

**DETERMINANTS OF TB TREATMENT ADHERENCE AMONG PATIENTS ON  
ANTI-TB TREATMENT IN TORORO DISTRICT, UGANDA**

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A mini-thesis submitted in partial fulfilment of the requirements for the degree of Magister  
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## ABSTRACT

### **Introduction:**

Tuberculosis (TB) remains a contributor to the burden of disease in the world especially in resource limited Africa yet adherence to anti-tuberculosis (anti-TB) treatment remains a challenge.

**Objectives:** To address this challenge, our study was to ascertain the extent of poor adherence to anti-TB treatment, to describe the demographic factors of patients on anti-TB treatment, to investigate the factors associated with poor adherence to anti-TB treatment in Tororo district, and to make respective recommendations to improve adherence to anti-TB treatment in order to contribute to the reduction of the TB burden in the world.

**Study design and Methodology:** In this cross sectional study, we utilized data from 200 patients on anti-TB treatment from Tororo district Uganda. Participant's socio-demographic, medical, anti-TB treatment, and economic data were collected. Determinants of poor adherence to anti-TB treatment were investigated using interactive expansion logistic regression by means of Stata, version 10.1.

**Results:** More males (60%) had TB compared to females. Most participants (71%) were  $\leq 45$  years, and a considerable proportion of participants (21%) had no education. Most participants (90%) lived alone. Nearly two thirds of the participants (65%) were adherent to their anti-TB treatment. Using a p-value of  $< 0.05$ , a previous diagnosis of TB (adjusted odds ratio [AOR] 3.9; p-value 0.045), perceived pill burden causing quitting of anti-TB treatment (AOR 6.5; p-value

0.010), only agreeing that missing doses or taking them incorrectly can ruin anti-TB treatment (AOR 2.6; p-value 0.013), being on adult anti-TB re-treatment regimen (AOR 3.4; p-value of 0.049), and surprisingly having electricity in the house hold (AOR 2.22; p-value 0.045) were all independently associated with poor adherence to anti-TB treatment.

**Recommendations:** TB patients (especially retreatment patients) should receive counselling to swallow all their medication, fixed dose combinations and DOTS should be encouraged in the management of patients, and research to condense all the various drugs in one pill should be encouraged. We also warranty further research to test and confirm the association between household electricity and poor anti-TB treatment adherence.

(331 words)



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## DECLARATION

I declare that Determinants of TB Treatment Adherence among Patients on Anti-TB Treatment in Tororo District, Uganda is my own work, that it has not been submitted before for any degree or examination in any other university, and that all the sources I have used or quoted have been indicated and acknowledged as complete references.

Alex Wanyama Barasa,



Signed: .....

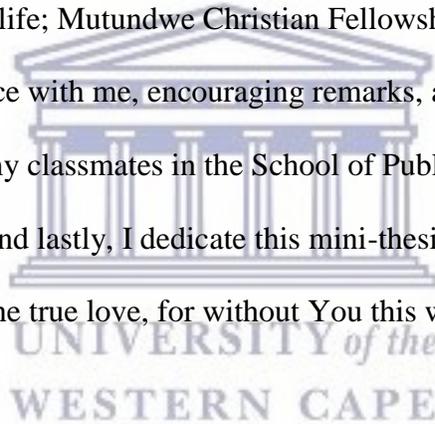
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## DEDICATION

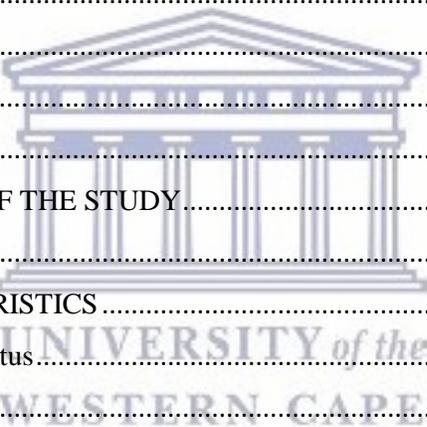
I dedicate this mini-thesis: to my loving spouse Eva Ruth Nalumansi and our lovely children Namubiru Lynnet, Atudaha Cohen, Atulinda Cosam, Natulinda Corlissa and Natudaha Contrenah for allowing me use some time that should have been theirs to complete this Magister of Public Health (MPH). To my parents Mr. Kanani Wanyama and Mrs. Sarah Wanyama, for the love and foundation of my education they invested in me. To all my siblings and friends; my pastors, Pr Tom Mugerwa, Pr Kemirembe, Pr Hassan, Pr Moses Blessing, Pr Vincent, Pr Vickie, Pr Akankwasa, Pr Buyungo, Pr Betty, and Pr Kibirige for the spiritual guidance, counselling, intervention and training in my life; Mutundwe Christian Fellowship church; my supervisor Ms. Verona Mathews for her patience with me, encouraging remarks, and excellent supervision irrespective of my own ideas; my classmates in the School of Public Health, University of the Western Cape (SOPH UWC); and lastly, I dedicate this mini-thesis to my Lord and Savior, Jesus Christ, the Alpha and Omega, the true love, for without You this would not be possible.



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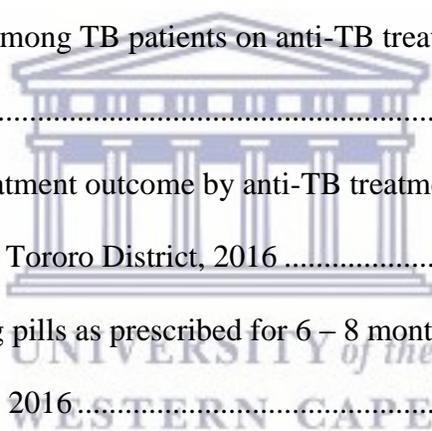


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## ABBREVIATIONS

AIDS	Human Immunodeficiency Virus
AOR	Adjusted Odds Ratio
ART	Anti-Retroviral Therapy
ARVs	Anti-Retrovirals
CB-DOTs	Community Based Directly Observed Therapy shortcourse
DOTs	Directly Observed Therapy shortcourse
HIV	Human Immunodeficiency Virus
MDG	Millennium Development Goals
MDR TB	Multi drug resistant tuberculosis
MOH	Ministry of Health
NGO	Non-governmental Organization
OR	Odds Ratio
SOPH	School of Public Health
TASO	The AIDS Support Organization
TB	Tuberculosis
TBCTA	Tuberculosis Coalition for Technical Assistance
UBOS	Uganda Bureau of Statistics
UWC	University of Western Cape
WHO	World Health Organization

## CHAPTER ONE: INTRODUCTION/BACKGROUND TO THE PROBLEM

The Millennium Development Goal (MDG) of halting and reversing the Tuberculosis (TB) epidemic by 2015 has been achieved. However, the global burden of TB remains enormous. Tuberculosis has claimed an estimated 1.4 million lives, 29% having been Human Immunodeficiency Virus (HIV) infected (WHO, 2016). There were 10.4 million new cases with 56% being males, 34% being females, 10% being children, and 11% being people living with HIV (PLHA) in the year 2015 alone (WHO, 2016).

The End TB strategy goal is to end the global TB epidemic and some of its targets are to reduce the number of TB deaths and TB incidence by 95% and 90% respectively, and to attain a TB treatment success of 90% by the year 2035 (WHO, 2014c).

The Global Plan to Stop TB partnership made a commitment to eliminate TB as a public health problem by 2050 and achieve a global incidence of active TB of less than one case per one million population per year. To achieve this, reinforcing adherence to anti-TB treatment is one of the essential parameters that will decrease the source of TB and at the same time prevent development of drug-resistant TB. One of the components of the Global Plan to Stop TB is the research and development element to develop new tools essential to transform the control of TB, as a basis for its elimination (WHO, 2010b).

In 2015 in Uganda, the TB incidence risk was 202 per 100,000 population including those with HIV associated TB. The incidence risk of multi-drug resistant TB (MDR-TB) in 2015 was 12 per 100,000 for (WHO, 2016). A review of TB treatment default studies in Sub-Saharan African countries including Uganda, Zambia, and Ethiopia by Castelnovo (2014) revealed that the

proportion of TB patients that defaulted anti-TB treatment ranged from 11% to 30%. This contributed to lack of attainment of a treatment success rate of 100% (Castelnuovo, 2010). Various measures to decrease TB infection such as community referral for TB treatment and TB treatment adherence support in basic management units have been provided in various countries (WHO, 2014b).

Uganda's treatment success rate had neither reached nor exceeded 85%, though there had been an improvement from a rate of 73% in 2011 to 77% in 2012, remaining below the global treatment success target (WHO, 2014b). However, currently, Uganda is not listed among the high TB burden countries (WHO, 2016).

Prevention and control of TB is one of the priority services of the Ugandan health sector. Uganda adopted a decentralized model of TB control called Community-based DOTs (CB-DOTs) as a national policy (MOH, 2008). The Uganda national TB control programme adopted the Stop TB and DOTS strategy of detecting 70% of new TB infectious cases, and to successfully treat 85% of them using the DOTs strategy. This has not been achieved due to two key contributors: inadequate health promotion due to lack of strategic communication guidelines; and an environment of HIV/AIDS complicating the management of TB (MOH, 2008). In addition, though the government adopted CB DOTS, there is shortage of medical personnel in many health facilities. Medical personnel have to monitor CB-DOTs implementation in their health facilities' community catchment areas.

Furthermore, part of the six core functions the WHO pursues in addressing TB is developing evidence based policies, strategies and standards for TB prevention, care and control (WHO, 2014c). To achieve part of these core functions, re-enforcing and improving adherence to anti-

TB treatment are important. In TB care, health practitioners must not only prescribe an appropriate anti-TB regimen but must also assess and address poor patient adherence when it occurs so that they (the practitioners) can be able to ensure adherence to the regimen until treatment is completed in order to achieve a desirable treatment outcome (Tuberculosis Coalition for Technical Assistance (TBCTA), 2006). Poor adherence to TB therapy has been found to be one of the major obstacles in the global fight against TB, and there is a need to identify treatment adherence interventions and to test various adherence interventions (WHO, 2010b).

In Uganda, poor adherence to anti TB treatment was revealed to be one of the significant predictors of treatment failure in a retrospective unmatched case control study with an odds ratio (OR) of 14.59 (95% CI 3.04-70.15) in a hospital setting (Namukwaya, Nakwagala, Mulekya, Mayanja-Kizza, & Mugerwa, 2011). Provision of anti-TB drugs in the management of TB in resource limited settings is a very important aspect of TB control. However, the long-term success of anti TB treatment in resource limited settings requires establishing the levels of poor adherence and factors that determine poor adherence to anti TB treatment.

## **PROBLEM STATEMENT**

In order to eliminate TB from the world, effective preventive measures as well as optimal case management is required (WHO, 2008). In order to control TB, the magnitude and core causes of poor treatment outcomes such as poor adherence to treatment need to be known. In Uganda, the treatment success rate of newly diagnosed and relapse TB cases as of 2012 was 77%, remaining less than the set global target of 85% (WHO, 2014b). The causes of this poor treatment outcome have not been adequately investigated or completely addressed.

Poor adherence to anti-TB treatment can lead to treatment failure, MDR-TB, or death (WHO, 2010a). Good adherence is essential for maximum clinical benefit from anti-TB treatment. The level of adherence to anti-TB treatment has not been measured in Tororo district. It is from this insight that we did conduct the study to ascertain the anti-TB treatment poor adherence rate, and the factors associated with poor adherence to anti-TB treatment.

## **AIMS AND OBJECTIVES**

### **Aim**

The aim of the study was to describe adherence levels and explore the factors influencing adherence among persons on anti-TB treatment in Tororo district.

### **Objectives**

- To describe the socio-demographic profiles of persons on anti TB Treatment for at least 2 months in Tororo district.
- To determine the extent of poor adherence to anti-TB treatment among persons on anti TB Treatment for at least 2 months in Tororo district.
- To identify factors that influence TB treatment adherence among persons on anti TB Treatment for at least 2 months in Tororo district.

## **SIGNIFICANCE OF THE STUDY**

The study will provide insight into the level of adherence, and patients and health services factors that result in poor adherence to anti-TB treatment thus contribute to the existing body of

knowledge. The findings of the study will contribute to establishing, revising, or amending strategies and guidelines to improve adherence to anti-TB treatment by addressing the mitigating factors that will be found to be causing poor adherence anti-TB treatment in order to achieve better outcomes of anti-TB treatment.

## **DEFINITION OF KEY TERMS**

The following are definitions of the key concepts used in this study. Please find the full conceptual and operational study definitions in Appendix 1.

### **Adherence**

“Adherence to long-term therapy is defined as the extent to which an individual’s behavior corresponds to a health care provider’s agreed upon recommendations” (WHO, 2003:3).

### **Antiretroviral therapy**

Anti-retroviral therapy involves using drug combinations to treat HIV infection where three or more different classes of antiretroviral drugs are used to stop the HIV multiplication by acting through different stages of the HIV life cycle (WHO, 2006:24).

### **Compliance**

Compliance is the continuous, correct and uninterrupted taking of prescribed medication as directed by the healthcare professional (Ait-Khaled N, Alarcón E, Armengol R, Bissell K, Boillot F, Caminero J A, Chiang C-Y, Clevenbergh P, Dlodlo R, Enarson D A, Enarson P, Fujiwara P I, Harries A D, Heldal E, Hinderaker S G, Lienhardt C, Monedero I, Rieder H L, Rusen I D, Trébucq A, Van Deun , 2010:12).

