

MAKERERE



UNIVERSITY

**FACTORS ASSOCIATED WITH SELF-REPORTED TUBERCULOSIS MEDICATION
ADHERENCE IN JINJA REGIONAL REFERRAL HOSPITAL**

BY

MWESIGWA PETER

BSTA (Mak)

**A DISSERTATION SUBMITTED TO THE DIRECTORATE OF GRADUATE TRAINING
IN PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE
DEGREE OF MASTER OF STATISTICS OF MAKERERE UNIVERSITY**

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DECLARATION

I Mwesigwa Peter declare that this dissertation titled “Factors associated with self-reported tuberculosis medication adherence in Jinja Regional Referral Hospital” is my original work and that it has never been submitted to any other institution by any one for the award of the degree or any other award.

Signature



.....

Date

29th Sept - 2026

Mwesigwa Peter

2022/HD06/1832U

APPROVAL

This dissertation was done under supervision and to a good extent makes an original contribution to the existing field of knowledge

Dr. Felix Wamono

Department of Statistical Methods and Actuarial Sciences,
Makerere University

Signature..........

Date.....29/09/2026.....

Dr. Hellen Namaweje

Department of Statistical Methods and Actuarial Sciences,
Makerere University

Signature..........

Date.....30/9/2026.....

DEDICATION

This work is dedicated to my family, whose unwavering support and encouragement have been the cornerstone of my academic journey. It is also extended to Dr. Joseph Muvawala, Executive Director at the National Planning Authority for his tremendous and zealous support towards my academic journey. To the countless individuals who get treatment from Jinja Regional Referral Hospital battling tuberculosis, this research is a testament to their strength and resilience. May this study contribute to improving their health outcomes and fostering hope for a healthier future.

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TABLE OF CONTENTS

DECLARATION	ii
APPROVAL	iii
DEDICATION	iv
ACKNOWLEDGEMENTS	v
LIST OF TABLES	ix
LIST OF FIGURES	x
ABBREVIATIONS	xi
ABSTRACT	xii
CHAPTER ONE: INTRODUCTION	1
1.1 Background of the Study	1
1.2 Statement of the Problem	3
1.3 Main Objective of the Study	4
1.3.1 Specific Objectives	4
1.4 Hypotheses of the Study	5
1.5 Significance of the Study	5
1.6 Definition of Concepts	5
1.7 Scope of the Study	6
1.8 The conceptual framework	6
1.9 Structure of the dissertation	7
CHAPTER TWO: LITERATURE REVIEW	8
2.1 Introduction	8
2.2 Epidemiology of Tuberculosis	8
2.3 Treatment of Tuberculosis	8
2.4 Self-reported adherence to TB Treatment	9
2.5 Socio-demographic factors and adherence to Tuberculosis (TB) medication	9
2.5.1 Age and adherence to TB medication	9
2.5.2 Sex and adherence to TB medication	10
2.5.3 Education level and adherence to TB medication	11
2.5.4 Marital status and TB medication adherence	11
2.5.5 Employment status and TB Medication adherence	12
2.5.6 Monthly income and TB Medication adherence	12
2.6 Family and Social Support factors and TB medication adherence	12
2.6.1 Family support and medication reminders and TB Medication adherence	12

2.7	Health-related factors and adherence to Tuberculosis (TB) medication.....	13
2.7.1	Distance to health facilities and adherence to TB medication.....	13
2.7.2	Knowledge of TB and adherence to TB medication.....	13
2.7.3	Side Effects of TB Medication and adherence to TB medication	14
2.7.4	Stigma and discrimination and TB Medication adherence	14
2.7.5	Health workers' attitude and TB Medication adherence	14
2.8	Summary of literature review.....	15
CHAPTER THREE: METHODOLOGY		16
3.1	Introduction	16
3.2	Research Design.....	16
3.3	Study Area.....	16
3.4	Study population	17
3.5	Inclusion and Exclusion Criteria	17
3.5.1	Inclusion Criteria	17
3.5.2	Exclusion Criteria	18
3.5.3	Data Collection Method.....	18
3.5.4	Data Collection Instrument	18
3.6	Measurement of Study Variables	18
3.7	Data Analysis methodology	21
3.7.1	Descriptive Analysis	21
3.7.2	Bivariate Analysis.....	21
3.7.3	Multivariate analysis.....	21
3.8	Ethical Considerations.....	22
3.9	Limitations to the Study	22
CHAPTER FOUR: PRESENTATION AND DISCUSSION OF FINDINGS.....		23
4.1	Introduction	23
4.2	Descriptive Analysis	23
4.3	Bivariate Analysis	25
4.3.1	Association between the study variables and self-reported TB adherence.....	25
4.4	Multivariate Analysis	27
4.4.1	Factors affecting self-reported TB medication adherence among patients.....	27
4.5	Diagnostic tests	28
4.5.1	Multicollinearity diagnostic	28
4.5.2	Receiver Operating Characteristic (ROC) Curve	29

4.6	Discussion of findings.....	29
4.6.1	Socio-demographic factors and self-reported TB medication adherence	29
4.6.2	Family and social support factors and self-reported TB medication adherence	30
4.6.3	Health-related factors and Self-reported TB medication adherence.....	30
4.6.4	Multivariate findings.....	30
CHAPTER FIVE: SUMMARY OF THE FINDINGS, CONCLUSIONS, AND		
RECOMMENDATIONS		31
5.1	Introduction	31
5.2	Summary of the Findings	31
5.3	Conclusions	32
5.4	Recommendations	32
REFERENCES		33
APPENDICES		39
6.1	Introductory Letter	39
6.2	Clearance from JRRH Research and Ethics Committee	40
6.3	Questionnaire	41
6.4	VIF stata output.....	45

LIST OF TABLES

Table 1: Population distribution.....	17
Table 2: Description of the different variables that were used	18
Table 3: Distribution of socio-demographic factors (n=118)	23
Table 4: Distribution of family and social support factors	24
Table 5: Distribution of health-related factors.....	24
Table 6: Distribution of Self-Reported TB Medication Adherence.....	25
Table 7: Association between socio-demographic factors and self-reported TB medication adherence	25
Table 8: Association between Family and Social Support factors and self-reported TB medication adherence.....	26
Table 9: Association between health-related factors and self-reported TB adherence.....	26
Table 10: Binary logistic regression analysis	27
Table 11: Multicollinearity diagnostic test using VIFs.....	28

LIST OF FIGURES

Figure 1: Number of people newly diagnosed with TB and officially notified globally	1
Figure 2: Number of people newly diagnosed with TB and officially notified in Africa	2
Figure 3: Number of people newly diagnosed with TB and officially notified in Uganda	2
Figure 4: Conceptual Framework of the study	6
Figure 5: ROC Curve for the Binary Logistic Regression Model	29

ABBREVIATIONS

BMI	Body Mass Index
CNR	Case Notification Rate
DST	Drug Susceptibility Testing
HIV	Human Immunodeficiency Virus
LTFU	Lost to Follow-Up
MDR-TB	Multidrug-Resistant Tuberculosis
NGO	Non-Governmental Organization
NTP	National Tuberculosis Program
OR	Odds Ratio
PR	Prevalence Rate
SES	Socioeconomic Status
TB	Tuberculosis
WHO	World Health Organization

ABSTRACT

Tuberculosis (TB) remains a major public health challenge, with non-adherence to TB medication contributing to treatment failure, continued disease transmission, drug resistance, and mortality. This study examined factors associated with self-reported TB medication adherence among patients attending Jinja Regional Referral Hospital.

A quantitative cross-sectional study was conducted among 118 eligible TB patients drawn from 172 patients registered for treatment at Jinja Regional Referral Hospital. Data were collected using a structured interviewer-administered questionnaire. Descriptive statistics were used to summarize the study variables, while binary logistic regression was used to identify independent predictors of self-reported TB medication adherence. Adjusted Odds Ratios (AORs) with 95% confidence intervals were estimated, with statistical significance assessed at the 5% level.

Overall, 70 (59.3%) respondents were adherent to TB medication, while 48 (40.7%) were non-adherent. The binary logistic regression model was statistically significant overall (LR $\chi^2(18)$ = 99.52, $p < 0.001$), with a Pseudo R^2 of 0.6806. After adjustment for other factors, challenges in accessing the health facility remained the only statistically significant independent predictor of self-reported adherence (AOR = 30.24; 95% CI: 2.83-322.84; $p = 0.005$). Respondents who did not experience challenges in accessing the health facility had approximately 30 times higher odds of being adherent to TB medication compared to those who experienced challenges.

The study concludes that challenges in accessing health facilities are an important barrier to self-reported TB medication adherence among patients attending Jinja Regional Referral Hospital. The study recommends strengthening decentralized TB treatment services at lower-level health facilities to improve access to treatment. Further studies involving larger and more diverse populations are recommended to obtain more precise estimates and improve comparability across settings.

CHAPTER ONE: INTRODUCTION

1.1 Background of the Study

According to the latest data from World Health Organization (WHO), global treatment success rates with adherence to TB medical treatment as one of the key factors rose from about 81% in 2016 to 88% in 2023 (*TB Treatment and Treatment Coverage*, n.d.).

The figure below shows the number of people newly diagnosed with TB and officially notified as TB case (new and recurrent cases) (black) compared with the estimated number of people who developed TB (incident cases) (green), 30 high TB burden countries, from 2010 - 2024.

There is a 95% uncertainty interval of TB incidence number as of 2024 (9.92 - 11.5 million).

As of 2024, TB cases notified were 8.30 Million (*TB Treatment and Treatment Coverage*, n.d.).

