiality and non-judgmental counseling. Explore discreet access points and cost relief where feasible.

6.2.4 Policy Development

Leverage these findings to inform university SRH policies and partnerships with government/NGOs. Prioritize youth-friendly standards (privacy, confidentiality, affordability) and align campus efforts with national SRH goals and the SDGs.

6.3 Limitations

- **Cross-sectional design:** limits causal inference. The cross-sectional design limits causal inference, as both predictors and outcomes were measured at the same time, making it impossible to establish temporal order.

- **Self-report:** potential recall and social desirability bias may misclassify contraceptive use in the analysis.
- **Single-site, modest sample (N=134):** limits generalizability and reduces statistical power for detecting associations.

6.4 Areas for Further Research

- **Longitudinal designs** to track changes in knowledge, attitudes and behavior over time and to strengthen causal interpretation.
- **Stratified recruitment** (e.g., by gender, year of study) to examine subgroup differences with adequate power.
- **Multi-university studies** to assess heterogeneity across institutions and improve generalizability.
- **Mixed-methods deep dives** on privacy, stigma and provider–student interactions; include discreet-access pilots and provider-training evaluations.
- **Implementation research** testing student-centered service innovations (extended hours, peer navigators, confidential pick-up points) and their impact on consistent use.

In sum, the findings show that awareness alone is insufficient; *context of access*—especially privacy, confidentiality and perceived stigma—critically shapes whether students translate knowledge and intention into consistent contraceptive use. The recommendations offered here are immediately actionable within the university setting and provide a roadmap for scalable improvements across similar campuses.

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APPENDICES

Appendix A: Consent Form

Introduction: My name is Misheck Nzondo, a student of Mathematical Sciences. I am conducting an academic study on contraceptive knowledge and use among undergraduate students at Mzuzu University. Your participation is voluntary and you may withdraw at any time. Responses are confidential.

Consent: I hereby voluntarily agree to participate in this study. I understand that my responses will remain confidential and I can withdraw at any time without any consequences.

Appendix B: Student Questionnaire

Introduction: My name is Misheck Nzondo, a student of Mathematical Sciences. I am conducting an academic study to assess knowledge and use of contraceptive methods among undergraduate students at Mzuzu University. Your participation is voluntary and you may withdraw at any time. Responses are confidential.

Part A: Demographics

1. Gender: Male Female
2. Age: 18–21 22–25 Over 25
3. Marital status: Single In a relationship Married Widowed
4. Year of study: 1st year 2nd year 3rd year 4th or 5th year
5. Religion: Christian Islamic Other
6. Residence: Rural Urban Semi-urban
7. Parent's highest education level: Primary Secondary Tertiary
8. Student's net monthly income (MK): 0–50,000 51,000–150,000 Over 150,000

Part B: Contraceptive Methods

1. Have you ever heard about contraceptive methods? Yes / No
2. Which methods have you heard of? -----
3. Have you ever used a contraceptive method? Yes / No
4. If yes, which method(s)? -----
5. What was your main source of information? Friends Media Health providers
School Other
6. Does this institution offer contraceptive methods? Yes / No
7. What methods are offered? -----

8. Which methods are most commonly used by students and why? -----
9. What challenges do students face in accessing methods and how can they be addressed?

Part C: Clinic Services

1. Is this a 24-hour clinic? Yes / No
2. If not, how do students access contraceptives after hours? -----
3. What policies or guidelines do students follow when visiting the clinic? -----

Part D: Unwanted Pregnancies

1. Are students at risk of unplanned pregnancies? Yes / No
2. How common are pregnancies or abortions among students? -----
3. Why do you think students are exposed to unplanned pregnancies? -----

Part E: Information and Education

1. Are there interventions to educate students on contraceptives? Yes / No If yes, who conducts them? -----
2. Which organizations work with this institution on contraceptives and what interventions do they undertake? -----

Additional Comments: -----

Appendix C: Ethical Clearance Form

 MZUZU UNIVERSITY
DIRECTORATE OF RESEARCH

Mzuzu University
Private Bag 201
Luwinga
Mzuzu 2
MALAWI
TEL 01 320 722
FAX 01 320 648

MZUZU UNIVERSITY RESEARCH ETHICS COMMITTEE (MZUNIREC)
Ref No: MZUNIREC/DOR/UG/25/56 **25/06/2025.**

TO WHOM IT MAY CONCERN

Dear Sir/Madam,

STATEMENT OF ETHICS FOR MISHECK NZONDO
MISHECK NZONDO (BSMAT 2421) is a student at Mzuzu University and is currently studying Bachelor of Science, Mathematical Sciences. The student plans to conduct a study **ON ANALYSIS OF CONTRACEPTIVE USE AMONG MZUZU UNIVERSITY STUDENTS USING BINARY LOGISTIC REGRESSION**. MZUNIREC assessed the study and noted that the study is a low-risk study. The student is therefore advised to adhere to principles of ethics such as seeking consent first from the patients that are to be engaged, maintaining confidentiality, and anonymity throughout the study period.

We look forward to your assistance

Yours Sincerely,



Faith Mwangonde
Research Ethics Administrator.
FOR : MZUNIREC CHAIRPERSON


MZUZU UNIVERSITY
RESEARCH ETHICS COMMITTEE
25 JUN 2025
PRIVATE BAG 201 LUWINGA
MZUZU 2

Mzuzu University Research Ethics Committee
Directorate of Research
Mzuzu University
P/Bag 201
Luwinga
Mzuzu 2
Email: mzunirec@mzuni.ac.mw
Cell: 0998384804

Figure 1: Ethical clearance certificate issued by MZUNIREC.

Appendix D: R Code for Data Cleaning and Descriptive Analysis

```
1 library(dplyr)
2 library(ggplot2)
3 library(MASS)
4
5 df <- read.csv("ContraceptiveUsage.csv", fileEncoding="UTF-8")
6 View(df)
7
8 df$CM_knowledge_level <- factor(df$CM_knowledge_level,
9     levels = c("Low", "Moderate", "High"), ordered = TRUE)
10
11 df$CM_Frequency <- factor(df$CM_Frequency,
12     levels = c("Rarely", "Sometimes", "Often", "Always"), ordered = TRUE
13 )
14
15 table(df$CM_knowledge_level)
16 table(df$CM_Frequency)
17 table(df$Gender)
18 table(df$ever_heard_of_CM)
19
20 sum(is.na(df))
21
22 df[] <- lapply(df, function(x) {
23     if (is.factor(x)) as.character(x) else x
24 })
25
26 df[is.na(df)] <- 0
27
28 write.csv(df, "Rcleaned_data.csv", row.names=FALSE)
29
30 table(df$Gender)
```

```
31 table(df$Age)
32 table(df$Religion)
33 table(df$Marital_status)
34 table(df$Condom)
35 table(df$Pills)
36
37 colSums(df [c("Condom", "Pills")])
```

Listing 1: R code for data cleaning and descriptive statistics