## **DOTS**

Directly observed treatment, short-course (DOTS) is an international strategy used in the implementation of the basics of TB case-finding and cure. It includes, political commitment, case-detection through quality bacteriology, short-course chemotherapy, adequate drug supply, and comprehensive recording and reporting systems (WHO, 2006b).

## **First-line TB drugs**

First-line TB drugs are the drugs used in the treatment of susceptible TB (WHO, 2010:30) and for this study they are rifampicin, isoniazid, pyrazinamide, ethambutol and streptomycin.

## **Incidence**

Incidence is a measure of the probability of occurrence of a given condition in a population within a specified period of time. Incidence proportion (cumulative incidence) is the number of new cases with a particular condition (which is TB in our study) in a specified period of time per population initially at risk (Rothman, Lash, & Greenland, 2008).

## **Multidrug-resistant tuberculosis (MDR-TB)**

This is tuberculosis caused by organisms that do not respond to or show resistance to at least rifampicin and isoniazid (WHO, 2014a, 2016).

## **Prevalence**

Prevalence is the number of cases with a particular condition per 10,000 or 100,000 population. In this study we used period prevalence which is the number of cases per 100,000 people that had Tuberculosis during a one year period, and includes people who already had the condition at

the start of the study period as well as those who acquired it during that period (Rothman, 2012:53).

### **Rural Uganda**

In this study rural Uganda refers to the remote parts of Uganda accessed only through marram roads where most of the local people are peasants who depend on subsistence farming with limited or no access to hydroelectric power, and limited clean water and health facilities.

### **Tuberculosis (TB)**

Tuberculosis is a chronic infectious disease caused by an organism called *Mycobacterium tuberculosis* or *Mycobacteria bovis*, transmitted through droplet infection when the infected person sneezes or coughs, or through drinking of unpasteurized milk from an infected animal; presenting with clinical features such as cough, chest pain, sputum production, weight loss, fevers and night sweats (Aït-Khaled N, Alarcón E, Armengol R, Bissell K, Boillot F, Caminero J A, Chiang C-Y, Clevenbergh P, Dlodlo R, Enarson D A, Enarson P, Fujiwara P I, Harries A D, Heldal E, Hinderaker S G, Lienhardt C, Monedero I, Rieder H L, Rusen I D, Trébucq A, Van Deun , 2010:5; MOH, 2012:90-91). In Tororo, TB is a chronic infection caused by bacteria with clinical features that include but not limited to chronic cough of two weeks or more, fevers with excessive night sweats, weight loss, and lymph nodes enlargement. A TB diagnosis is confirmed by two sputum ZN stain for alcohol acid fast bacilli (AAFB) or polymerase chain reaction (PCR) Gene xpert test for HIV positive patients (MOH, 2012).

### **SUMMARY OF THE RESEARCH STUDY**

In summary of this research study, the rest of the thesis is outlined as follows:

- **Chapter 2: Literature Review.** Chapter 2 shows a thorough review of the literature related to anti-TB treatment adherence to furnish the researcher on all accessible information or knowledge that is already published and discussed on adherence to anti-TB treatment.
- **Chapter 3: Design and Methodology.** This chapter shows the study design and methodology used to address the research question. It talks about our study design, study settings, study population, sampling, data collection, data collection instrument, data analysis validity and reliability, generalizability, ethical considerations, and scope and limitations of the study.
- **Chapter 4: Results.** Here we have the presentation of our study findings. The results chapter presents the results from the analysis of the factors associated with poor adherence to anti-TB treatment among Patients on anti-TB treatment in Tororo district. Our analysis results include a description of the demographic characteristics of our study participants, followed by univariate and multivariate analysis.
- **Chapter 5: Discussion.** In the discussion, our study findings are related to literature.
- **Chapter 6: Conclusions and recommendations.** Conclusions and recommendations emanating from our study findings are described.

## **CHAPTER TWO: LITERATURE REVIEW**

### **INTRODUCTION**

This literature review focuses on describing adherence levels and exploring the factors influencing adherence among persons on anti-TB treatment. The chapter starts with an overview of the TB and HIV associated TB co-infection status and anti-TB treatment adherence status in Uganda. This is followed by factors affecting adherence to anti-TB treatment.

### **TB AND TB/HIV CO-INFECTION STATUS AND ANTI-TB TREATMENT**

#### **ADHERENCE STATUS IN UGANDA**

According to the 2016 WHO Uganda tuberculosis profile, the mortality of TB in Uganda is 12/100,000 population (excluding HIV+TB) and 17/100,000 population (HIV+TB only). The TB prevalence was found to be 159/100,000 population (including HIV+TB) with an incidence of 161/100,000 population (including HIV+TB) and 73/100,000 population (for HIV+TB only) (WHO, 2016). The proportion of TB with MDR TB was 1.4% for new and 12% for retreatment cases (WHO, 2016). A high proportion of TB patients (100%) know their HIV status and almost half (42%) of these patients are living with HIV and AIDS (WHO, 2016). A review of TB treatment default studies in Sub-Saharan African countries including Uganda, Zambia, and Ethiopia by Castelnuovo (2014), revealed the proportion of patients defaulting Tuberculosis to vary from 11.3% to 29.6% (Castelnuovo, 2010).

The Directly observed therapy shortcourse (DOTS) strategy is the basic package that underpins the Stop TB Strategy and has five components that include government commitment, case detection by sputum smear microscopy, directly observed standardized treatment regimen, a

regular drug supply, and standardized recording and reporting. DOTS is the internationally recommended approach behind the goal of eliminating TB as a public health problem and, ultimately to securing a world free of TB (WHO, 2009). However, we cannot secure a world free of TB if the control measures and specifically in this case, adherence which determines treatment outcome are not addressed.

## **ANTI-TB TREATMENT**

The standardized anti-TB treatment regimens recommended by WHO include five essential medicines designated as “first line”: isoniazid (H), rifampicin (R), pyrazinamide (Z), ethambutol (E) and streptomycin (S). For treatment purposes, patients are categorized as previously untreated and previously treated. All new pulmonary TB patients receive a regimen containing 6 months of rifampicin (2HRZE/4HR or /4HRE where there are high levels of H resistance), with daily dosing or thrice weekly dosing if DOTs; and 2HRZES/1HRZE/5HRE for previously treated patients (WHO, 2002, 2010d).

WHO recommends the use of fixed-dose combinations (FDCs) of drugs for the treatment of all TB patients. Several advantages of FDCs over individual medicines (or single-drug formulations) have been identified and these include a high likelihood of prescription errors being less frequent, and patients having to swallow fewer tablets which may encourage adherence to treatment (WHO, 2002)

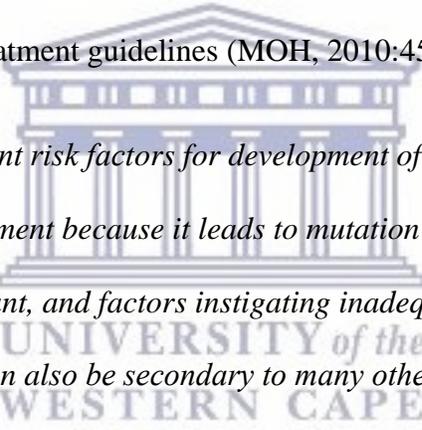
In Uganda, adherence to TB treatment is when a patient takes his/her drugs according to the prescription instructions, following the dosage, number of times, and number of days without missing any sessions until all the medication is completely taken (MOH, 2008). Adherence to TB treatment has been revealed to be the strongest determinant of tuberculosis treatment outcome

(Namukwaya *et al.*, 2011; Rocha, Pereira, Ferreira, & Barros, 2003; WHO, 2010a) and it has also been revealed that poor adherence to TB treatment or suboptimal treatment can result into treatment failure, MDR TB, or death if not addressed (WHO, 2010a).

## **FACTORS AFFECTING ADHERENCE TO ANTI-TB TREATMENT**

As per the Uganda Clinical Guidelines (2010), short course TB treatment regimens are dependent on patient treatment status (first time treatment or re-treatment) and are carried out in phases (initial and continuation phases). Each regimen starts with an initial (intensive) phase of 2-3 months and continuation Phase of 4-6 months depending on the drug combinations used.

According to the Uganda TB treatment guidelines (MOH, 2010:45-46),



*“one of the most important risk factors for development of drug-resistant Tuberculosis is inadequate anti-TB treatment because it leads to mutation in drug-susceptible bacilli making them drug resistant, and factors instigating inadequate anti-TB treatment include poor adherence which can also be secondary to many other factors.”*

There are various factors that can determine adherence to TB treatment and consequently TB treatment outcome. These factors include age, sex, education, TB knowledge, treatment support, supervision of drug taking, alcohol and tobacco use, improvement in treatment, economic support, financial status, cost of treatment, distance from health facility, travel related costs, co-morbid health condition, and partner status. Each of these factors will be discussed in turn below.

## **Age and sex**

Increasing age and male sex may be associated with poor adherence to treatment. A study conducted in Europe revealed increasing age to be associated with poor treatment success among patients on anti-TB treatment (Falzon, Strat, Belghiti, & Infuso, 2005). This is in line with another study in Nigeria that also revealed younger age groups to be associated higher adherence to anti-TB treatment (Anyaike, Musa, Babatunde, Bolarinwa, Durowade & Ajayi, 2013). Likewise, male sex was found to be associated with poor adherence to anti-TB medication in a cross-sectional study conducted in Thailand (Peltzer & Pengpid, 2015).

## **Patient's education**

Patients' education may be associated with good treatment adherence. A cross sectional survey in Nigeria revealed that a high proportion of respondents with no education (19.4%) missed their anti-TB treatment drugs (Anyaike *et al.*, 2013). This concurs with a study in 2012 by Finlay *et al* who also found cases of poor adherence to anti-TB treatment to be more likely to lack education as compared to controls in a retrospective case control study in South Africa (Finlay *et al.*, 2012). In line with this, illiteracy was also found to be associated with poor compliance to directly observed therapy (Gopi, Vasantha, Muniyandi, Chandrasekaran & Balasubramanian, 2007).

## **Patient TB knowledge and consultation of traditional healers**

Inadequate patient TB knowledge and consultation of traditional healers may be associated with poor adherence to anti-TB treatment. The patient's knowledge about TB in terms of treatment, treatment duration, medication side effects and counselling was found to be predictive of

patients' adherence to TB treatment (Clark, Karagoz, Apikoglu-Rabus, & Izzettin, 2007; Tekle, Mariam, & Ali, 2002; Zhou *et al.*, 2012). On the other hand, a case control study in South Africa revealed seeing a traditional healer during anti-TB treatment to be associated with anti-TB treatment default (Finlay Lancaster, Holtz, Weyer, Miranda & van der Walt., 2012).

### **Treatment support**

Treatment support is a likely determinant of good adherence to treatment. Support from treatment supporters and/or family members were found to be crucial factors in determining adherence to TB treatment and treatment success (Tekle *et al.*, 2002). This is also in line with a study conducted in Shandong China by Zhou *et al.* (2012) that revealed divorce or spouse bereavement to be risk factors for non-adherence (Zhou *et al.*, 2012).

### **Forgetfulness and stigma**

Forgetfulness and stigma may be likely causes of poor adherence. An institution based cross sectional survey conducted in north Ethiopia revealed forgetfulness to be a main cause of high rates of non-adherence to anti-TB treatment with adjusted OR of 7.04 (Adane, Alene, Koye, & Zeleke, 2013).

Stigma was found to influence patient's decisions on TB treatment adherence in a cross sectional study in South Africa (Cramm, Finkenflügel, Møller, & Nieboer, 2010).

### **Drug supply and supervision of drug taking**

Inadequate drug supply and non-supervised drug taking may be associated with poor adherence. Shortage of adequate anti TB drug supply was found to be associated with poor adherence to

anti-TB treatment in a cross-sectional study in India (Bagchi, Ambe, & Sathiakumar, 2010). However, though self-supervision by patients was found to have more TB treatment success as compared to directly observed therapy by 6% with a 90% CI of -5.1 – 17.0 in a randomized controlled trial in South Africa (Zwarenstein, Schoeman, Vundule, Lombard, & Tatley, 1998), this was contrary to a study in China which revealed self-supervision to be a risk factor for non-adherence in migrant workers in 12 counties of Shandong (Zhou *et al.*, 2012) and also contrary to another study which also revealed that in remote/poor areas of China, direct observation of TB treatment by health care staff was associated with better adherence to drug therapy (Yao *et al.*, 2011).

### **Alcohol and Tobacco use**

Alcohol and Tobacco use may be associated with poor adherence. TB patients who abuse alcohol were at 4.4 times increased risk of defaulting ATT in an urban primary care clinics in Kampala (Adjusted odds ratio (AOR) of 4.4, (95% CI 1.8–13.5) (Sendagire, Schim Van der Loeff, Kambugu, Konde-Lule, & Cobelens, 2012). Likewise, tobacco use was found to be associated with TB treatment non-adherence in a cross-sectional study in South Africa (Naidoo *et al.*, 2013).

### **Improvement on treatment**

Improvement on anti-TB treatment may be associated with poor adherence. Feeling better was found to be a determinant of failure to comply with TB treatment among TB patients in a cross sectional study in Zambia (Kaona, Tuba, Siziya, & Sikaona, 2004). This was conducted as a household-based survey in six randomly selected catchment areas of Ndola Zambia.