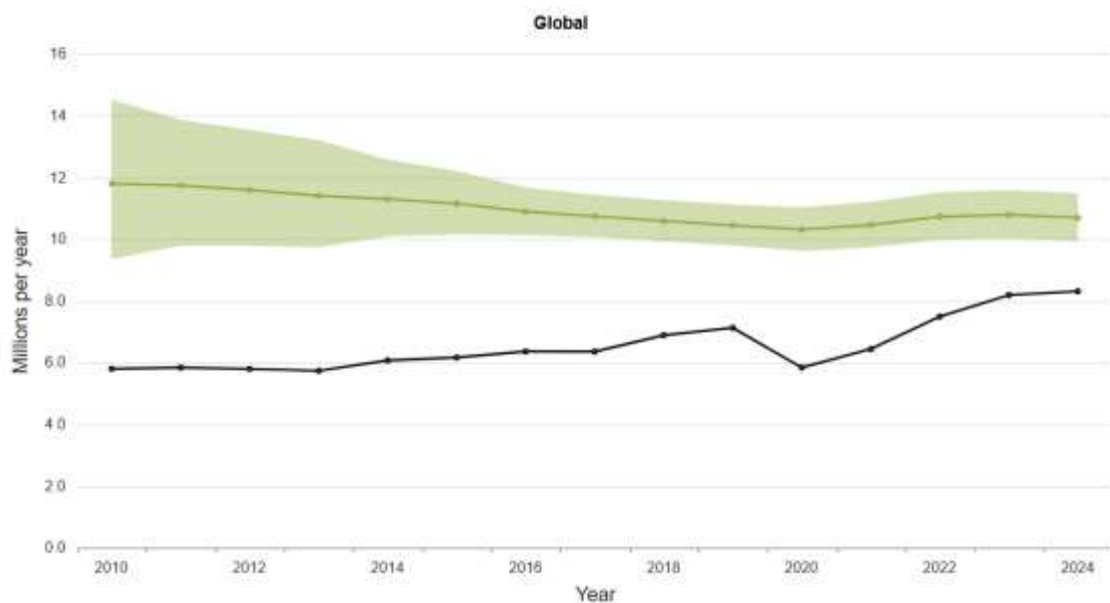


Figure 1: Number of people newly diagnosed with TB and officially notified globally

Source: WHO global programme on TB

According to Chakaya et al., (2021), tuberculosis is one of the leading communicable diseases contributing significantly to morbidity and mortality rates worldwide. According to (Kitata, 2022), tuberculosis incidence in Sub-Saharan Africa stands at 255 cases per 100,000 population. In Uganda, tuberculosis incidence rate stands at 200 cases per 100,000 population (Ministry of Health Uganda, 2021).

The graphs below illustrate the trend for TB incidence and the TB cases notified for Africa and Uganda consecutively. The 95% uncertainty interval of TB incidence and the TB cases notified was 2.24 - 3.03 million and 1.93 million people for Africa. For Uganda, the TB incidence was specifically at 99,000 people while the TB cases notified were 88,861 people as of 2024.

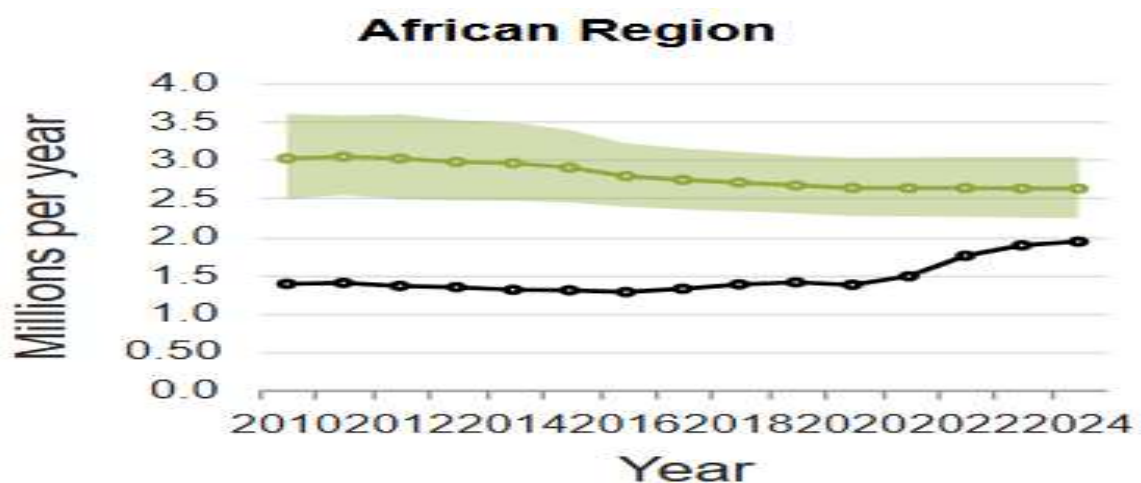


Figure 2: Number of people newly diagnosed with TB and officially notified in Africa
Source: WHO global programme on TB

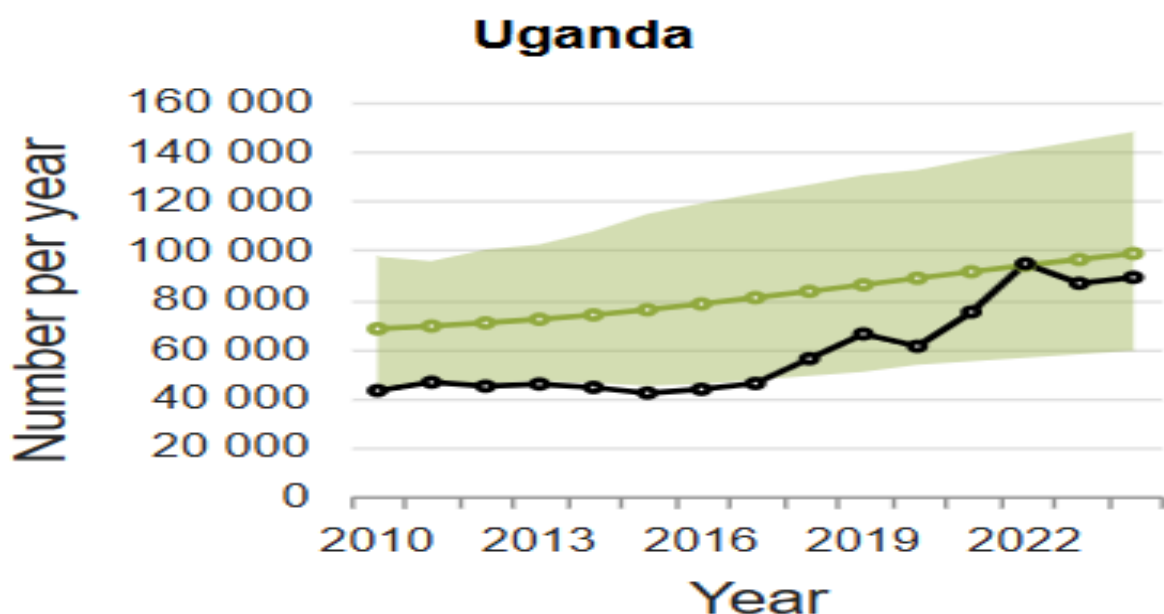


Figure 3: Number of people newly diagnosed with TB and officially notified in Uganda
Source: WHO global programme on TB

Despite the availability of effective treatment, poor treatment adherence is still one of the major factors that impedes efforts in combating the TB epidemic (Benjamin, 2016). Adherence to TB treatment significantly contributes to higher treatment success rates, with a 90% increase in successful outcomes among adherent patients (Buh, 2024). Ensuring adherence to tuberculosis treatment is paramount for effective TB control, addressing the multifaceted challenges in providing high-quality care to TB patients (World Health Organization, 2022). Non-adherence to TB treatment, characterized by treatment interruption or incomplete courses, is associated with a range of adverse outcomes including poor treatment response (Pettit et al., 2013).

Individuals who experience treatment interruptions face a higher risk of developing multidrug-resistant TB (MDR-TB) compared to those who maintain uninterrupted treatment (Batte et al., 2021). According to Chakaya et al., (2021), global adherence rate to tuberculosis (TB) treatment stands at approximately 80%. Previous studies conducted in various regions has highlighted significant disparities in adherence rates, ranging from 15.5% in Thailand to as high as 50% in India, and between 19.5% and 35% across Africa (Chakaya et al., 2021).

Numerous factors have emerged as influential determinants of adherence to TB treatment. These incorporate socio-demographic variables such as age, sex, marital status, and educational level (Asres et al., 2018; Bati et al., 2017). Additionally, factors including knowledge about TB and its treatment, disease-related stigma, the presence of strong social support networks, side effects of anti-TB medications, and patients' perceptions of treatment progress have been identified as major contributors to non-adherence (Abera et al., 2014; Bhagawati et al., 2016; Cheng et al., 2014). The study by (Batte et al., 2021) conducted a cohort study and used generalised linear models for the binary family to model the factors associated with prevalence of adherence on TB adherence among patients of Mulago National referral hospital. Further (Ogwok et al., 2022) used content and reasoning analysis and this might have produced less optimal adherence factors and this study used binary logistic because it was best suitable for binary dependent outcomes.

1.2 Statement of the Problem

In the Jinja Regional Referral Hospital, the number of TB cases has significantly increased from 283 in 2013 to 663 in 2022 (Aceng et al., 2024). Despite the various efforts by Uganda government, it is estimated that approximately 30 people die from TB every day (MOH, 2019). Previous studies conducted in various regions have highlighted significant disparities in adherence rates, ranging from 15.5% in Thailand to as high as 50% in India, and between 19.5% and 35% across Africa (Chakaya et al., 2021). Despite the availability of effective treatment, poor treatment adherence is still one of the major factors that impedes efforts in combating the TB epidemic (Benjamin, 2016). Adherence to TB treatment significantly contributes to higher treatment success rates, with a 90% increase in successful outcomes among adherent patients (Buh, 2024). **WHO** strongly recommends that all people on TB treatment receive health education and counselling about the disease and the importance of completing the full treatment course. This helps patients understand TB, how treatment works, why adherence matters, and how to manage side-effects or challenges (“World Health Organizarion, 2025). Since there are serious public health consequences if treatment isn’t

adhered to, it is important that all patients are supported to ensure full adherence to treatment (World Health Organization, 2022).