Furthermore, previous non-compliance (a non-modifiable factor) was found to be associated with

non-compliance to anti-tuberculosis treatment in an unmatched case–control study in patients diagnosed with tuberculosis in four Peruvian provinces (Culqui *et al.*, 2012).

### **Economic support, financial status, and cost of treatment**

Economic support low treatment cost and a good financial status may facilitate adherence. This is shown by a qualitative study conducted in Addis-Ababa which revealed that food provision and minimal financial support may facilitate adherence to TB treatment (Gebremariam, Bjune, & Frich, 2011). This is also in line with a qualitative research review in China which revealed cost of treatment to be the most cited reason for TB treatment default (Long, Smith, Zhang, Tang, & Garner, 2011) and also in line with Zhou *et al* (2012) who revealed weak incentives for treatment adherence to be a risk factor for non-adherence in migrant TB patients in Shandong.

Furthermore, poverty was also found to be a significant predictor of TB treatment non-adherence in South Africa (Naidoo *et al.*, 2013).

### **Distance from health facility and travel related costs**

Distance from the health facility and travel related costs may be associated with poor adherence. A Sub-Saharan African articles review by Castelnuovo (2010), revealed distance from the hospital to be a risk factor for defaulting treatment (Castelnuovo, 2010). Also, difficulty in accessing a health facility, change of treatment facility, and change of residence were associated with poor adherence to TB treatment (Gopi *et al.*, 2007; Nuwaha, 1999; Sendagire *et al.*, 2012). Travel-related costs were also significantly associated with non-adherence in newly-diagnosed patients in a cross-sectional study in Mumbai, India (Bagchi *et al.*, 2010). Also, long waiting times for TB related services such as review by a health professional was found to have a

negative impact on patient TB treatment adherence in a study in Ethiopia (Nezenega, Gacho, & Tafere, 2013).

### **Previous anti-TB treatment history**

Previous anti-TB treatment history may be associated with poor adherence. A retrospective case control study in South Africa revealed a history of TB treatment default to be associated with anti-TB treatment default with an adjusted odds ratio of 6 (Finlay *et al.*, 2012).

### **Presence of a co-morbid health condition and partner status**

A co-morbid health condition and partner status may cause poor adherence. According to the WHO Country TB profile for Uganda, 42% of the HIV associated TB (HIV/TB) co-infected patients with known HIV status are positive for HIV and 88% of these are on anti-retroviral therapy (WHO, 2016). HIV infection was found to be a determinant of TB treatment non-adherence in patients treated as outpatients (Rocha *et al.*, 2003). This is in line with a study by Kliiman and Altraja (2009) who revealed HIV infection to be a risk factor for poor treatment outcome in MDR-TB patients (Kliiman & Altraja, 2009). Having one or more co-morbid health conditions and having an HIV positive partner were also found to be associated with poor compliance to TB treatment in a cross-sectional study in South Africa (Naidoo *et al.*, 2013).

### **CONCLUSION**

In this chapter we reviewed literature in which we looked at TB and TB/HIV co-infection status in Uganda, anti-TB treatment adherence status in Uganda, and standardized anti-TB treatment regimens. We also looked at factors affecting adherence to anti-TB treatment which include age, sex, patient's education, patient TB knowledge, consultation of traditional healers, treatment

supporters, supervision of drug taking, alcohol and tobacco use, improvement on treatment, economic support, financial status, cost of treatment, distance from health facility, travel related costs, previous anti-TB treatment history, presence of a co-morbid health condition, & partner status.



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## CHAPTER THREE: STUDY DESIGN AND METHODOLOGY

In this chapter we describe the study design, study settings, study population, sampling, data collection, data collection instrument, data analysis validity and reliability, generalizability, ethical considerations, and conclude with the scope and limitations of the study.

### STUDY DESIGN AND SETTING

A cross-sectional study design was conducted to determine the prevalence of poor adherence in people on anti TB treatment and the factors related to poor adherence among people on anti-TB treatment within Tororo district.

#### Study Setting / Location

This study was conducted in Tororo district. Tororo district is an administrative district located in the Eastern Central region of Uganda, bordering Kenya. The 2015 population estimate of Tororo is 538,000, 50.8% being female by gender. There are two main tribes; the Jopadhola, and the Itesots, and agriculture is the main source of income (UBOS, 2014:110). The providers of TB and/or TB/HIV care and treatment in Tororo include Tororo district government hospital, The Aids Support Organization (a non-governmental organisation), St Anthony's hospital (a private hospital), Mukujju Health Centre, and Nagongera Health Centre. Our study participants were recruited from the three facilities providing anti-TB treatment under government sponsorship. The facilities include Mukujju Health Center, Nagongera Health Center and Tororo District Hospital.

## **STUDY POPULATION AND SAMPLING**

### **Study population**

Our study population was all patients receiving anti-TB treatment from government sponsored health facilities within Tororo district. All the TB patients in Tororo district can receive free anti-TB treatment either from Mukujju Health Center, Nagongera Health Center, or Tororo District Hospital. Sampling was not done since all the patients on anti-TB treatment with in government sponsored health facilities within Tororo were approached for inclusion in the study. A total number of 215 patients on anti-TB treatment for at least 2 months in Tororo district were approached to participate in the study. Of the 215 patients, 200 patients accepted to participate in the study, culminating into a response rate of 93%.

### **Sampling**

There was no sampling as the total study population (the total TB population receiving anti-TB treatment from government sponsored health facilities within Tororo district) was approached to participate in the study.

Thus, all patients who had been on anti-TB treatment for at least 2 months in government sponsored health facilities within Tororo district and were willing or whose parents (in case of children below 18 years) were willing to provide informed consent, were included in the study.

## DATA COLLECTION AND ANALYSIS

### Data collection

Data was collected by two trained research assistants through administering our pretested data instrument (questionnaire). The questionnaire was pretested by administering it to three people who were not included in the main study. The pretesting of the questionnaire informed the researcher of ambiguous and repeated questions thus ambiguous questions were made clear and one of the repeated questions was deleted.

The research assistants were chosen based on their ability to communicate in the local languages in Tororo in addition to English, their knowledge of data collection, and their experience of the cultures of the target population. The research assistants were fluent in English, Swahili, and either Ateso or Jopadhola.

The questionnaires were translated to Swahili and retranslated back to English by another party to ensure that their meaning was retained. The questionnaires were administered in the TB clinic areas within the campuses of the three public health facilities (Two health facilities and one hospital). The questionnaires were administered as the patients (study participants) were waiting for their TB services such as anti-TB drug refills.

The data collection process started with explaining the study to the patients or caretakers in case of children below 18 years of age. Those who accepted to participate were moved away from the rest of the patients to a private place where no one else could hear the proceedings within or outside the TB clinic area. Patients were provided an information sheet which they read through followed by a detailed explanation of the purpose of the study, and were later asked to provide

informed consent before administration of the questionnaire commenced. Each participant was issued a unique study number which also appeared on their informed consent forms together with their names. Only participants' unique study numbers were recorded on the questionnaires. No names were recorded on the questionnaires. A copy of the informed consent form was retained in a lockable cabin for reference. A list of prospective participants was provided by the health facilities' officers in charge of anti-TB treatment. A checklist was developed to track who had already been interviewed and who had not yet been interviewed to prevent duplication. The chief researcher did not administer questionnaires but double checked completeness of questionnaires completed by the research assistants.

### **The data collection instrument**

We used a questionnaire as our data collection instrument to collect data from our study participants. The questionnaire was developed using the objectives of the study. Our data collection instrument was divided into six sections as listed below.

- Section 100: General Information (Demographic and socioeconomic information).
- Section 200: Access to information on TB
- Section 300: Adherence factors
- Section 400: Barriers to Adherence
- Section 500: Perspective on benefits and/or costs of TB treatment
- Section 600: Beliefs and myths about TB

## Data analysis

In this study, data was captured by the research assistants using Epi Info version 3.5.1. Data was then exported into and analyzed by the researcher using Microsoft Excel version 2010 for demographic and univariate analysis. We used Stata version 10.1 for bivariate analysis using the chi-square test and multivariate analysis using logistic regression (interactive expansive logistic regression).

We graded participants who had history of missing one or more prescribed doses by the proportion of medication they swallowed in the last two weeks prior to the interview. We considered participants who had swallowed up to or more than 95% of their medication in the last two weeks prior to the interview as adherent to their anti-TB treatment. We considered participants who had swallowed less than 95% of their medication in the last two weeks prior to the interview as poorly adherent to their anti-TB treatment.

We used measures of central tendency and measures of dispersion to describe the study variables. We used the Chi-square test to ascertain the difference in the various independent variables' anti-TB treatment adherent and poorly adherent proportions. We used interactive expansive logistic regression to ascertain the associations between adherence to anti-TB treatment and the different categories or levels of the various independent variables whose anti-TB treatment adherent and poorly adherent proportions were found to be significantly different after univariate analysis.

For statistical significance, we set and used the 5% level of significance as cut off. To describe and present the results, we used bar charts, pie charts, and tables.

## **VALIDITY AND RELIABILITY**

### **Validity**

Polit and Beck define validity as “*the expression of the degree to which a test is capable of measuring what it is intended to measure*” (Polit & Beck, 2008:768). Polit & Beck (2008) identify internal and external validity where internal validity is the degree to which the results of an observation are correct for the particular group of people being studied and external validity is the extent to which the results of a study apply to people not in it. We enhanced internal validity by using a cross sectional survey design which was the most appropriate design for our study purpose, we used a data collection tool that was pretested and adapted to our study, we complied with and observed our study protocols, and also ensured that our data collectors were not pre-exposed to the study area. External validity was ensured through carrying out a total population study which included all patients on TB treatment for at least 2 months in 3 different facilities in Tororo district (Tororo district government hospital, Mukujju health center, and Nagongera health center). This also increased the study statistical power and generalizability (Polit & Beck, 2008). In addition, the research assistants were trained on administering the questionnaires.

### **Reliability**

Polit and Beck define reliability as “*the degree of consistence or dependability with which an instrument measures an attribute*” (Polit & Beck, 2008:764). To enhance reliability of our study data collection tool (questionnaire), it was pre-tested and adapted to our study. We also enhanced reliability by training research assistants on how to use the tool. To further ensure reliability, after translation of the questionnaires to Swahili, we had the questionnaire retranslated back to English by another party to check whether the meaning remained the same.

## **GENERALIZABILITY**

The study results are not generalizable to the whole country, but can be generalizable to people similar to our study participants and from settings similar to our study participants' settings in Uganda or elsewhere in the world.

## **ETHICAL CONSIDERATIONS**

Ethics approval to undertake this study was granted by the University of the Western Cape Ethics Committee. Permission to collect data from patients in the three facilities Mukujju health center, Nagongera health center and Tororo hospital was granted by the Tororo District Local Government District Health Office. Participation was voluntary without any form of coercion. Information sheets explaining the study details, benefits, the study's voluntary nature, and assurance of confidentiality and privacy were availed to the study participants in both English and Swahili and were explained further by the research assistants. Informed consent was sought and signed by patients who accepted to participate in the study. For minors (children below 18 years of age), consent was signed by their parents.

Confidentiality and anonymity were enhanced by administering the questionnaire to one patient at a time in a private area and in the absence of other participants. The identities of all participants were kept secret by using codes instead of participants' names, and all collected information was stored privately in a lockable cabinet. Participants who would have developed psychological or emotional harm would be referred to the health counsellor for assistance. Each participant was informed of his/her free will to withdraw from the study at any stage and no repercussion or consequence such with-holding TB care and treatment services would occur to him/her. The names

of the health facilities were not kept confidential because they are known to be providing TB services within the district.

### **SCOPE AND LIMITATIONS OF THE STUDY**

We had some time and resource limitations but these did not affect the quality of our study. The opinions of health workers were not explored in this research study which could have added to the perspectives on anti-TB treatment.



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## CHAPTER FOUR: RESULTS

In this chapter the results from the analysis of the factors associated with poor adherence to anti-TB treatment in Tororo district is presented. The chapter starts with a description of the demographic characteristics of our study participants, followed by univariate and multivariate analysis. The study sample comprised 215 patients from the 3 health facilities with TB and 200 (93%) were included in the final sample. The majority of the participants (53%) were recruited from Tororo District Hospital followed by Mukujju Health Center (30%) and the least number were from Nagongera Health Center (17%).

### DEMOGRAPHIC CHARACTERISTICS

In this section of the results, the demographic characteristics including age, gender, marital status, household status, education level, occupation, type of water supply, and household electricity of the study sample are presented.

#### Age, gender and household status

The majority (74%) of the study participants were more than 45 years old and majority (60%) were female. The majority of the study participants (64%) were heads of their households, and the majority (62%) were married with only 0.5% cohabiting.

#### Employment and education

Most (80 – 40%) of our study participants attended secondary school education and 42 – 21% did not attend any education (Figure 1).

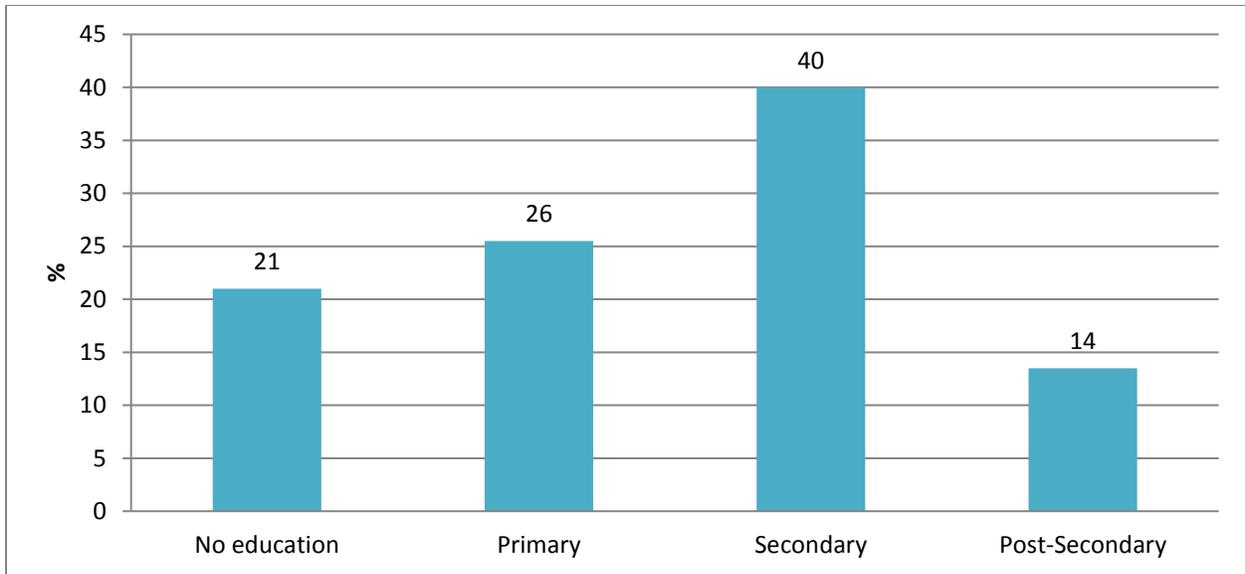


Figure 1: Education Level of TB patients on anti-TB treatment in Tororo District, 2016 (N=200).

Most of the participants 92 – 46% were self-employed and only 9 – 4.5% were laborers (Figure 2).

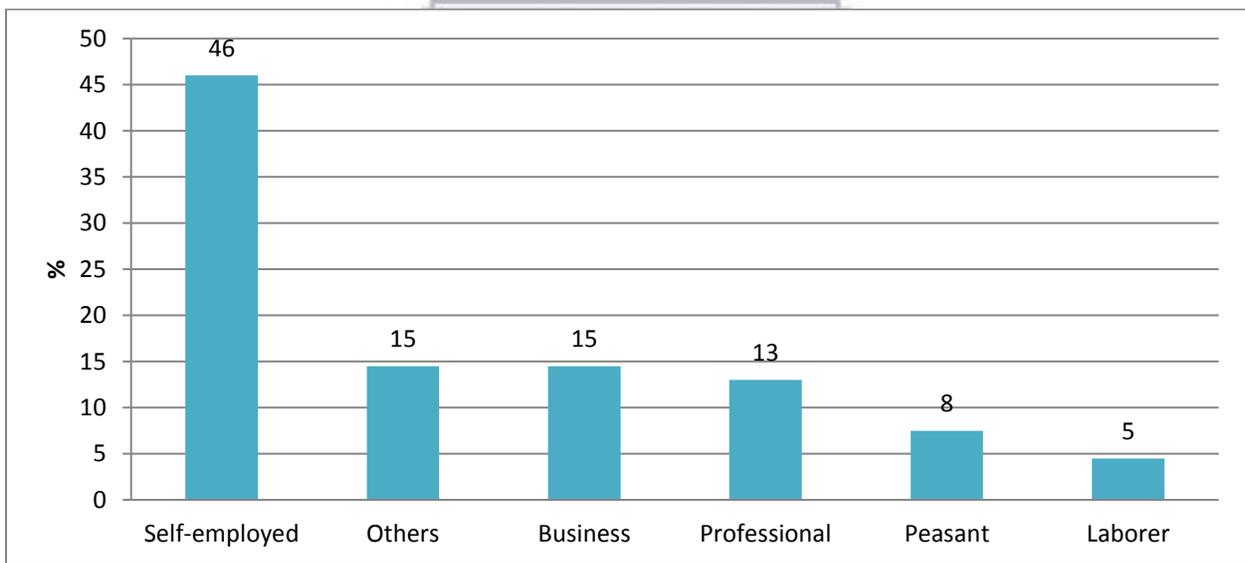


Figure 2: Occupation of TB patients on anti-TB treatment in Tororo District, 2016 (N=200).

## **Environmental Characteristics**

Environmental characteristics of our study participants include type of water source, electricity supply, and living arrangements in terms of number of people participants live with, and number of rooms in the house.

The majority (127 – 63.5%) of the study participants used bore holes as their water supply and only 2 – 1% used other types of water supply (Figure 3). The majority (135 – 67.5%) of the study participants, had no electricity supply in their houses.

The majority of the study participants (180 – 90.5%) lived alone, 11 – 5.5% lived with family, only 1 – 0.5% lived with friends and 7 – 3.5% lived with other people. The majority (88 – 44.4%) of our study participants lived in houses with more than 3 bedrooms, 67 – 33.3% lived in 3-bedroom houses, 43 – 21.7% lived in 2-bedroomed houses, and none lived in a one bedroom house. The majority (106 – 53.5%) of our study participants lived in a house of 4 – 6 people, 52 – 26.3% lived in a house of less than or equal to 3 people, 30 – 15.2% lived in a house of 7 – 9 people and 10 – 5.1% lived in a house of 10 or more people including themselves.

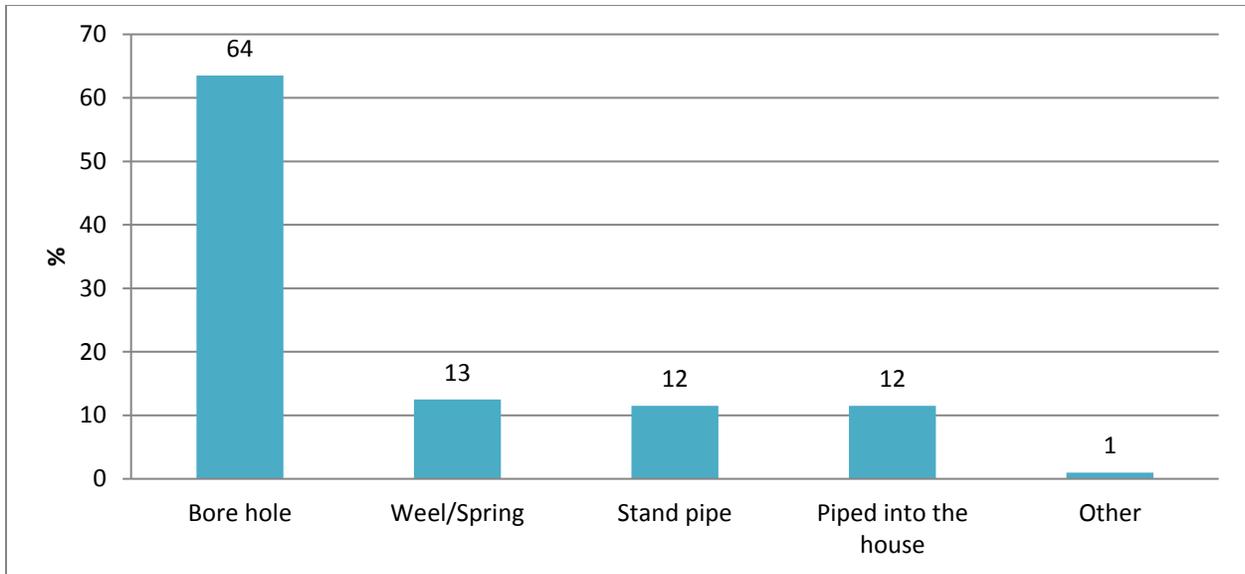


Figure 3: Type of water supply of TB patients on anti-TB treatment in Tororo District, 2016 (N=200).



## **UNIVARIATE ANALYSIS**

We conducted univariate analysis on TB disclosure and HIV AIDS status, social economic factors, source of information on TB, adherence related factors, barriers to adherence, and beliefs and myths about TB. We used bar charts, pie graphs, and frequency tables to summarize and display the analysis results.

### **Social economic factors**

The majority of the participants (157 – 78.5%) were permanent residents of Tororo district and the rest were temporary residents. Less than half of our study participants (81 – 40.5%) disclosed their average monthly income whose average was Uganda shillings (UGX) 222,035 with a standard deviation of Uganda shillings 229,512 and a range of Uganda shillings 5,000 to 1,400,000. The majority of those who disclosed their monthly income (53 – 65.4%) were earning UGX 0 – 200,000, 22 – 27.2% were earning UGX 200,000 – 500,000 and only 6 – 7.4% were earning UGX 500,000 to 1,500,000.

### **Substance use**

The majority of the participants (129 – 64.5%) never drank alcohol, only 1 – 0.5% drank more than 3 drinks a day, 5 – 2.5% drank less than 3 drinks a day, and 9 – 4.5% of the participants drank less than 5 drinks a week. Majority of the participants (180 – 90%) never smoked cigarettes, 16 – 8% occasionally smoked cigarettes, 3 – 1.5% regularly smoked less than 5 cigarettes a week, and only 1 – 0.5% regularly smoked more than 5 cigarettes a day. Except one participant who regularly smoked more than five cigarettes of marijuana a day, all other study participants never smoked Marijuana and none of our study participants used Cocaine.

## **Sources of information**

The majority of the participants (144 – 72%) received their information from health care workers followed by media (36 – 18%), relatives (10 – 5%), friends (5 – 2.5%) and others (4 – 2%). The least information source used by the participants was the TASO drama group with only (1 – 0.5%) person reporting. The majority of the participants (181 – 90.5%) preferred information from health care workers followed by media (8 – 4%), relatives (3 – 1.5%), friends (2 – 1%), TASO drama group (2 – 1%), and others (4 – 2%). Most of the participants (89 – 44.5%) other preferred choice of information was media followed by relatives (46 – 23%), friends (40 – 20%), TASO drama group (14 – 7%), others (9 – 4.5%) and only 2 – 1% was booklets.

The majority of our study participants (161 – 80.5%) have ever attended a TB awareness campaign and the rest have never. Among participants who attended awareness campaigns, Ministry of Health (MoH) Uganda provided TB awareness to 41 – 25.6% of the participants, NGOs provided to 12 – 7.7%, TASO drama group provided to 87 – 53.9%, and others provided to 21 – 12.8%.

## **TB, HIV and AIDS disclosure status**

The majority of the participants (185 – 92.7%) had disclosed their TB status to someone and the rest did not. The majority of the participants (193 – 96.5%) knew their HIV status. Among participants who knew their HIV status, the majority 129 – 67.2% were HIV negative, 60 – 31.3% were HIV positive, and 3 – 1.5% did not want to disclose their HIV status (Figure 6). The majority of the the participants (59 – 98.3%) who were HIV positive were also on anti-retroviral drugs (ART), and of these 19 – 32% were poorly adherent to anti-TB treatment.

## ADHERENCE TO ANTI-TB TREATMENT

In this section are univariate analysis results of various factors that include current anti-TB treatment, duration on anti-TB treatment, anti-TB treatment adherence status, reasons for missing doses, barriers to adherence, previous TB treatment, previous anti-TB treatment outcome, barriers to accessing drugs, barriers to taking medication, perspectives on TB, and knowledge beliefs and myths about TB.

### Current anti-TB treatment regimen and duration on anti-TB treatment

The majority of the study participants (146 – 73%) were on 2HERZ/4HR or 2HERZ/6HE, 31 – 15.5% were on the pediatric regimen (2HRZ/4HR), 20 – 10% were on 2SHERZ/1HERZ/5HER (retreatment regimen), and 2 – 1.0% were on other regimens which were both 2HERZ/10RH (Figure 4).

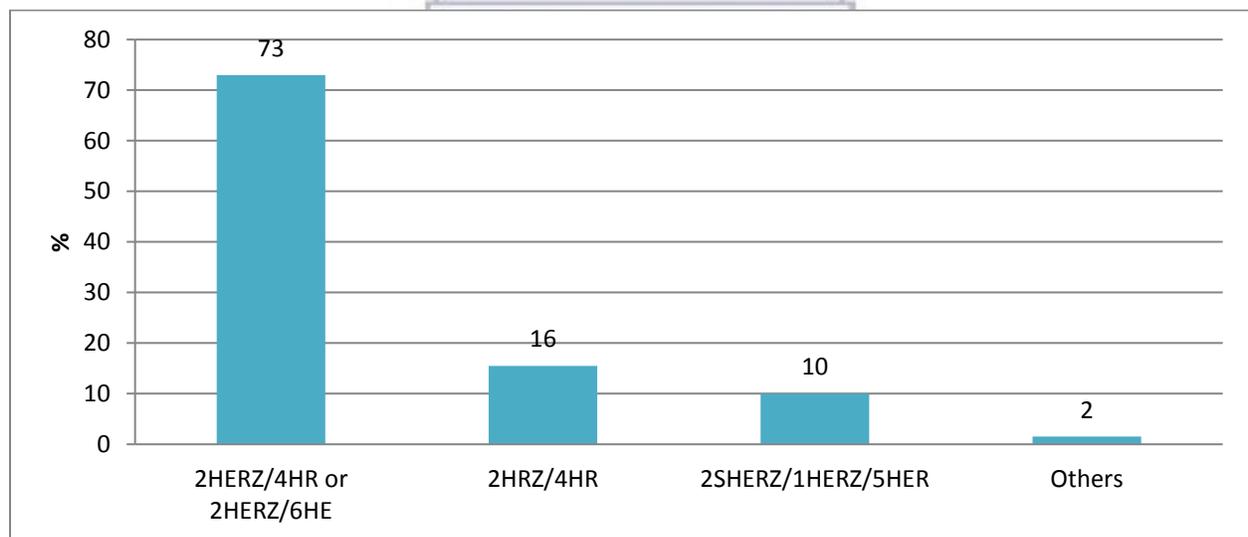


Figure 4: Current anti-TB treatment regimen of TB patients on anti-TB treatment in Tororo District, 2016 (N=200).