Poor adherence accelerates the development of multi drug resistant tuberculosis and this undermines public health initiatives and reduces effectiveness of TB control progress (Munro et al., 2007). A study by (Batte et al., 2021) conducted a cohort study and used generalised linear models for the binary family to model the factors associated with prevalence of adherence on TB adherence among patients of Mulago National referral hospital. Further (Ogwok et al., 2022) used content and reasoning analysis and this might have produced less optimal adherence factors and this study used binary logistic regression model as its best suitable for binary dependent outcomes. According to the latest national data for the financial year 2023/24, Uganda National Tuberculosis and Leprosy Programme (NTLP) reported a treatment success rate (TSR) of 91.3% for TB (MOH AHSPR 2023/24). Previous studies such as (Ogwok et al., 2022); (Batte et al., 2021) have examined TB medication adherence in different settings. Although (Alinaitwe et al., 2025) assessed TB medication adherence in Jinja district from the different TB treatment centres using a medication adherence rating scale, limited evidence exists on self-reported TB medication adherence specifically among patients attending Jinja Regional Referral Hospital. This study therefore sought to estimate self-reported TB medication adherence and examine its associated factors using binary logistic regression.

1.3 Main Objective of the Study

The main purpose of this study was to establish the factors associated with self-reported tuberculosis (TB) medication adherence in Jinja Regional Referral Hospital.

1.3.1 Specific Objectives

The specific objectives of the study were to;

- i. To find out the socio-demographic factors that influence TB medication adherence among patients in Jinja Regional Referral Hospital.
- ii. To investigate the association between family and social support factors and TB medication adherence among patients in Jinja Regional Referral Hospital.
- iii. To ascertain the association between health-related factors and TB medication adherence among patients in Jinja Regional Referral Hospital.

1.4 Hypotheses of the Study

- i. There is no statistically significant association between socio-demographic factors and self-reported TB medication adherence among patients attending Jinja Regional Referral Hospital.
- ii. There is no statistically significant association between family/social support and self-reported TB medication adherence among patients attending Jinja Regional Referral Hospital.
- iii. There is no statistically significant association between health-related factors and self-reported TB medication adherence among patients attending Jinja Regional Referral Hospital.

1.5 Significance of the Study

This study provides critical insights into self-reported medication adherence among tuberculosis patients at Jinja Regional Referral Hospital. By identifying the factors influencing adherence and the challenges encountered during treatment, the study generates evidence that is essential for policymakers, healthcare providers, and other stakeholders involved in TB control efforts in the region. The findings are expected to inform the design and implementation of more responsive and effective interventions aimed at improving treatment outcomes. In addition, the study contributes to the existing body of knowledge on self-reported TB medication adherence within the Ugandan context, thereby serving as a valuable reference for future research, program planning, and policy development.

1.6 Definition of Concepts

Self-reported Tuberculosis Medication Adherence

TB medication adherence refers to the extent to which a patient correctly follows the prescribed six-month treatment regimen for drug-sensitive tuberculosis, including taking the right medicines, in the correct dosage, at the correct frequency, and without unnecessary interruption (Munro et al., 2007). Adherence is understood as the patient's faithfulness to the standard WHO-recommended and Uganda NTLP six-month TB treatment regimen, which consists of an intensive phase followed by a continuation phase (Kitonsa et al., 2025).

In this study, self-reported TB medication adherence refers to the extent to which a patient reported taking their prescribed tuberculosis medication without missing any dose during the treatment period. In this study, a respondent who reported not missing any TB medication dose was classified as adherent, while a respondent who reported missing at least one dose was classified as non-adherent.

1.7 Scope of the Study

The study was conducted at Jinja Regional Referral Hospital, which serves a catchment population covering Jinja, Iganga, Bugiri, Mayuge, Kaliro, Kamuli, Luuka, Namayingo and parts of Buikwe District.

1.8 The conceptual framework

The conceptual framework was developed based on compilations from previous studies regarding factors associated with self-reported TB medication adherence. These studies mostly focused on specific factors which have a direct effect on the adherence of TB medications as summarized in Figure 4 below.

Independent Variables

Social - demographic factors

Age
Sex
Marital status
Education level
Employment status
Monthly income

Family & Social support factors

Living with family members
Emotional support from family members
Family reminders to take TB medication

Health-related factors

Medication side effects
Stigma and discrimination
Distance to nearest health facility
Affordable transportation
Financial constraints
Health workers' attitude
Feeling discouraged by health workers
Knowledge about TB

Dependent Variable

Self-reported
Adherence to
TB medication

Figure 4: Conceptual Framework of the study

Source: Adopted from (Holtz et al., 2006) and modified by researcher

The conceptual framework for this study explored the relationships between various independent variables such as distance to health facilities, knowledge of tuberculosis (TB), side effects of TB medication, social support, stigma and discrimination, gender, age, marital status,

and educational level among others as indicated in figure 4 above and the dependent variable, self-reported TB medication adherence in Jinja Regional Referral Hospital. The framework posits that these factors, categorized as above each play a critical role in influencing whether patients consistently adhere to their TB treatment regimens.

1.9 Structure of the dissertation

The dissertation consists of five chapters. Chapter One presents the background to the study, statement of the problem, objectives of the study, hypothesis, significance of the study and conceptual framework of the study. Chapter Two reviews the literature on factors associated with self-reported TB medication adherence. In Chapter Three, the methodology used for this study is illustrated including the data source, study population, study variables, data analysis methodology, ethical considerations. Chapter Four includes Descriptive analysis, bivariate analysis, multivariate analysis, diagnostic tests and discussion of findings. Chapter Five includes summary of findings, conclusions and recommendations.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

In Chapter Two, a comprehensive literature review on the chosen topic is provided as a foundation for this study. In this review, scholarly articles, reports, speeches, and other relevant sources are synthesized to provide a deep understanding of the subject matter.

2.2 Epidemiology of Tuberculosis

The epidemiology of TB is characterized by considerable heterogeneity across regions, with variations in disease incidence, prevalence, and mortality rates (Chakaya et al., 2021). In high-burden countries, TB transmission is fuelled by ongoing socioeconomic challenges, population mobility, and suboptimal healthcare systems, leading to persistent transmission dynamics (Reddy et al., 2025). Additionally, the emergence of drug-resistant TB strains, including multidrug-resistant TB (MDR-TB) and extensively drug-resistant TB (XDR-TB), presents a growing threat to TB control efforts, further complicating disease management and treatment outcomes (Chowdhury et al., 2023).

Efforts to combat TB have been guided by the WHO's End TB Strategy, which aims to reduce TB incidence by 80% and TB-related deaths by 90% by 2030 (World Health Organization, 2022). Key pillars of the strategy include early diagnosis and treatment of TB cases, prevention of TB transmission, and addressing social determinants of tuberculosis (Bhargava et al., 2021). However, achieving these targets necessitates sustained political commitment, investment in TB research and innovation, and strengthened health systems to ensure universal access to quality TB care and services (Gulumbe et al., 2024).

Tuberculosis remains a significant global health challenge, with an estimated 10 million new cases and 1.4 million deaths reported worldwide in 2019. The burden of TB is disproportionately borne by low- and middle-income countries, particularly in sub-Saharan Africa, Southeast Asia, and the Western Pacific region.

2.3 Treatment of Tuberculosis

The treatment of TB relies on a standardized regimen of antimicrobial drugs administered over a specified duration of six months to achieve cure and prevent disease transmission (Zumla et al., 2015). First-line TB treatment typically consists of a combination of four drugs: isoniazid, rifampicin, pyrazinamide, and ethambutol, administered for a minimum of six months. This regimen, known as directly observed treatment, short-course (DOTS), has been endorsed by the WHO as the cornerstone of TB control efforts globally.

However, the emergence of drug-resistant TB strains necessitates alternative treatment approaches, including the use of second-line anti-TB drugs and individualized treatment regimens based on drug susceptibility testing (DST) results (Saktiawati et al., 2024). MDR-TB and XDR-TB require prolonged treatment with more toxic and costly drugs, posing significant challenges to patients and healthcare systems. Moreover, treatment outcomes for drug-resistant TB are often suboptimal, with higher rates of treatment failure, relapse, and mortality compared to drug-susceptible TB (Alemu et al., 2020).

To address the complex challenges of TB treatment, ongoing research efforts focus on developing novel TB drugs, diagnostics, and vaccines, as well as optimizing treatment regimens and delivery strategies (Dartois & Rubin, 2022). Collaborative initiatives such as the Global TB Drug Facility (GDF) and the Global Drug-Resistant TB Initiative (GDI) aim to improve access to quality-assured TB medications, strengthen health systems, and enhance TB control efforts at the global level.

2.4 Self-reported adherence to TB Treatment

The World Health Organization (WHO) defines adherence to TB treatment as “the extent to which patient’s history of therapeutic drug-taking coincides with prescribed treatment” (Grigoryan et al., 2022).

Treatment adherence is a critical determinant of TB treatment outcomes, influencing cure rates, disease transmission, and the emergence of drug resistance (Nezenega et al., 2020). Adherence to TB medication regimens requires patients to take medications consistently and as prescribed for the entire duration of treatment, which can range from six months to several years for drug-resistant TB cases (Mase & Chorba, 2019).

Self-reported medication adherence has been used in previous tuberculosis studies as a practical method of assessing whether patients take prescribed medication. For example, Kiros et al. (2014) assessed adherence using self-reported missed doses alongside a visual analogue scale and record review, while studies in Uganda have also incorporated patient self-report in monitoring TB medication-taking behaviour. In the present study, self-reported TB medication adherence was operationalized as a binary outcome, whereby respondents who reported not missing any TB medication dose were classified as adherent, while those who reported missing at least one dose were classified as non-adherent.

2.5 Socio-demographic factors and adherence to Tuberculosis (TB) medication

2.5.1 Age and adherence to TB medication

Several studies such as (Gebremariam et al., 2021), (da Silva et al., 2017) have suggested that older age is associated with higher adherence rates due to greater perceived susceptibility to

TB complications and higher levels of healthcare engagement. Conversely, younger individuals may face challenges such as competing priorities, including work or family responsibilities, which can impede adherence (Rynhoud, 2021).

Tola et al. (2022) observed that older adults were more likely to complete TB treatment successfully due to better health-seeking behaviour and greater appreciation of the consequences of treatment interruption. Likewise, a study in Kenya by Mwangi et al. (2023) found that younger patients had higher odds of missing clinic appointments and medication refills than older patients, increasing the risk of poor treatment outcomes.

Despite these findings, the relationship between age and TB medication adherence remains inconsistent. Some studies have reported no statistically significant association between age and adherence after adjusting for other socioeconomic and health-related factors (Biru et al., 2020; Alene et al., 2021). These mixed findings suggest that the effect of age may vary across contexts and populations. Therefore, further research is needed to better understand how age influences TB medication adherence, particularly in Uganda where contextual factors may differ from those reported in other settings.

2.5.2 Sex and adherence to TB medication

Sex differences in TB medication adherence have been widely documented, with studies indicating that females are more likely to adhere to treatment compared to males (Manteuffel et al., 2014). Various factors contribute to this disparity, including differences in health-seeking behaviours, social support networks, and stigma associated with TB diagnosis (Benuto et al., 2020). Additionally, cultural norms may influence treatment adherence differently for men and women, with men often facing greater barriers due to traditional gender roles (McQuaid & Landier, 2018).

Recent studies have continued to demonstrate the influence of sex on TB medication adherence. Biru et al. (2020) found that male patients were more likely to default on treatment than females, partly due to occupational commitments and delayed healthcare-seeking behaviour. Similarly, Chidambaram et al. (2021) reported that men experienced higher rates of treatment interruption because of work-related mobility, alcohol consumption, and lower engagement with healthcare services. In a multicountry review conducted in sub-Saharan Africa, Horton et al. (2022) observed that women generally exhibited better treatment adherence, largely because they were more likely to utilize healthcare services and comply with medical advice.

Furthermore, Kigozi et al. (2023) noted that social support from family members and community health workers played a greater role in enhancing adherence among female TB patients than among males. Conversely, men were more likely to perceive TB treatment visits as disruptive to income-generating activities, thereby increasing the likelihood of missed appointments and medication doses. WHO (2023) also highlighted gender-related inequalities in access to TB services, emphasizing that men continue to bear a disproportionately higher burden of poor treatment outcomes due to lower treatment adherence.

However, some studies have reported no significant association between sex and TB medication adherence after controlling for socioeconomic, clinical, and healthcare access factors (Alene et al., 2021). These inconsistent findings suggest that the influence of sex may vary across settings and populations. Thus, interventions targeting gender-specific barriers may be crucial for improving adherence among both men and women in Uganda.

2.5.3 Education level and adherence to TB medication

Educational level significantly impacts TB medication adherence, as patients with higher education levels are more likely to understand the importance of completing their treatment regimen (Nezenega et al., 2020). They are also more likely to seek information about their condition and adhere to medical advice. Conversely, those with lower educational levels may struggle with understanding the disease and the importance of strict adherence to treatment, leading to higher rates of non-adherence (Konstantinou et al., 2020). Employment status also influences adherence, with unemployed or underemployed patients facing greater challenges in maintaining regular treatment due to financial constraints, lack of access to health services, or lower health literacy (Shelton et al., 2011).

2.5.4 Marital status and TB medication adherence

Marital status has been identified as an important social determinant of tuberculosis (TB) medication adherence because married individuals are more likely to receive emotional, financial, and practical support from their spouses throughout the treatment period (*Factors Influencing Patient Adherence to Tuberculosis Treatment in Ethiopia: A Literature Review - PMC*, n.d.). Spousal support often includes medication reminders, accompaniment to health facilities, encouragement to complete treatment, and assistance in managing treatment side effects, all of which contribute to improved adherence. Conversely, unmarried, divorced, separated, or widowed patients may lack consistent support systems, increasing their risk of treatment interruption (*Prevalence of Tuberculosis Treatment Non-Adherence in Ethiopia*, n.d.). However, some studies have found no statistically significant association between

marital status and TB medication adherence after adjusting for socioeconomic and clinical characteristics (Alene et al., 2021). These inconsistent findings suggest that the influence of marital status may vary depending on cultural context, household structure, and the availability of other sources of social support.

2.5.5 Employment status and TB Medication adherence

Employment status may influence TB medication adherence through both economic and occupational pathways. Employed individuals often have greater financial capacity to meet indirect treatment costs such as transportation and nutritional requirements, which may facilitate adherence (Biru et al., 2020). However, employment may also reduce adherence where demanding work schedules, fear of job loss, or long working hours interfere with clinic attendance and medication schedules (Chidambaram et al., 2021). Conversely, unemployed patients may experience fewer scheduling conflicts but may encounter financial difficulties that limit their ability to access healthcare services consistently (Nezenega et al., 2020). Consequently, previous studies have reported mixed findings regarding the association between employment status and TB medication adherence.

2.5.6 Monthly income and TB Medication adherence

Household income is widely recognized as an important determinant of adherence to TB treatment. Although anti-tuberculosis medicines are provided free of charge in most high-burden countries, patients frequently incur indirect costs related to transportation, nutritional support, accommodation, and loss of income during treatment (WHO, 2023). Patients with higher household incomes are generally better able to meet these costs and are therefore more likely to complete treatment successfully (Nidoi et al., 2021). Conversely, low-income patients often experience catastrophic treatment-related expenditures that contribute to missed appointments, treatment interruption, and poor treatment outcomes (Thomas et al., 2016). Several studies have therefore recommended strengthening social protection programmes to reduce financial barriers to TB treatment adherence (WHO, 2023).

2.6 Family and Social Support factors and TB medication adherence

2.6.1 Family support and medication reminders and TB Medication adherence

Family support has consistently been identified as one of the strongest facilitators of TB medication adherence. Emotional support, medication reminders, assistance with transportation, supervision of treatment, and encouragement from family members improve patients' motivation to complete treatment (Munro et al., 2007). Studies have shown that patients receiving regular family support are more likely to attend clinic appointments, collect

medication refills, and adhere to prescribed treatment regimens than those lacking such support (Tola et al., 2022). Medication reminders provided by family members or treatment supporters help patients maintain consistent medication schedules, particularly among children, older adults, and patients experiencing prolonged treatment (Alipanah et al., 2018). However, reminders alone may not overcome structural barriers such as poverty, medication side effects, stigma, or long travel distances to health facilities. Consequently, family support should be integrated with broader patient-centred adherence interventions to achieve optimal treatment outcomes (WHO, 2023).

2.7 Health-related factors and adherence to Tuberculosis (TB) medication

2.7.1 Distance to health facilities and adherence to TB medication

The distance to health facilities is a significant barrier to TB medication adherence, particularly in rural areas where healthcare services are often limited and scattered (Appiah et al., 2023). Studies have shown that patients living far from health facilities are less likely to complete their TB treatment due to the logistical challenges of traveling long distances, which can be both time-consuming and costly.(Appiah et al., 2023),(Gebremariam et al., 2021). Additionally, the lack of reliable transportation options exacerbates this issue, making it difficult for patients to attend regular follow-up appointments, collect medication refills, and receive necessary medical care (Syed et al., 2013). As a result, patients may miss doses or discontinue treatment altogether, leading to poor treatment outcomes and increased risk of developing drug-resistant TB.

2.7.2 Knowledge of TB and adherence to TB medication

Adequate knowledge about TB is essential for effective treatment adherence. Patients who are well-informed about the disease, its transmission, symptoms, and the importance of completing the full course of treatment are more likely to adhere to their medication regimen (John, 2024). Educational interventions that provide clear and accurate information about TB have been shown to improve adherence rates by enhancing patients' understanding of the disease and motivating them to complete their treatment (Pradipta et al., 2020). However, low levels of knowledge about TB remain a significant challenge, particularly in low-income settings where access to health education and information is limited (Craciun et al., 2023). Misconceptions and lack of awareness about the disease often result in non-adherence, as patients may not fully comprehend the seriousness of TB and the consequences of incomplete treatment.

2.7.3 Side Effects of TB Medication and adherence to TB medication

The side effects of TB medication are a common reason for non-adherence among patients. Severe side effects can lead patients to discontinue their medication prematurely or skip doses in an attempt to avoid discomfort, ultimately jeopardizing the success of the treatment (Chowdhury et al., 2023). It is therefore critical for healthcare providers to monitor patients closely, manage side effects effectively, and provide adequate counselling and support to help patients cope with the challenges of long-term medication.

2.7.4 Stigma and discrimination and TB Medication adherence

Tuberculosis-related stigma remains one of the most important psychosocial barriers to successful treatment adherence. Patients who fear discrimination from family members, employers, or communities may conceal their diagnosis, avoid collecting medication openly, or discontinue treatment prematurely to avoid social exclusion (Courtwright & Turner, 2010). Stigma may also reduce patients' willingness to seek healthcare services or disclose treatment challenges to healthcare providers, thereby increasing the risk of treatment interruption (Craig et al., 2017). Community sensitization, patient education, counselling, and family involvement have been shown to reduce stigma and improve treatment adherence (WHO, 2023). Nevertheless, some studies have reported that the effect of stigma diminishes after adjusting for other social and economic determinants, suggesting that stigma interacts with several contextual factors influencing adherence (Alene et al., 2021).

2.7.5 Health workers' attitude and TB Medication adherence

The attitude and behaviour of healthcare providers play a critical role in influencing patients' adherence to TB treatment. Patients who perceive healthcare workers as respectful, supportive, and approachable are more likely to trust medical advice, attend follow-up appointments, and complete treatment (Munro et al., 2007). Effective communication between healthcare providers and patients improves patients' understanding of treatment requirements and enhances confidence in health services (Nezenega et al., 2020). Conversely, poor communication, disrespectful treatment, discrimination, or negative attitudes from healthcare providers may discourage patients from attending clinic appointments or continuing treatment (Datiko & Lindtjørn, 2009). Strengthening patient-centred care and communication skills among healthcare providers has therefore been recommended as an important strategy for improving TB treatment adherence (WHO, 2023).