Most of our study participants (76 – 38%) had swallowed their anti-TB drugs for 2 months and up to 71 – 35.5% had swallowed for more than 4 months (Figure 5).

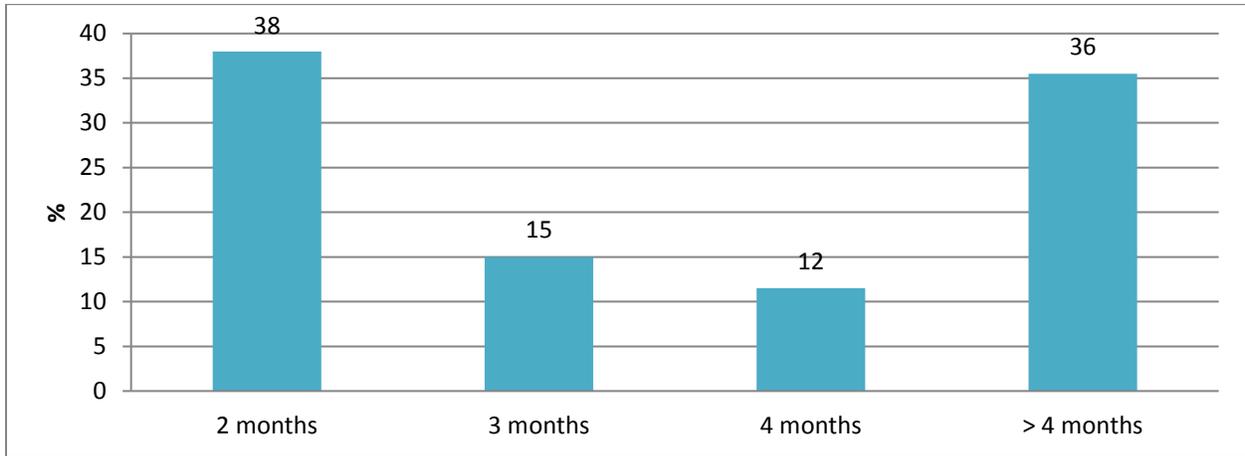


Figure 5: Duration on anti-TB treatment of TB patients on anti-TB treatment in Tororo District, 2016 (N=200).

Most of the participants (73 - 36.5%) swallowed 14 tablets a week, 67 - 33.5% swallowed 21 tablets per week, 59 - 29.5% swallowed 28 tablets per week, and only 1 (0.5%) of the participants swallowed 35 tablets per week.

For the majority of our study participants (165 – 82.5%), drug taking was monitored by someone. Most of the participants (87 – 43.5%) were monitored by their spouses, 38 - 19% were monitored by their mothers, 8 - 4% by their friends, 11 - 5.5% by their fathers, 6 - 3% by their siblings, 15 - 7.5% by others and 35 - 17.5% were not monitored.

The majority of our study participants (180 - 90%), were not taking additional drugs apart from HIV drugs and rest did (Figure 9). The diseases that other drugs other than ARVs were taken for included Diabetes (1 participant), Hypertension (4 participants), and others (14 participants [who included Asthma, Malaria, Typhoid, Gastric ulcers, and a sexually transmitted infections]).

### **Anti-TB treatment adherence status**

Nearly two thirds of the participants (131 – 65%) were found to be adherent to their anti-TB treatment (Figure 6).

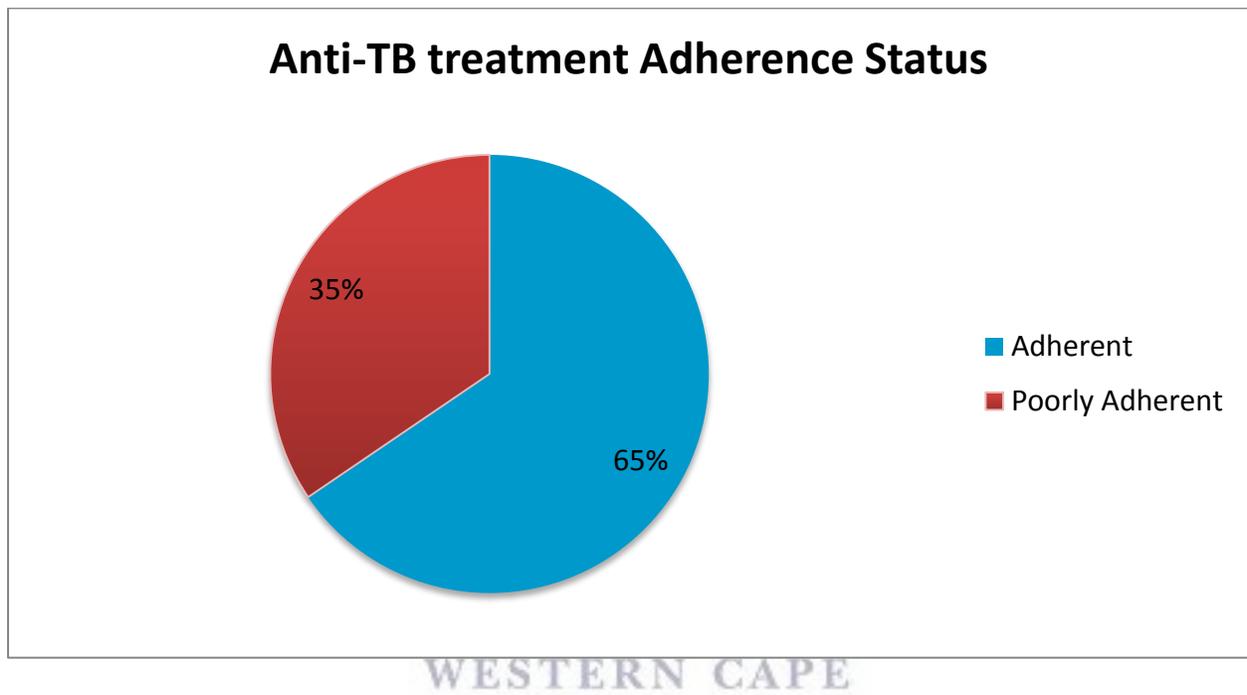


Figure 6: Anti-TB treatment adherence status of TB patients on anti-TB treatment in Tororo District, 2016 (N=200).

### **Reasons for missing medication**

Multiple reasons caused some participants to miss their drugs. Clinical reasons were cited by 87% of the participants who missed their medication, and situation at home was cited by only 30% of the participants who missed their medication (Figure 7).

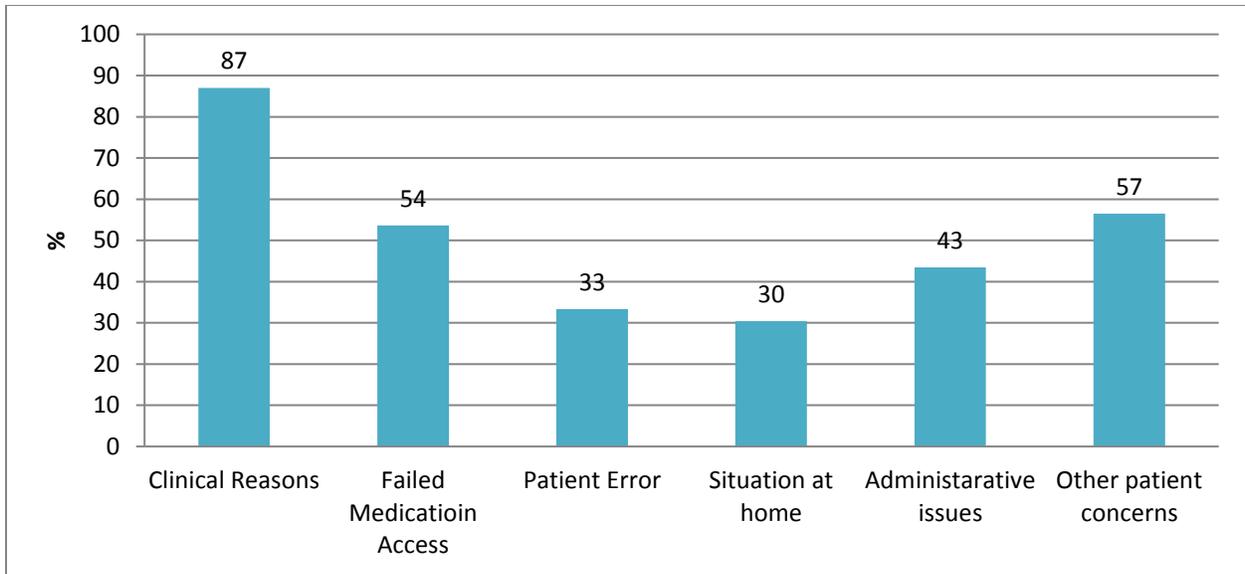
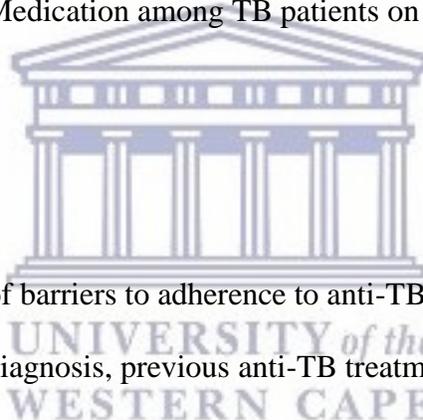


Figure 7: Reasons for Missing Medication among TB patients on anti-TB treatment in Tororo District, 2016 (N=69).



### **Barriers to Adherence**

The univariate analysis results of barriers to adherence to anti-TB treatment are as below. These include results of previous TB diagnosis, previous anti-TB treatment outcome, barriers to accessing drugs, perspectives on anti-TB treatment, and barriers to taking medication.

### **Previous TB Diagnosis**

The majority of the study participants, (182 – 91%) had never been diagnosed with TB before, 15 – 7.5% have ever been diagnosed with TB once before and 3 – 1.5% have ever been diagnosed with TB twice or more before.

### **Previous anti-TB Treatment Outcome**

The majority of our participants who received treatment before (28 – 53%) did not complete their treatment before. The reasons for not completing treatment included having to swallow too many pills (28%), pill taking length (8%), fear of getting anti-TB drugs side effects (24%), if participant vomits pills (8%), fear of people finding out (4%) and others ( $N=169$ ).

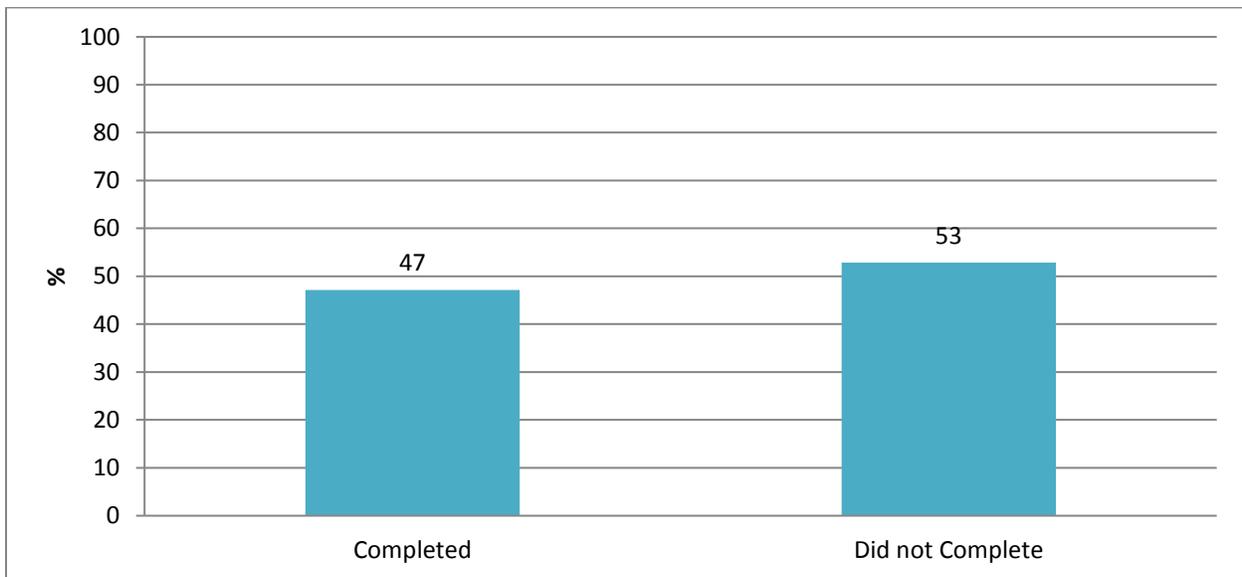


Figure 8: Previous anti-TB Treatment Outcomes of TB patients on anti-TB re-treatment in Tororo District, 2016 ( $N=25$ ).