2.8 Summary of literature review

Previous studies have reported mixed evidence regarding associations between socio-demographic, family and social support, and health-related factors and TB medication adherence, with findings varying across populations and settings. Factors commonly examined include distance to health facilities, knowledge about TB, medication side effects, social support and stigma.

Despite extensive research in this area, a critical gap remains in understanding how these factors intersect and interact within specific populations facing unique contextual challenges. In particular, rural communities, individuals with low socioeconomic status, and patients with co-morbidities may encounter distinct barriers to adherence that are not fully captured by broader national-level studies. Existing studies have predominantly relied on qualitative methods, generalised linear models (meta-analyses, and statistical models such as the Weibull model) to analyse TB adherence. However, few studies have explored these issues using comprehensive, population-specific data from Jinja Regional Referral Hospital and the study sought to add to the existing evidence.

CHAPTER THREE: METHODOLOGY

3.1 Introduction

This chapter presents the methodology that was employed in conducting the study on factors associated with self-reported TB medication adherence in Jinja Regional Referral Hospital. Specifically, the chapter described the research design, study area, study population, inclusion and exclusion criteria, data collection methods, data collection instruments, measurement of study variables, and Data analysis methodology, ethical considerations, and limitations of the study.

3.2 Research Design

The study employed a quantitative cross-sectional research design. A cross-sectional design involves collecting data from a study population at a single point in time to examine the prevalence of an outcome and its associated factors (Setia, 2016). The design was considered appropriate because it enabled the researcher to assess the relationship between socio-demographic, family & social support, and health-related factors and self-reported medication adherence among patients in Jinja Regional Referral Hospital.

The quantitative approach facilitated the collection of numerical data that were analyzed statistically to establish associations between the dependent variable (self-reported TB medication adherence) and independent variables such as age, sex, educational level, social support, stigma, knowledge about TB, medication side effects, distance to health facilities among others.

3.3 Study Area

The study was conducted at Jinja Regional Referral Hospital. Jinja Regional Referral Hospital serves as a referral center for the districts of Jinja, Iganga, Bugiri, Mayuge, Kaliro, Kamuli, Luuka, Namayingo, and parts of Buikwe District. The hospital provides specialized health services, including diagnosis, treatment, counselling, and follow-up care for tuberculosis patients under the National Tuberculosis and Leprosy Control Programme.

The hospital was selected because it serves a large population of TB patients from diverse socio-economic backgrounds and records a considerable number of TB cases annually. As a referral facility, the hospital receives patients from lower-level health facilities within the region, making it an ideal setting for examining determinants of self-reported TB medication adherence. In addition, the hospital maintains an active TB treatment program that facilitates patient follow-up and monitoring throughout the treatment period.

3.4 Study population

The study population comprised all tuberculosis patients receiving treatment through Jinja Regional Referral Hospital and its catchment area during the study period. The study included patients diagnosed with either pulmonary or extrapulmonary tuberculosis and who were enrolled on anti-tuberculosis treatment.

The study population was considered appropriate because the participants possessed first-hand information regarding their experiences with TB treatment, self-reported adherence practices, access to health services, social support, stigma, and other factors that could influence self-reported TB medication adherence. Consequently, data obtained from the participants provided valuable information regarding determinants of TB medication adherence within the study area.

The study population comprised 172 tuberculosis (TB) patients who were registered for treatment at Jinja Regional Referral Hospital during the study period which was 1st January 2024 - 31st March 2024.

During data collection, however, not all registered patients were available for interview. A total of 54 patients were excluded from the study because 5 had died, 11 were lost to follow-up (LTFU), 25 had unreachable telephone contacts, and 13 required caregiver-assisted interviews but their caregivers were unavailable. Consequently, the final study population consisted of 118 respondents. Descriptive and bivariate analyses were based on these respondents, while the multivariate analysis was based on 107 complete observations.

Table 1: Population distribution

Description	Frequency (n)
Registered TB patients	172
Death	5
Lost to Follow-Up (LTFU)	11
Phone numbers unavailable/off	25
Caregiver not available with patient	13
Total excluded	54
Final study population	118

3.5 Inclusion and Exclusion Criteria

3.5.1 Inclusion Criteria

Participants were included in the study if they:

- Were registered patients and had received their treatment at Jinja Regional Referral Hospital
- Had complete medical records that enabled identification and follow-up.

- Were alive at the time of data collection.
- Had not been classified as LTFU or Dead
- Could be successfully contacted through the telephone number recorded in the health facility records.
- Personally, participated in the interview or, where appropriate, had a caregiver available to provide the required information.
- Voluntarily provided informed consent to participate in the study.

3.5.2 Exclusion Criteria

Participants were excluded from the study if they:

- Had died before the commencement of data collection.
- Were classified as lost to follow-up (LTFU) and could not be traced.
- Had telephone numbers that were switched off, unreachable, or invalid throughout the data collection period despite repeated contact attempts.
- Required a caregiver respondent, but the caregiver was unavailable or not with the patient during the data collection period.
- Declined to provide informed consent or withdrew from the study at any stage.

3.5.3 Data Collection Method

The study utilized primary data, which were collected directly from tuberculosis (TB) patients who had received treatment at the health facility. Phone call interviews were conducted to get responses from the selected eligible participants. For children, information was obtained from their parents/ treatment supporters or guardians.

3.5.4 Data Collection Instrument

Data were collected using a structured questionnaire that was developed based on the study objectives and an extensive review of relevant literature on factors associated with self-reported TB medication adherence. The questionnaire comprised predominantly close-ended questions organized into sections covering respondents' socio-demographic characteristics, health-related and treatment-related factors, health system factors, family and social support, and adherence to TB medication.

3.6 Measurement of Study Variables

Table 2: Description of the different variables that were used

Variables	Codes	Data type
Dependent variable		

Variables	Codes	Data type
Self-reported TB medication adherence	1 = Adherent 0 = Non-adherent	Binary
Independent variables		
Socio-demographic factors		
Age category (years)	1 = less than 10 2 = 11-20 3 = 21-30 4 = 31-40 5 = Above 40	Ordinal
Sex	0 = Female 1 = Male	Nominal
Marital status	1 = Divorced 2 = Married 3 = Single 4 = Widowed	Nominal
Education level	0 = No formal education 1 = Primary 2 = Secondary 3 = Tertiary 4 = Others	Ordinal
Monthly income (UGX)	0 = Not earning 1 = less than 100,000 2 = 100,001-250,000 3 = 250,001-450,000 4 = Above 450,000	Ordinal
Employment status	0 = No 1 = Yes	Nominal
Family and social support factors		
Living with family members	0 = No 1 = Yes	Nominal
Family reminders to take TB medication	1 = Daily 2 = Occasionally	Ordinal

Variables	Codes	Data type
	3 = Weekly 4 = Never	
Emotional support from family	0 = No 1 = Yes	Nominal
Health-related factors		
Medication side effects	0 = No 1 = Yes	Nominal
Stigma and discrimination	0 = No 1 = Yes	Nominal
Affordable transportation	0 = No 1 = Yes	Nominal
Financial constraints	0 = No 1 = Yes	Nominal
Challenges accessing health facility	0 = No 1 = Yes	Nominal
Attitude of health workers	1 = Excellent 2 = Good 3 = Fair 4 = Poor	Ordinal
Felt discouraged by health workers	0 = No 1 = Yes	Nominal
Distance to nearest health facility	1 = Near 2 = Average 3 = Very far	Ordinal
Received education/knowledge or counselling about TB treatment	0 = No 1 = Yes	Nominal

3.7 Data Analysis methodology

3.7.1 Descriptive Analysis

Descriptive analysis involved the examination of variable distributions at the univariate level, including both numerical and categorical variables. Frequency distribution tables and summary statistics were generated for the study variables

3.7.2 Bivariate Analysis

Cross-tabulation was conducted between the dependent variable and the independent variables. The Pearson's chi-square test was utilised to determine whether the observed differences are statistically significant or occurred by chance and also the Fisher's Exact test was used for cross tabulation for variables with less than 5 observations in the cell.

The formula for the Pearson's chi-square test is as follows:

$$\chi^2 = \sum_{j=1}^c \sum_{i=1}^r \frac{(O_{ij} - E_{ij})^2}{E_{ij}}$$

Where:

r= the number of categories of the independent variable;

O_{ij} = observed frequency in the i^{th} row and j^{th} column

E_{ij} = Expected frequency in the i^{th} row and j^{th} column

r = number of categories of the independent variable; and

c = number of categories of the dependent variable.

At the 5% level of significance ($\alpha = 0.05$), the chi-square test assessed associations between variables, specifically examining the relationship between self-reported TB medication adherence and the independent variables. The test statistic provided insights into whether there is a significant association between the dependent variable and independent variables. This helped to aid in selecting the factors associated with the dependent variable self-reported TB medication adherence for multivariate analysis.

3.7.3 Multivariate analysis

The binary logistic regression model was applied to investigate the odds of the potential predictor variables on the self-reported TB medication adherence.

The binary logistic regression model;

$$\log\left(\frac{p}{1-p}\right) = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \dots + \beta_m X_m$$

Where

p is the probability that the TB patient adheres to the treatment

$\frac{p}{1-p}$ is the odds ratio

β_0 is the estimated odds of self-reported TB medication adherence holding other factors constant

β_i is the slope/ coefficient for the independent variables for $i = 1, 2, 3, \dots m$

X_i is the independent variables for $i = 1, 2, 3, \dots m$

Prior to interpretation of the fitted model, multicollinearity among the independent variables was assessed using Variance Inflation Factors (VIFs). The discriminatory ability of the fitted binary logistic regression model was assessed using the Receiver Operating Characteristic (ROC) curve and the corresponding Area Under the Curve (AUC). Statistical significance was assessed at the 5% level.