### Barriers to Accessing Drugs

Most of the study participants (80 – 40%) lived 2 – 4 kilometers from their TB treatment facility, most (85 – 43.1%) took averagely 30 – 60 minutes to pick their medication, majority 165 – 82.5% required time off to pick their drugs, most (106 – 53%) used motor cycles as their travel means to pick their drugs, and majority (145 – 72.9%) had to pay for transport to pick their drugs (Table1).

Table 1: Barrier to accessing drugs among TB patients on anti-TB treatment in Tororo District, 2016

<b>Barrier to accessing drugs</b>	<b>Degree of barrier to accessing drugs</b>	<b>Number (%)</b>
<b>Distance between hospital and home</b>	< 2 km	44(22%)
	2 – 4 km	80(40%)
	4 – 6 km	45(23%)
	6 – 8 km	12(6%)
	8 – 10 km	4(2%)
	> 10 km	15 (8%)
	Total	200
<b>Average time to move to and back from the hospital</b>	<30 minutes	51(26%)
	30 – 60 minutes	85(43%)
	60 – 90 minutes	37(19%)
	90 – 120 minutes	10(5%)
	>120 minutes, Specify	14(7%)
	Total	197
<b>Time off to pick drugs</b>	No need to take off time to pick my drugs	35(18%)
	Need to take off time to pick my drugs	165(83%)
	Total	200
<b>Travel means to pick drugs</b>	Bicycle	23(12%)
	Car	16 (8%)

	Mini-Bus	8(4%)
	Motor cycle	106(53%)
	Walk	47(24%)
	Total	200
<b>Having to pay transport</b>	No	54(27%)
	Yes	145(73%)
	Total	199

### Barriers to Taking Medication

Almost all our study participants (193 – 98.5%) did not have history of any Psychiatric illness, 170 – 85.4% had no history of difficulties in swallowing their drugs, and 152 – 77% did not have history of feeling stigmatized because of TB. The majority of our study participants (115 – 58%) did experience a side effect of anti-TB treatment.

Most of the study participants 57 – 28.5% would most likely want to quit their anti TB treatment because of too many pills and only 19 - 9.5% would want to quit because of pill taking length (Figure 9).

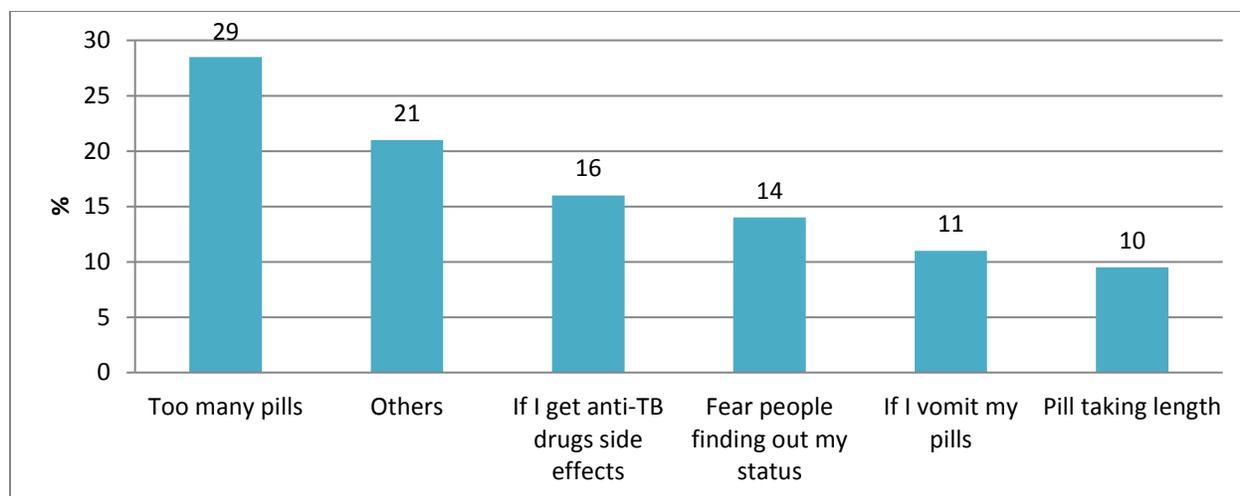


Figure 9: Reasons to quit anti-TB medication among TB patients on anti-TB treatment in Tororo District, 2016 (N=200).

### Perspectives on TB

Here are the results of the perspectives on stopping anti-TB drugs, perspectives on taking drugs as prescribed, perspectives on benefits or costs of TB treatment, and perspectives on TB acquisition.



### Perspectives on stopping anti-TB drugs

The majority of the participants (166 – 83%) thought that they can feel worse or TB could worsen if they stopped swallowing their anti-TB drugs and only 1 – 0.5% thought nothing would happen (Figure 10).

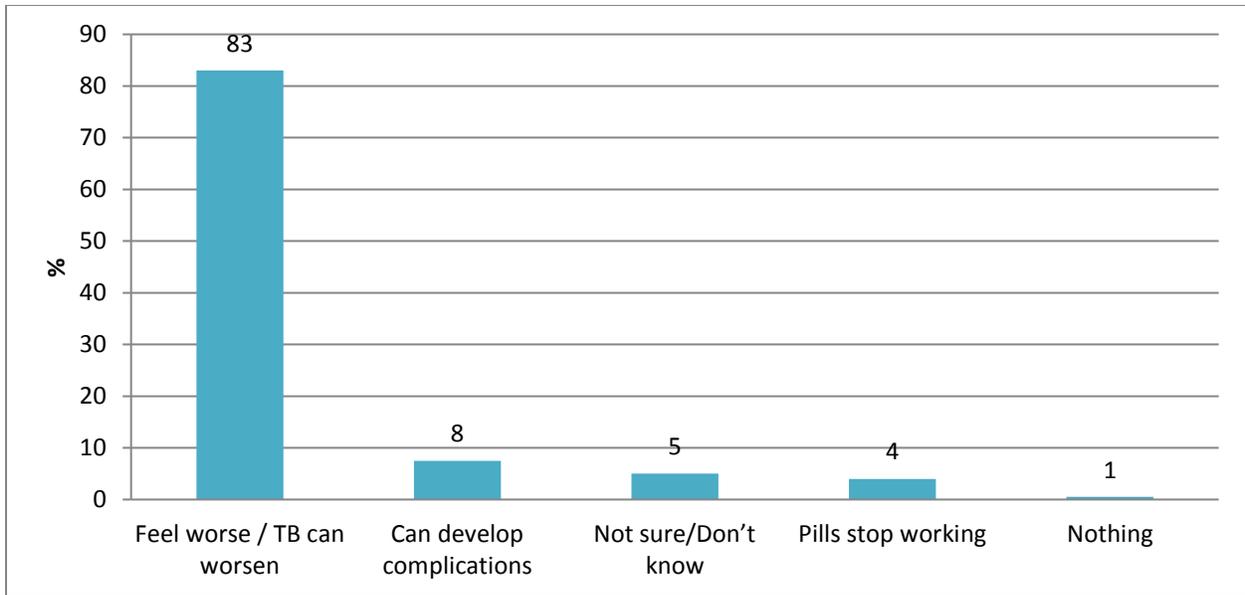
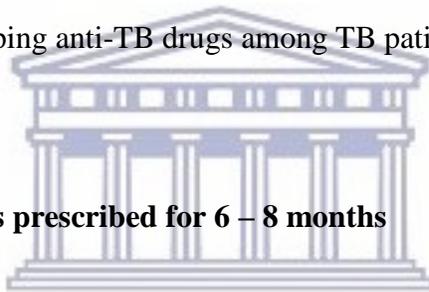


Figure 10: Perspectives on stopping anti-TB drugs among TB patients on anti-TB treatment in Tororo District, 2016



**Perspective on taking drugs as prescribed for 6 – 8 months**

As per the perspective on taking drugs as prescribed for 6 – 8 months, the majority of the participants, 195 – 97.5% admitted that they would take drugs as prescribed (Figure 11).

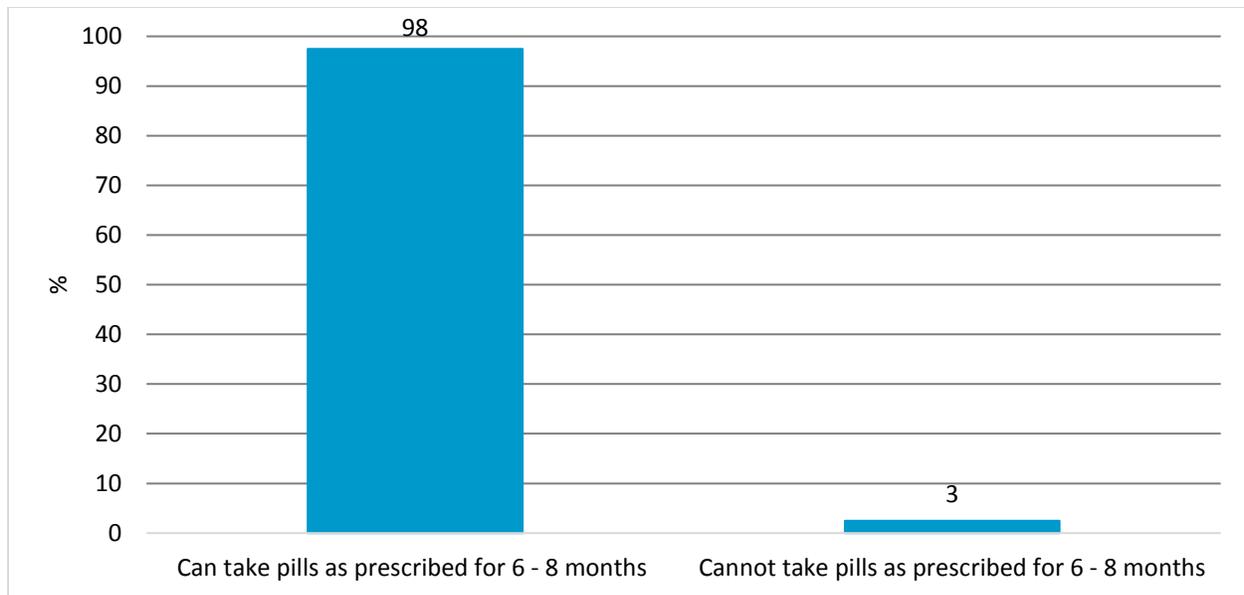


Figure 11: Perspective on ramifications if anti-TB drugs are stopped among TB patients on anti-TB treatment in Tororo District, 2016 (N=200).

### Perspective on the benefits and/or costs of TB treatment

Most of the participants strongly agreed with almost all of the positive perspectives on benefits and/or costs of TB treatment in our study (Table 2).

Table 2: Perspective on the benefits and/or costs of TB treatment among TB patients on anti-TB treatment in Tororo District, 2016

Perspectives on benefits and/or costs of TB treatment	Strongly agree	Agree	Don't know	Disagree
Taking anti-TB drugs outweigh any difficulties.	72(36%)	124(62%)	2(1%)	2(1%)
Taking anti-TB drugs is too cumbersome	108(54%)	81(40.5%)	3(1.5%)	8(4%)

Taking anti-TB drugs is better than not taking them.	134(66.8%)	62(70%)	1(0.5%)	4(2%)
Taking anti-TB drugs will help me be healthy.	143(71.5%)	56(28%)	1(0.5%)	0(0%)
No improvement if treatment plan is not followed.	133(66.5%)	59(29.5%)	5(2.5%)	3(1.5%)
TB is life threatening.	144(72%)	51(25.5%)	5(2.5%)	0(0%)
TB can worsen HIV/AIDS.	107(53.5%)	57(28.5%)	35(17.5%)	1(0.5%)
Taking drugs poorly can lead to TB complications	143(71.5%)	51(25.5%)	6(3%)	0(0%)



**Perspectives on how participants acquired TB**

The majority (124 – 62.0%) of the participants thought TB is acquired through cough of a case, and almost a third of the participants did not know how TB is acquired (Figure 12).