3.8 Ethical Considerations

To ensure adherence to ethical principles, an introductory letter from the Head of Department Statistics and Actuarial Sciences was provided to the Director of the Jinja Regional Referral Hospital to obtain data about the TB patients for the study.

The Research and Ethics Committee team reviewed the proposal, gave clearance and guidance on how the study would be conducted. Additionally, all data and information obtained was treated with the utmost confidentiality to protect the privacy and anonymity of the participants. This included secure storing of data, and restricting access to unauthorized personnel. By upholding these ethical standards, the rights and well-being of the participants while contributing valuable insights to the field of tuberculosis treatment adherence was upheld.

3.9 Limitations to the Study

Medication adherence was self-reported and may therefore have been affected by recall and social desirability bias. Where patients were children or unable to respond independently, parents, guardians or caregivers responded on their behalf, which may have introduced proxy-response bias.

CHAPTER FOUR: PRESENTATION AND DISCUSSION OF FINDINGS

4.1 Introduction

This chapter presents the findings of the cross-sectional study carried out on TB patients in Jinja Regional Referral Hospital.

4.2 Descriptive Analysis

Table 3: Distribution of socio-demographic factors (n=118)

Characteristics	Description	Frequency (n=118)	Percentage (%)
Age category	Less than10	57	48.3
	11-20	20	16.9
	21-30	21	17.8
	31-40	9	7.6
	Above 40	11	9.3
Sex	Female	61	51.7
	Male	57	48.3
Marital status	Divorced	5	4.2
	Married	16	13.6
	Single	95	80.5
	Widowed	2	1.7
Education level	No formal education	83	70.34
	Primary	14	11.86
	Secondary	6	5.08
	Tertiary	10	8.47
	Others	5	4.24
Monthly income	Less than 100,000	18	15.25
	100,001-250,000	4	3.39
	250,001-450,000	4	3.39
	Above 450,000	0	0.00
	Not earning	92	77.97
Employment status	No	92	77.97
	Yes	26	22.03

Table 3 presents the socio-demographic characteristics of the respondents. Nearly half of the respondents (48.3%) were aged 0-10 years. Females constituted a slightly higher proportion of respondents (51.7%) than males (48.3%). The majority of respondents were single (80.5%) and unemployed (77.97%). Educational attainment was generally low, with 70.3% reporting no formal education, while 11.9%, 5.1% and 8.5% had attained primary, secondary and tertiary education, respectively. Regarding monthly income, the majority of respondents (78.0%) reported that they were not earning an income, while 15.3% earned less than UGX 100,000 per month. These findings indicate considerable socioeconomic vulnerability among the study participants.

Table 4: Distribution of family and social support factors

Characteristic	Category	Frequency	Percentage (%)
Living with family members	Yes	99	83.9
	No	19	16.1
Emotional support from family	Yes	96	81.4
	No	22	18.6
Family reminders to take TB medication	Daily	65	55.1
	Occasionally	29	24.6
	Weekly	9	7.6
	Never	15	12.7

Table 4 presents the distribution of family and social support characteristics among respondents. The majority of respondents (83.9%) reported living with family members, while 16.1% did not. Similarly, most respondents (81.4%) reported receiving emotional support from their families. Regarding reminders to take TB medication, more than half (55.1%) received daily reminders, 24.6% received reminders occasionally, 7.6% received weekly reminders, while 12.7% reported never receiving reminders. These findings suggest that family support was common among respondents.

Table 5: Distribution of health-related factors

Characteristic	Category	Frequency	Percentage (%)
Side effects	Yes	46	39.0
	No	72	61.0
Stigma and discrimination	Yes	36	30.5
	No	82	69.5
Affordable transportation	Yes	73	61.9
	No	45	38.1
Financial constraints	Yes	74	62.7
	No	44	37.3
Challenges accessing health facility	Yes	56	47.5
	No	62	52.5
Health workers' attitude	Excellent	10	8.5
	Good	85	72.0
	Fair	21	17.8
	Poor	2	1.7
Felt discouraged by health workers	Yes	20	16.9
	No	98	83.1
Distance to nearest health facility	Near	65	55.1
	Average	18	15.3
	Very far	35	29.7
Knowledge/Education about TB	Yes	105	89.0
	No	13	11.0

Results from Table 5 indicate that 39.0% of respondents experienced medication side effects and 89.0% had received knowledge/education about TB.

Table 6: Distribution of Self-Reported TB Medication Adherence

Adherence status	Frequency	Percentage
Adherent	70	59.32
Non-adherent	48	40.68

Results from **Table 6** indicate that 70 (59.32%) respondents were classified as adherent to TB medication, while 48 (40.68%) were classified as non-adherent.

4.3 Bivariate Analysis

Bivariate analysis was conducted to assess the association between the independent variables and self-reported TB medication adherence. The independent variables were organized according to the conceptual framework into socio-demographic factors, family and social support factors, and health-related factors. Pearson's chi-square test or Fisher's exact test was used as appropriate. Statistical significance was assessed at the 5% level.

4.3.1 Association between the study variables and self-reported TB adherence

Table 7: Association between socio-demographic factors and self-reported TB medication adherence

Characteristic	Category	Adherent n=70	Non-adherent n=48	Chi-square	P-value
Age category (Years)	Less than 10	32 (45.7%)	25 (52.1%)		0.971
	11-20	12 (17.1%)	8 (16.7%)		
	21-30	13 (18.6%)	8 (16.7%)		
	31-40	6 (8.6%)	3 (6.3%)		
	Above 40	7 (10.0%)	4 (8.3%)		
Sex	Female	32 (45.7%)	29 (60.4%)	2.4649	0.116
	Male	38 (54.3%)	19 (39.6%)		
Marital status	Divorced	3 (4.3%)	2 (4.2%)		0.398
	Married	12 (17.1%)	4 (8.3%)		
	Single	53 (75.7%)	42 (87.5%)		
	Widowed	2 (2.9%)	0 (0.0%)		
Education level	No formal education	42 (60.0%)	41 (85.4%)		0.015
	Primary	13 (18.6%)	1 (2.1%)		
	Secondary	5 (7.1%)	1 (2.1%)		
	Tertiary	7 (10.0%)	3 (6.3%)		
	Others	3 (4.3%)	2 (4.2%)		
Monthly income (UGX)	Not earning	51 (72.9%)	41 (85.4%)		0.127
	Less than 100,000	11 (15.7%)	7 (14.6%)		
	100,001-250,000	4 (5.7%)	0 (0.0%)		
	250,001-450,000	4 (5.7%)	0 (0.0%)		
	More than 450,000	0 (0.0%)	0 (0.0%)		
Employment status	No	51 (72.9%)	41 (85.4%)	2.6146	0.106
	Yes	19 (27.1%)	7 (14.6%)		

Results from **Table 7** show that Education level was significantly associated with self-reported TB medication adherence ($p = 0.015$).

Table 8: Association between Family and Social Support factors and self-reported TB medication adherence

Characteristic	Category	Adherent	Non-adherent	Chi-square	P-value
Living with family members	No	3 (15.8%)	16 (84.2%)		0.000
	Yes	67 (67.7%)	32 (32.3%)		
Family reminders to take TB medication	Daily	45 (69.2%)	20 (30.8%)		0.000
	Occasionally	13 (44.8%)	16 (55.2%)		
	Weekly	9 (100.0%)	0 (0.0%)		
	Never	3 (20.0%)	12 (80.0%)		
Emotional support from family members	No	4 (18.2%)	18 (81.8%)		0.000
	Yes	66 (68.8%)	30 (31.2%)		

Results from **Table 8** indicate that all the variables had their p - values less than 0.05 which indicates that all of them were statistically significant and therefore had an association with self-reported medication adherence.

Table 9: Association between health-related factors and self-reported TB adherence

Characteristic	Category	Adherent	Non-adherent	Chi-square	P-value
Experienced side effects from TB medication	No	55 (76.4%)	17 (23.6%)	22.2940	0.000
	Yes	15 (32.6%)	31 (67.4%)		
Stigma and discrimination	No	56 (68.3%)	26 (31.7%)	8.9633	0.003
	Yes	14 (38.9%)	22 (61.1%)		
Affordable transportation to access TB treatment	No	10 (22.2%)	35 (77.8%)	41.4897	0.000
	Yes	60 (82.2%)	13 (17.8%)		
Financial constraints	No	39 (88.6%)	5 (11.4%)	24.9855	0.000
	Yes	31 (41.9%)	43 (58.1%)		
Challenges accessing the health facility	No	58 (93.5%)	4 (6.5%)		0.000
	Yes	12 (21.4%)	44 (78.6%)		
Attitude of health workers	Excellent	7 (70.0%)	3 (30.0%)		0.002
	Good	57 (67.1%)	28 (32.9%)		
	Fair	6 (28.6%)	15 (71.4%)		
	Poor	0 (0.0%)	2 (100.0%)		
Felt discouraged by health workers	No	65 (66.3%)	33 (33.7%)	11.7559	0.001
	Yes	5 (25.0%)	15 (75.0%)		
Distance to nearest health facility	Average	6 (33.3%)	12 (66.7%)	15.9198	0.000
	Near	49 (75.4%)	16 (24.6%)		
	Very far	15 (42.9%)	20 (57.1%)		
Received education/knowledge or counselling about TB treatment	No	6 (46.2%)	7 (53.8%)	1.0498	0.306
	Yes	64 (61.0%)	41 (39.0%)		

Results from Table 9 indicate that all variables had p-value less than 0.05 except Received education / knowledge or counselling about TB treatment. This means that these variables had an association with self-reported adherence to TB treatment.

4.4 Multivariate Analysis

4.4.1 Factors affecting self-reported TB medication adherence among patients

Binary logistic regression was performed to assess the association between selected independent variables and self-reported TB medication adherence and the results presented below.

Table 10: Binary logistic regression analysis

Variable	Category	AOR	95% CI	p-value
Education	No formal Education	1.00		
	Primary	57.78	0.001-2,615,982.00	0.458
	Secondary	4.63	0.122-176.07	0.409
	Tertiary	0.92	0.061-14.00	0.953
	Others	4.22	0.107-167.38	0.442
Living with family	Yes	1.00		
	No	<0.001	0.000-NE	0.990
Reminders	Daily	1.00		
	Occasionally	0.63	0.082-4.83	0.656
	Weekly	Omitted/empty		
	Never	205,775.60	0.000-NE	0.992
Emotional support	Yes	1.00		
	No	4.19	0.069-255.84	0.494
Medication side effects	Yes	1.00		
	No	8.25	0.650-104.81	0.104
Stigma and discrimination	Yes	1.00		
	No	0.30	0.017-5.47	0.418
Affordable transportation	Yes	1.00		
	No	0.11	0.008-1.55	0.102
Financial constraints	Yes	1.00		
	No	3.27	0.211-50.44	0.397
Challenges accessing health facility	Yes	1.00		
	No	30.24	2.83-322.84	0.005*
Attitude of health workers	Excellent	1.00		
	Good	1.08	0.041-28.43	0.965
	Fair	0.20	0.002-16.52	0.475
	Poor	Omitted/empty		
Felt discouraged by health workers	Yes	1.00		
	No	0.05	0.001-2.54	0.132
Distance to health facility	Near	1.00		
	Average	0.14	0.006-3.19	0.219
	Very far	1.87	0.100-35.06	0.675

The binary logistic regression model was statistically significant overall (LR χ^2 (18) = 99.52, $p < 0.001$), with a Pseudo R^2 of 0.6806. Among the variables included in the adjusted model, challenges in accessing the health facility was the only statistically significant predictor of self-reported TB medication adherence ($p = 0.005$). Respondents who reported not having challenges in accessing the health facility had approximately 30.24 times higher odds of self-reported adherence to TB treatment (AOR = 30.24; 95% CI: 2.83-322.84).

Although the overall study population consisted of 118 respondents, the binary logistic regression analysis included 107 respondents with complete observations for all variables entered into the model. Some variables had small or empty cells, resulting in unstable estimates, wide confidence intervals, and omission of some categories in the binary logistic regression model.

4.5 Diagnostic tests

Diagnostic tests were conducted to assess the adequacy and reliability of the fitted binary logistic regression model. Multicollinearity among the independent variables was assessed using the Variance Inflation Factor (VIF), and the discriminatory ability of the model was evaluated using the Receiver Operating Characteristic (ROC) curve and the corresponding Area Under the Curve (AUC).

4.5.1 Multicollinearity diagnostic

Table 11: Multicollinearity diagnostic test using VIFs

Diagnostic	Result	Interpretation
Mean VIF	2.72	Low overall multicollinearity
Maximum VIF	9.54	Below conventional threshold of 10
Minimum tolerance (1/VIF)	0.105	No severe multicollinearity detected

Multicollinearity among the independent variables was assessed using the Variance Inflation Factor (VIF). Table 11 shows that the mean VIF was 2.72, while the highest VIF was 9.54. Although some individual categories, particularly living with family members (VIF = 9.54), emotional support (VIF = 5.70), and one category of family reminders (VIF = 5.34), showed relatively elevated VIF values, none exceeded the conventional threshold of 10 (Indicated in the annex). The minimum tolerance value (1/VIF) was approximately 0.105. Therefore, there was no evidence of severe multicollinearity that would warrant exclusion of variables from the fitted model.

4.5.2 Receiver Operating Characteristic (ROC) Curve

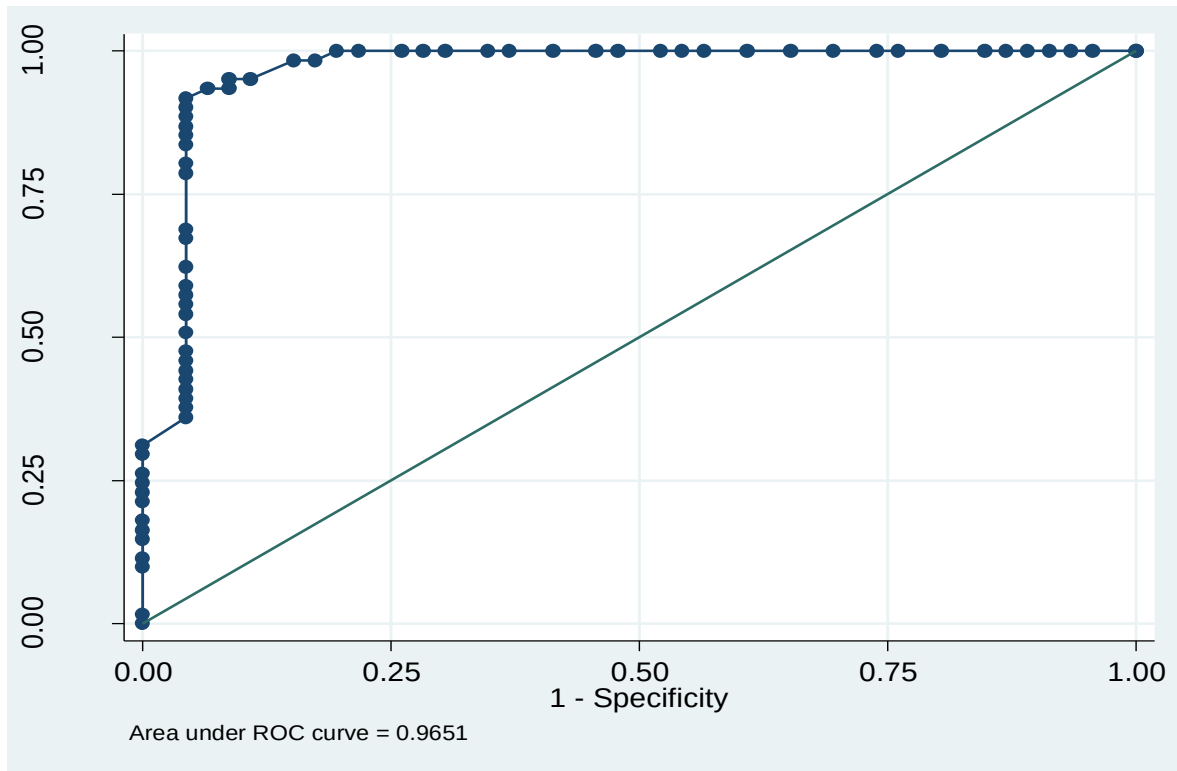


Figure 5: ROC Curve for the Binary Logistic Regression Model

The discriminatory ability of the binary logistic regression model was assessed using the Receiver Operating Characteristic (ROC) curve. The Area Under the ROC Curve (AUC) was 0.9651, indicating excellent discriminatory ability. This suggests that the fitted model had a very high ability to distinguish between respondents classified as adherent and non-adherent to TB medication.

4.6 Discussion of findings

The study examined the factors associated with self-reported TB medication adherence among patients attending Jinja Regional Referral Hospital between 1st January, 2024 - 31st March, 2024. 70 respondents (59.32%) were classified as adherent while 48 respondents (40.68%) were classified as non-adherent.

4.6.1 Socio-demographic factors and self-reported TB medication adherence

Among the socio-demographic factors examined, education level was the only factor significantly associated with self-reported TB medication adherence at the bivariate level ($p = 0.015$). Age, sex, marital status, monthly income and employment status were not statistically significant ($p > 0.05$). This suggests that self-reported TB medication adherence differed significantly across education categories, whereas the other socio-demographic

characteristics did not demonstrate evidence of an association with self-reported medication adherence in this study.

4.6.2 Family and social support factors and self-reported TB medication adherence

All the assessed family and social support factors were significantly associated with self-reported TB medication adherence at the bivariate level ($p < 0.001$). These included living with family members, family reminders to take TB medication, and emotional support from family members. Self-reported TB medication adherence was notably higher among respondents living with family members (67.7%) than those who were not (15.8%), and among those receiving emotional support (68.8%) compared with those who did not (18.2%). These findings demonstrate the importance of family and social support in self-reported TB medication adherence.

4.6.3 Health-related factors and Self-reported TB medication adherence

Most health-related factors were significantly associated with self-reported TB medication adherence at the bivariate level. Significant associations were observed for medication side effects ($p < 0.001$), stigma and discrimination ($p = 0.003$), affordable transportation ($p < 0.001$), financial constraints ($p < 0.001$), challenges accessing the health facility ($p < 0.001$), attitude of health workers ($p = 0.002$), discouragement by health workers ($p = 0.001$), and distance to the nearest health facility ($p < 0.001$). However, receiving education/knowledge or counselling about TB treatment was not statistically significant ($p = 0.306$).

4.6.4 Multivariate findings

At multivariate analysis, the overall binary logistic regression model was statistically significant ($LR \chi^2 (18) = 99.52$, $p < 0.001$; Pseudo $R^2 = 0.6806$).

Diagnostic assessment showed no evidence of severe multicollinearity among the predictors (mean VIF = 2.72; maximum VIF = 9.54), while the model demonstrated excellent discriminatory ability (AUC = 0.9651).

After adjustment for other factors, challenges in accessing the health facility was the only statistically significant independent predictor of self-reported TB medication adherence (AOR = 30.24; 95% CI: 2.83-322.84; $p = 0.005$). Respondents who reported having no challenges in accessing the health facility had approximately 30 times higher odds of being adherent as compared to those who indicated having challenges.

CHAPTER FIVE: SUMMARY OF THE FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary of the study findings, conclusions and recommendations based on the study objectives. The study examined factors associated with self-reported TB medication adherence among patients attending Jinja Regional Referral Hospital, focusing on socio-demographic, family and social support, and health-related factors. The conclusions and recommendations are drawn from the findings presented in Chapter Four.

5.2 Summary of the Findings

The study included 118 respondents, of whom 70 (59.3%) were adherent to TB medication while 48 (40.7%) were non-adherent. At the bivariate level, among the socio-demographic factors assessed, education level was the only factor significantly associated with self-reported TB medication adherence ($p = 0.015$). Age, sex, marital status, monthly income and employment status were not statistically significantly associated with self-reported TB medication adherence ($p > 0.05$).