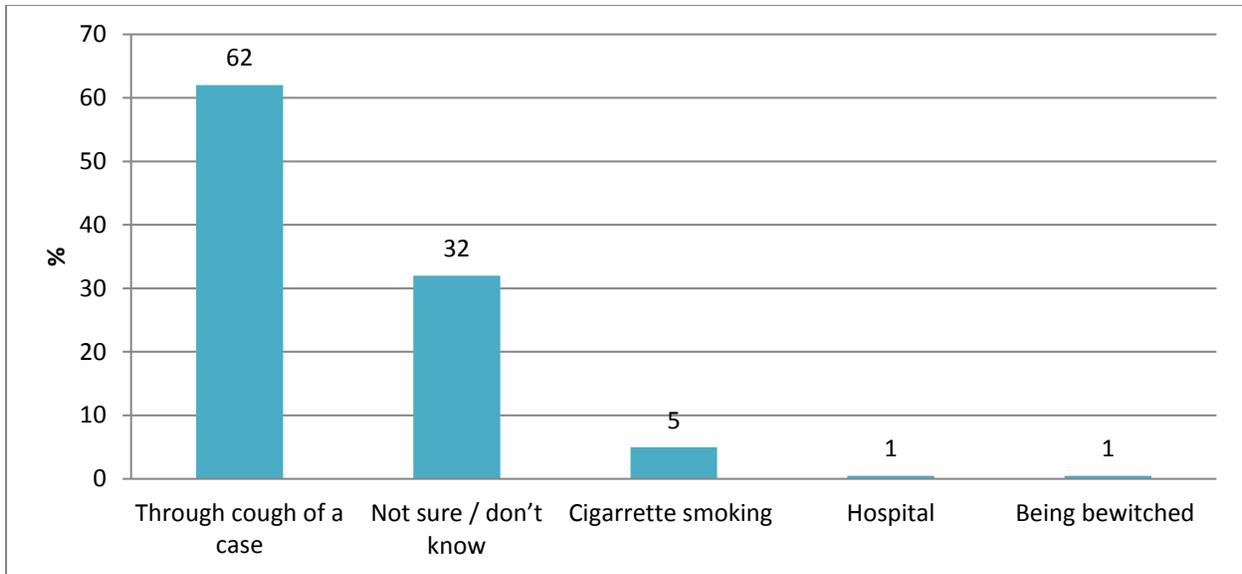


Figure 12: Perspectives on TB acquisition among TB patients on anti-TB treatment in Tororo District, 2016 (N=200).

### Knowledge, beliefs and myths about TB

The majority of the participants were well knowledgeable on beliefs and myths about TB and anti-TB treatment (Table 3).

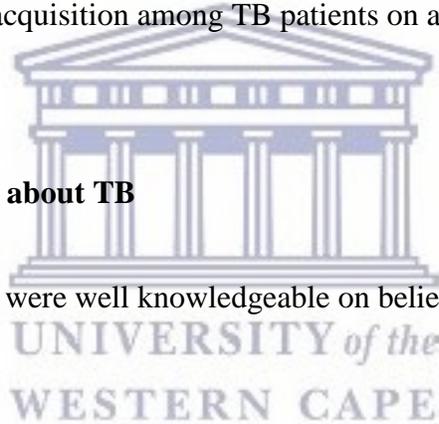
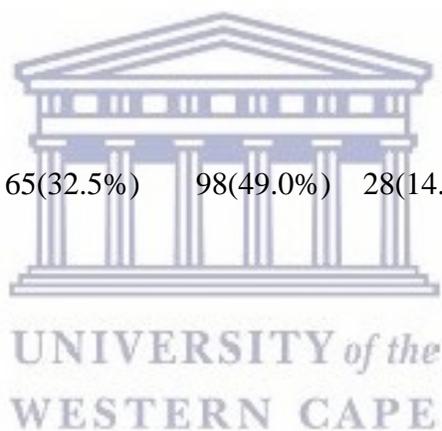


Table 3: Knowledge and beliefs about TB among TB patients on anti-TB treatment in Tororo District, 2016

Knowledge, beliefs and myths about TB	Strongly agree	Agree	Don't Know	Disagree	Strongly Disagree
<b>Traditional healers can help heal TB.</b>	4(2.0%)	8(4.0%)	28(14.0%)	55(27.5%)	105(52.5%)

<b>TB can cure without completing anti-TB treatment.</b>	10(5.0%)	3(1.5%)	4(2.0%)	72(36.2%)	111(55.3%)
<b>TB can be transmitted through the air</b>	83(41.5%)	85(42.5%)	23(11.5%)	8(4.0%)	1(0.5%)
<b>Congestion and poor circulation increase TB transmission</b>	65(32.5%)	93(46.5%)	33(16.5%)	8(4.0%)	1(0.5%)
<b>Completing anti-TB treatment is vital for TB cure</b>	97(48.5%)	91(45.5%)	8(4.0%)	4(2.0%)	0(0.0%)
<b>After initial two weeks of regularly swallowing anti-TB drugs, TB transmission to family decreases</b>	65(32.5%)	98(49.0%)	28(14.0%)	7(3.5%)	2(1.0%)
<b>I have to swallow anti-TB drugs for 6 or 8 months</b>	142(71.0%)	49(24.5%)	3(1.5%)	1(0.5%)	4(2.0%)
<b>Timing of doses medication influences effectiveness</b>	103(51.3%)	81(40.7%)	5(2.5%)	8(4.0%)	3(1.5%)



**Incorrect swallowing of  
drugs can ruin treatment  
outcome**      108(54.0%)    81(40.5%)    3(1.5%)    2(1.0%)    6(3.0%)



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## **BIVARIATE ANALYSIS**

### **Bivariate (Chi square test) Results**

We conducted bivariate analysis of various factors that we presumed to be associated with poor adherence to anti-TB treatment by anti-TB treatment status. Among these factors are demographic factors, social economic factors, factors related to source of information on TB, adherence related factors, barriers to adherence factors, and factors related to beliefs and myths about TB. We used the Chi-square test. The results are displayed in two by two tables and a p-value of 0.05 was used to decide significance of the factors depending on results. The bivariate analysis results of the factors presumed to be associated with poor adherence to anti-TB treatment are shown below.

#### **Demographic factors**

Results of bivariate analysis of various demographic factors by anti TB treatment status are shown below displayed in two by two tables, summarized in percentages with p-values.

#### **Age by sex and anti-TB treatment adherence status**

Most of the poorly adherent participants (14 – 74%) were more than 45 years old and were female (Table 4).

Table 4: Age and gender of TB patients on anti-TB treatment by adherence status in Tororo District, 2016

Age group	Adherent by gender N (%)		Poorly Adherent by gender N (%)	
	Female	Male	Female	Male
<18 Years	3(38%)	5(63%)	1(33%)	2(67%)
18-25 Years	16(55%)	13(45%)	7(50%)	7(50%)
26-35 Years	14(61%)	9(39%)	9(50%)	9(50%)
36-45 Years	22(67%)	11(33%)	8(53%)	7(47%)
> 45 Years	27(71%)	11(29%)	14(74%)	5(26%)
<b>Total</b>	<b>82(63%)</b>	<b>49(37%)</b>	<b>39(57%)</b>	<b>30(43%)</b>

### Marital status, household status, type of water source, and occupation by anti-TB treatment adherence status

Marital status, household status, type of water source, and occupation were not found significant with p-values of 0.187, 0.588, 0.862, and 0.135 respectively.

### Education level by anti-TB treatment adherence status

Among the participants who attended secondary education, 23(29%) were poorly adherent to anti TB treatment and participants who did not attend any education, only 15 (36%) were poorly adherent to anti TB treatment. This had no significant difference to the adherent group with a p-value of 0.539 (Table 5).

Table 5: Education level by anti-TB treatment adherence status among TB patients on anti-TB treatment in Tororo District, 2016

<b>Education level</b>	<b>Adherent <i>N</i> (%)</b>	<b>Poorly adherent <i>N</i> (%)</b>	<b>Total</b>
No education	27(64%)	15(36%)	42
Primary	31(61%)	20(39%)	51
Secondary	57(71%)	23(29%)	80
Post-Secondary	16(59%)	11(41%)	27
<b>Total</b>			<b>200</b>

Pearson  $\chi^2(3) = 2.1651$  Pr = 0.539

### **Presence of electricity in the house by anti-TB treatment adherence status**

Among the participants who had electrical supply in the house, 30 – 46% were poorly adherent.

This was a significant difference from the adherent group with a p-value of 0.016 (Table 6).

Table 6 : House hold electricity by anti-TB treatment adherence status among TB patients on anti-TB treatment in Tororo District, 2016

<b>House hold electricity</b>	<b>Adherent <i>N</i> (%)</b>	<b>Poorly adherent <i>N</i> (%)</b>	<b>Total</b>
<b>Yes</b>	35(54%)	30(46%)	<b>65</b>
<b>No</b>	96(71%)	39(29%)	<b>135</b>
<b>Total</b>			<b>200</b>

Pearson  $\chi^2(1) = 5.7875$  Pr = 0.016

### **Social economic factors by anti-TB treatment adherence status**

Results of bivariate analysis of various socio-economic factors by anti TB treatment status are shown below displayed in two by two tables, and summarized by percentages with p-values.

### **Residence status in Tororo district by anti-TB treatment adherence status**

Among the considerable number of the participants who were permanent residents in Tororo district, 58 – 37% were poorly adherent to anti-TB treatment. This was not significant with a p-value of 0.165.

### **Knowledge of HIV status, HIV status and TB status disclosure by anti-TB treatment adherence status**

More than half of the participants who did not want to disclose their HIV status, 2 – 67% were poorly adherent to treatment, an insignificant difference from the adherent group with a p-value 0.440. A bigger proportion of participants who revealed their TB status to their fathers (14 – 54%) were poorly adherent to their anti-TB treatment, an insignificant difference from the adherent group with a p-value 0.180 (Table 7).

Table 7: Knowledge of HIV status, HIV status disclosure, and TB status disclosure by anti-TB treatment adherence status among TB patients on anti-TB treatment in Tororo District, 2016

<b>Knowledge of HIV status, HIV status disclosure, and TB status disclosure</b>	<b>Status/Level /Degree</b>	<b>Adherent N (%)</b>	<b>Poorly adherent N (%)</b>	<b>P-value</b>
<b>Knew their HIV status</b>	Yes	125(65%)	68(35%)	0.737
	No	5(71%)	2 (29%)	
<b>HIV Status</b>	Positive	41(68%)	19(32%)	0.440

	Negative	83(64%)	46(36%)	
	Did not want to disclose	1(33%)	2(67%)	
<b>Disclosed TB status</b>	Yes	122(66%)	63(34%)	0.477
	No	8(57%)	6(43%)	
<b>Person to whom participant disclosed TB status to</b>	Spouse	75(69%)	33(31%)	0.180
	Father	12(46%)	14(54%)	
	Mother	20(74%)	7(26%)	
	Sibling	5(63%)	3(38%)	
	Friend	4(50%)	4(50%)	
	Other	11(79%)	3(21%)	

#### Monthly income by anti-TB treatment adherence status

The average income of our participants was 222,035 Uganda shillings with a standard deviation of 229512 Uganda shillings. Among the participants who were earning between UGX 500,000 to 1,500,000 category, 3 – 50% were poorly adherent to their anti-TB treatment. This was not significant with a p-value of 0.736 (Table 8).

Table 8: Monthly income by anti-TB treatment adherence status among TB patients on anti-TB treatment in Tororo District, 2016

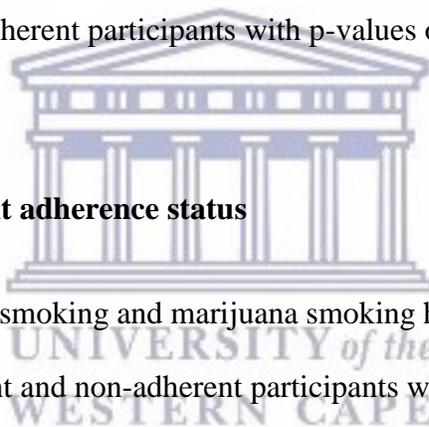
Participants' Average monthly income	Adherent N (%)	Poorly adherent N (%)	Total

<b>UGX 0 – 200,000</b>	33(62%)	20(38%)	53
<b>UGX 200,000 – 500,000</b>	12(55%)	10(45%)	22
<b>UGX 500,000 – 1,500,000</b>	3(50%)	3(50%)	6
<b>Total</b>			<b>81</b>

Pearson  $\chi^2(2) = 0.6138$  Pr = 0.736

### **House Living conditions by anti-TB treatment adherence status**

Person/s the participants live with, number of people living in the house, number of bedrooms in the house by anti-TB treatment adherence status, had no significance found between TB medication adherent and non-adherent participants with p-values of 0.155, 0.558 and 0.676 respectively.



### **Drug use by anti-TB treatment adherence status**

Alcohol consumption, cigarette smoking and marijuana smoking had no significance found between TB medication adherent and non-adherent participants with p-values of 0.413, 0.578, and 0.167 respectively.

### **Access to Information on TB by anti-TB treatment Status**

Results of bivariate analysis of various factors to do with access to information on TB by anti TB treatment status are shown below displayed in two by two tables and summarized into percentages with p-values.

### **Main Source of information by anti-TB treatment adherence status**

The only participant whose source of information was TASO drama group was poorly adherent to anti-TB treatment while 52 – 36% of those whose source of information was health workers were poorly adherent, a non-significant difference compared to the adherent group with a p-value of 0.470 (Table 9).

Table 9: Main Source of information by anti-TB treatment adherence status among TB patients on anti-TB treatment in Tororo District, 2016

Main Source of information	Adherent <i>N</i> (%)	Poorly adherent <i>N</i> (%)	Total
Media	25(69%)	11(31%)	36
Health workers	92(64%)	52(36%)	144
Relatives	7(70%)	3(30%)	10
Friends	3(60%)	2(40%)	5
TASO Drama group	0(0%)	1(100%)	1
Other	4(100%)	0(0%)	4
<b>Total</b>			<b>200</b>

Pearson  $\chi^2(5) = 4.5752$  Pr = 0.470

#### Preferred choice of information by anti-TB treatment adherence status

All the participants 2 – 100% whose preferred choice of information was TASO Drama group were poorly adherent to their anti-TB treatment with an insignificant difference to the adherent group of a p-value of 0.061 (Table 10).