Regarding family and social support factors, living with family members, family reminders to take TB medication, and emotional support from family members were all significantly associated with self-reported TB medication adherence ($p < 0.001$) at the bivariate level. Self-reported TB medication adherence was higher among respondents who lived with family members and those who received emotional support. The findings therefore demonstrated significant bivariate relationships between family and social support factors and self-reported TB medication adherence.

For health-related factors, significant bivariate associations with self-reported TB medication adherence were observed for medication side effects ($p < 0.001$), stigma and discrimination ($p = 0.003$), affordable transportation ($p < 0.001$), financial constraints ($p < 0.001$), challenges accessing the health facility ($p < 0.001$), attitude of health workers ($p = 0.002$), discouragement by health workers ($p = 0.001$), and distance to the nearest health facility ($p < 0.001$). However, receiving education/knowledge or counselling about TB treatment was not significantly associated with self-reported TB medication adherence ($p = 0.306$).

At multivariate analysis, the binary logistic regression model was statistically significant overall (LR $\chi^2(18) = 99.52$, $p < 0.001$), with a Pseudo R^2 of 0.6806. After adjustment for the other variables included in the model, challenges in accessing the health facility was the only

statistically significant independent predictor of self-reported TB adherence (AOR = 30.24; 95% CI: 2.83-322.84; $p = 0.005$).

5.3 Conclusions

The study concludes that self-reported TB medication adherence among the respondents was 59.3%, indicating that a substantial proportion of patients remained non-adherent. At the bivariate level, education level, family and social support factors, and most of the assessed health-related factors were significantly associated with self-reported TB medication adherence. However, these associations largely did not persist after controlling for other variables in the multivariate analysis.

From the study, challenges in accessing the health facility were independently associated with self-reported TB medication adherence. Patients who did not experience challenges accessing health facilities had significantly higher odds of being adherent than those who experienced such challenges. Therefore, barriers to accessing health facilities appear to be an important factor affecting adherence to TB medication among patients in this study.

5.4 Recommendations

- i. Based on the study findings, Jinja Regional Referral Hospital and relevant TB programme implementers should prioritise interventions aimed at reducing barriers to accessing TB treatment services. This may include strengthening patient follow-up, improving linkages with nearby TB treatment facilities, and providing appropriate support to patients who experience difficulties accessing health facilities.
- ii. Further studies should involve larger and more diverse study populations to obtain more precise estimates of the factors associated with self-reported TB medication adherence and improve the generalizability of the findings.

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APPENDICES

6.1 Introductory Letter

MAKERERE Plot 51, Pool Road P.O. Box 7062 Kampala, UGANDA VOIP: 26 100Cable MAKUNIKA		UNIVERSITY Phone: +256 414 541558/9 Fax: +256 414 530756 E-mail: hodsas.bams@mak.ac.ug URL: www.bams.mak.ac.ug
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College of Business and Management Sciences (CoBAMS)
SCHOOL OF STATISTICS AND PLANNING
Department of Statistical Methods and Actuarial Science

03rd April 2024

The Director,
Jinja Regional Referral Hospital,
Jinja (U)

Re: MWESIGWA PETER MSTAT 2022/HD06/1832U

This is to confirm that the above named student was admitted to Makerere University, College of Business and Management Sciences, School of Statistics and Planning, in 2022 to pursue a two year programme leading to the award of a Master of Statistics Degree.

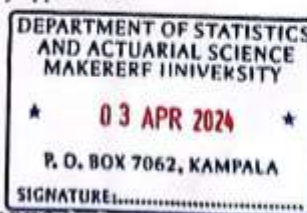
As part of the programme, he is expected to carry out academic research and submit a dissertation at the end of the exercise. By this, he would like to collect data from your Institution under the topic of research entitled: "Determinants of Tuberculosis medications adherence in Uganda".

The purpose of this letter therefore, is to inform you that he needs an ethical clearance to proceed with his research process.

Any assistance rendered to him will be highly appreciated.

Yours faithfully,


Serunjogi Ambrose,
Ag. HEAD,
DEPARTMENT OF STATISTICAL METHODS &
ACTUARIAL SCIENCE
Email: ambroseru@gmail.com



6.2 Clearance from JRRH Research and Ethics Committee



MINISTRY OF HEALTH
JINJA REGIONAL HOSPITAL

JINJA REGIONAL REFERRAL HOSPITAL RESEARCH AND ETHICS COMMITTEE
(JRRHREC).

Date: 13th / April / 2026

To: Mwesigwa Peter

Principal Investigator.

Dear Sir,

RE: APPROVAL TO DO DATA COLLECTION

I am glad to let you know that after reading through your research proposal titled: *"Determinants of Tuberculosis Medications adherence in Uganda"*.

This approval is granted under registration number **JRRH-REC-00109 / 2026** and should never be used for any other research process apart from this study.

During the study period, keep in touch with the chairperson of Jinja Regional Referral Hospital Research and Ethics Committee Dr. Afizi Kibuuka 0774573877, or the Secretary Jinja Regional Referral Hospital Research and Ethics Committee Mr. Nadide Simon 0706644690. For any inquiries or email the Administrative Assistant justinenangobi7@gmail.com and share a copy of your research findings on the same e-mail.

Yours Sincerely,


Dr. Kibuuka Afizi (MBCMB, MMED)

Chairperson – JRRHREC.



Copy: File

6.3 Questionnaire

Questionnaire identification number: _____

Date of interview: _____

Interviewer's name/code: _____

Introduction

Dear Respondent,

I am Mwesigwa Peter, a student at Makerere University conducting a study on factors associated with self-reported tuberculosis medication adherence among patients attending Jinja Regional Referral Hospital. You have been selected to participate in this study because you received tuberculosis treatment through the hospital.

Participation in this study is voluntary. The information you provide will be treated confidentially and used solely for academic purposes. You may decline to answer any question or withdraw from the interview at any time without affecting your access to healthcare services.

The interview will take approximately **10-15 minutes**.

Do you voluntarily agree to participate in this study?

☐ Yes

☐ No

Where the patient is a child or is unable to answer independently, the questions should be directed to the parent, guardian, caregiver or treatment supporter. In such cases, replace "you" with "the patient/your child" as appropriate.

SECTION A: SOCIO-DEMOGRAPHIC FACTORS

1. How old are you?

Age in completed years: _____

2. What is your sex?

☐ Female

☐ Male

3. What is your marital status?

☐ Single

☐ Married

☐ Divorced

☐ Widowed

4. What is the highest level of education you have attained?
- ☐ No formal education
 - ☐ Primary
 - ☐ Secondary
 - ☐ Tertiary
 - ☐ Other, specify: _____
5. Are you currently employed or engaged in any income-generating activity?
- ☐ Yes
 - ☐ No
6. Approximately how much income do you earn in a month?
- ☐ Not earning
 - ☐ Less than UGX 100,000
 - ☐ UGX 100,001-250,000
 - ☐ UGX 250,001-450,000
 - ☐ Above UGX 450,000

SECTION B: FAMILY AND SOCIAL SUPPORT FACTORS

7. Do you live with members of your family?
- ☐ Yes
 - ☐ No
8. How often do your family members or caregivers remind you to take your TB medication?
- ☐ Daily
 - ☐ Occasionally
 - ☐ Weekly
 - ☐ Never
9. Do you receive emotional support or encouragement from your family members regarding your TB treatment?
- ☐ Yes
 - ☐ No

SECTION C: HEALTH-RELATED FACTORS

Medication and health-related factors

10. Did you experience any side effects while taking your TB medication?
- ☐ Yes
- ☐ No
11. How would you describe your overall health during the period you were receiving TB treatment?
- ☐ Good
- ☐ Fair
- ☐ Poor
12. Apart from tuberculosis, did you have any other medical condition during your treatment period?
- ☐ Yes
- ☐ No
13. Did you ever experience stigma or discrimination because you had tuberculosis?
- ☐ Yes
- ☐ No

Access and financial factors

14. How would you describe the distance from your home to the health facility where you received your TB treatment?
- ☐ Near
- ☐ Average distance
- ☐ Very far
15. Were you able to afford transportation to the health facility whenever you needed TB treatment services?
- ☐ Yes
- ☐ No
16. During your TB treatment, did you experience financial difficulties in obtaining nutritious food?
- ☐ Yes
- ☐ No

17. Did you experience any challenges in accessing the health facility for your TB treatment?

☐ Yes

☐ No

Health-worker and health-service factors

18. How would you describe the overall attitude of the health workers who attended to you during your TB treatment?

☐ Excellent

☐ Good

☐ Fair

☐ Poor

19. During your TB treatment, did you ever feel discouraged, judged or treated negatively by a health worker because you had tuberculosis?

☐ Yes

☐ No

20. Did you receive education or counselling from a health worker about tuberculosis and its treatment?

☐ Yes

☐ No

SELF-REPORTED TB MEDICATION ADHERENCE

21. During your TB treatment, did you miss taking any dose of your TB medication?

☐ Yes

☐ No

Thank you for participating in this study. The information provided will be kept confidential and used solely for academic purposes.

6.4 VIF Stata output

. estat vif		
Variable	VIF	1/VIF
Edn		
2	1.21	0.828233
3	1.30	0.771590
4	1.10	0.911063
5	1.26	0.794712
2.Living_w~y	9.54	0.104854
Reminders		
2	1.69	0.592425
3	1.39	0.721572
4	5.34	0.187335
2.emotiona~t	5.70	0.175558
2.side_eff~s	2.04	0.490272
2.stigma_d~c	1.87	0.535073
2.Affordab~t	1.91	0.523408
2.Financia~t	2.10	0.475087
2.Challeng~g	2.21	0.453005
Attitude		
2	3.64	0.274899
3	3.81	0.262469
4	1.90	0.527234
2.Felt_Disc	2.17	0.460843
Distance		
2	2.21	0.451919
3	2.03	0.492893
Mean VIF	2.72	