Table 10: Preferred choice of information by anti-TB treatment adherence status among TB patients on anti-TB treatment in Tororo District, 2016

<b>Preferred choice of information</b>	<b>Adherent <i>N</i> (%)</b>	<b>Poorly adherent <i>N</i> (%)</b>	<b>Total</b>
<b>Media</b>	3(38%)	5(63%)	8
<b>Health workers</b>	121(67%)	60(33%)	181
<b>Relatives</b>	1(33%)	2(67%)	3
<b>Friends</b>	1(50%)	1(50%)	2
<b>TASO Drama group</b>	0(0%)	2(100%)	2
<b>Other</b>	4(100%)	0(0%)	4
<b>Total</b>			<b>200</b>

Pearson  $\chi^2(5) = 10.5559$  Pr = 0.061

#### **History of attending any TB awareness campaign by anti-TB treatment adherence status**

Among the participants who ever attended a TB awareness campaign, 58 – 36% were poorly adherent to anti-TB treatment. This had no significant difference with a p-value of 0.512 (Table 11).

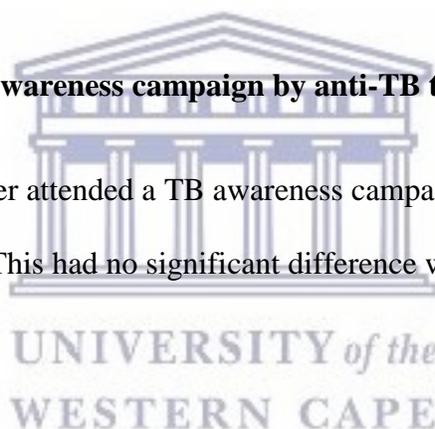


Table 11: History of attending any TB awareness campaign by anti-TB treatment adherence status among TB patients on anti-TB treatment in Tororo District, 2016

<b>History of attending any TB awareness campaign</b>	<b>Adherent <i>N</i> (%)</b>	<b>Poorly adherent <i>N</i> (%)</b>	<b>Total</b>
<b>Ever attended</b>	103(64%)	58(36%)	161
<b>Never attended</b>	28(72%)	11(28%)	39
<b>Total</b>			<b>200</b>

Pearson  $\chi^2(1) = 0.4309$  Pr = 0.512

### Adherence factors by anti-TB treatment status

Results of bivariate analysis of various adherence factors by anti TB treatment status are shown below displayed in two by two tables and summarized into percentages with p-values.

### TB regimen participant taking currently by anti-TB treatment adherence status

The majority of participants on retreatment regimen (13 – 65%) were poorly adherent to their anti-TB treatment with a significant difference to the adherent group of a p-value of 0.026 (Table 12).

Table 12: TB regimen participant taking currently by anti-TB treatment adherence status among TB patients on anti-TB treatment in Tororo District, 2016

TB regimen on currently	Adherent N (%)	Poorly adherent N (%)	Total
2HERZ/4HR or 2HERZ/6HE	100(68%)	47(32%)	147
2HRZ/4HR	22(71%)	9(29%)	31
2SHERZ/1HERZ/5HER	7(35%)	13(65%)	20
Others	2(100%)	0(0%)	2
<b>Total</b>			<b>200</b>

Pearson  $\chi^2(3) = 9.2240$  Pr = 0.026

### Duration on anti-TB treatment by anti-TB treatment adherence status

Among the participants who had swallowed their anti-TB treatment for 2 months 30 – 39% were poorly adherent. This was not significant with a p-value of 0.716 (Table 13).

Table 13: Duration on anti-TB treatment by anti-TB treatment adherence status among TB patients on anti-TB treatment in Tororo District, 2016

<b>Duration on anti-TB treatment</b>	<b>Adherent N (%)</b>	<b>Poorly adherent N (%)</b>	<b>Total</b>
<b>2 months</b>	46(61%)	30(39%)	76
<b>3 months</b>	20(67%)	10(33%)	30
<b>4 months</b>	16(70%)	7(30%)	23
<b>&gt; 4 months</b>	49(69%)	22(31%)	71
<b>Total</b>			<b>200</b>

Pearson  $\chi^2(4) = 2.1050$  Pr = 0.716

#### Number of Tablets swallowed per week by anti-TB treatment adherence status

Among the participants who swallowed 28 tablets a week, 24 – 41% were poorly adherent to anti-TB treatment. There was no significant difference with a p-value of 0.443 (Table 14).

Table 14: Number of Tablets swallowed per week by anti-TB treatment adherence status among TB patients on anti-TB treatment in Tororo District, 2016

<b>Number of Tabs swallowed per week</b>	<b>Adherent N (%)</b>	<b>Poorly adherent N (%)</b>	<b>Total</b>
<b>14 tablets</b>	47(64%)	26(36%)	73
<b>21 tablets</b>	48(72%)	19(28%)	67
<b>28 tablets</b>	35(59%)	24(41%)	59
<b>35 tablets</b>	1(100%)	0(0%)	1
<b>Total</b>			<b>200</b>

Pearson  $\chi^2(3) = 2.6819$  Pr = 0.443

### Monitoring of drug taking by someone by anti-TB treatment adherence status

Among the participants whose drug taking was monitored 59 – 36% were poorly adherent and 106 – 64% were adherent. And of those whose drug taking was not monitored, 10 – 29% were poorly adherent and 25 – 71% were adherent. This was not significant with a p-value of 0.417.

### Perspective of what may happen if the participants stop taking drugs by anti-TB treatment adherence status

Among the participants who were not sure about what would happen if they stopped taking their anti-TB treatment, 6 – 60% were poorly adherent This had no significant difference with a p-value of 0.398 (Table 15).

Table 15: Perspective of what may happen if the participants stop taking drugs by anti-TB treatment adherence status among TB patients on anti-TB treatment in Tororo District, 2016

<b>Perspective if the participants stopped taking drugs</b>	<b>Adherent N (%)</b>	<b>Poorly adherent N (%)</b>	<b>Total</b>
<b>Not Sure</b>	4 (40%)	6 (60%)	10
<b>Nothing would happen</b>	1(0.5%)	0(0%)	1
<b>Feel worse or TB could worsen</b>	111 (67%)	55 (33%)	166
<b>Develop complications</b>	9 (60%)	6 (40%)	15
<b>Pills stop working</b>	6 (75%)	2 (25%)	8
<b>Total</b>			<b>200</b>

Pearson  $\chi^2(4) = 4.0619$  Pr = 0.398

## Barriers to Adherence

Here are bivariate analysis results of barriers to anti-TB treatment by anti-TB treatment status.

These included number of times diagnosed with TB, history of completing treatment if previously diagnosed, perspective on taking pills as prescribed for 6 or 8 months, Distance of health facility from home, average time to move to and from hospital to pick drugs, requirement of time off to pick drugs, means of travel to pick drugs, requirement to pay transport fare to get to the health facility, history of treatment for a Psychiatric illness, any difficulties in taking TB drugs regularly and on time, any stigmatization because of having TB, what would cause them to quit taking your TB drugs, and experience of any TB drugs side effects.

### Number of times participant diagnosed with TB before current diagnosis time by anti-TB treatment adherence status

Among the participants who had never been diagnosed with TB before, 60 (33%) were poorly adherent to anti-TB treatment, and of those who had ever been diagnosed with TB once, 60% were poorly adherent. This had a significant difference with a p-value less than 0.048 (Table 16).

Table 16: Number of times participant diagnosed with TB before current diagnosis time by anti-TB treatment adherence status among TB patients on anti-TB treatment in Tororo District, 2016

Number of times diagnosed with TB before current diagnosis time	Adherent <i>N</i> (%)	Poorly adherent <i>N</i> (%)	Total
Never	122(67%)	60(33%)	182
Once	6(40%)	9(60%)	15
Twice or more	3(100%)	0(0%)	3

Total	<b>200</b>
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Pearson  $\chi^2(3) = 6.0857$  Pr = 0.048

### Previous anti-TB Treatment outcome by anti-TB treatment adherence status

Among the participants who completed treatment, 12 – 48% were poorly adherent to treatment and of those who did not complete treatment, 10 – 36% were poorly adherent. This was not statistically significant with a p-value of 0.365 (Table 17).

Table 17: Previous anti-TB Treatment outcome by anti-TB treatment adherence status among TB patients on anti-TB treatment in Tororo District, 2016

Previous anti-TB Treatment outcome	Adherent <i>N</i> (%)	Poorly adherent <i>N</i> (%)	Total
Completed treatment before	13(52%)	12(48%)	25
Never completed treatment before	18(64%)	10(36%)	28
<b>Total</b>	<b>31(58%)</b>	<b>22(42%)</b>	<b>53</b>

Pearson  $\chi^2(1) = 0.8211$  Pr = 0.365

### Perspective on Taking pills as prescribed for 6 – 8 months

All the participants 5 – 2.5% with a perspective of not taking drugs as prescribed were poorly adherent to their anti-TB treatment. This was significant with a p-value of 0.002 (Table 18).

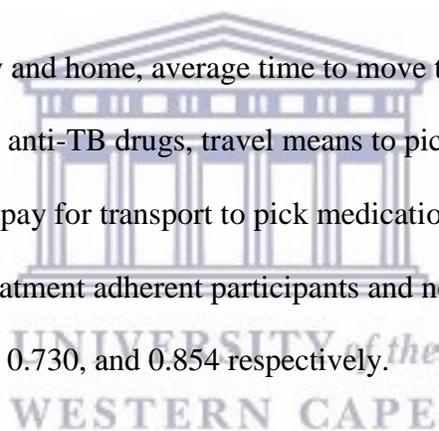
Table 18: Perspective on Taking pills as prescribed for 6 – 8 months among TB patients on anti-TB treatment in Tororo District, 2016

<b>Perspective on Taking pills as prescribed for 6 – 8 months</b>	<b>Adherent N (%)</b>	<b>Poorly adherent N (%)</b>	<b>Total</b>
<b>Could take as prescribed</b>	131(67%)	64(33%)	195
<b>Could not take as prescribed</b>	0(0%)	5(100%)	5
<b>Total</b>			<b>200</b>

Pearson chi2(1) = 9.7362 Pr = 0.002

### **Barriers to accessing drugs by anti-TB treatment status**

Distance between health facility and home, average time to move to and back from the health facility, need of time off to pick anti-TB drugs, travel means to pick drugs by anti-TB treatment adherence status, and having to pay for transport to pick medication were all found with no significance between the TB treatment adherent participants and non-adherent participants with p-values of 0.517, 0.523, 0.417, 0.730, and 0.854 respectively.



### **History of Psychiatric illness by anti-TB treatment adherence status**

Among those who did not have history of psychiatric illness, 66 – 34% were poorly adherent and of those who had history of psychiatric illness 1 – 33% was poorly adherent. This had no significance difference to the adherent group with a p-value of 0.975.

### **History of difficulty in swallowing drugs by anti-TB treatment adherence status**

Among the participants who had difficulty in swallowing their drugs, 16 – 55% were poorly adherent. This was significant with a p-value of 0.012 (Table 19).

Table 19: History of difficulty in swallowing drugs by anti-TB treatment adherence status among TB patients on anti-TB treatment in Tororo District, 2016

<b>History of difficulties in swallowing drugs</b>	<b>Adherent <i>N</i> (%)</b>	<b>Poorly adherent <i>N</i> (%)</b>	<b>Total</b>
<b>No history of difficulties</b>	117(69%)	53(31%)	170
<b>History of difficulties</b>	13(45%)	16(55%)	29
<b>Total</b>			<b>199</b>

Pearson  $\chi^2(1) = 6.2977$  Pr = 0.012

**What could most likely make a participant want to quit their anti-TB drugs by anti-TB treatment adherence status?**

A higher proportion of participants (29 – 51%) believed that having to swallow too many pills would make them want to quit their anti-TB medication were poorly adherent to their anti TB treatment. This was significant with a p-value of 0.003 (Table 20).

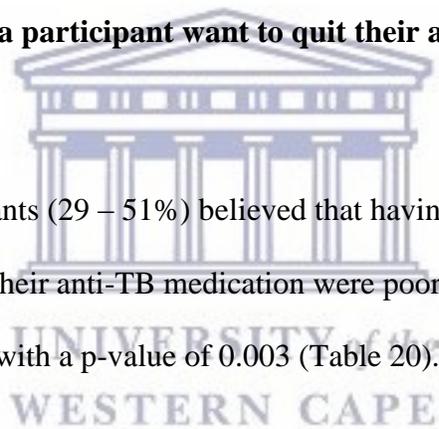


Table 20: What could most likely make a participant want to quit their anti-TB drugs by anti-TB treatment adherence status among TB patients on anti-TB treatment in Tororo District, 2016

<b>What could make participants want to quit swallowing their anti-TB drugs</b>	<b>Adherent <i>N</i> (%)</b>	<b>Poorly adherent <i>N</i> (%)</b>	<b>Total</b>
<b>Pill taking length</b>	15(79%)	4(21%)	19
<b>Too many pills</b>	28(49%)	29(51%)	57
<b>If I vomit my pills</b>	15(68%)	7(32%)	22
<b>If I get anti-TB drugs side effects</b>	28(88%)	4(13%)	32

<b>Fear people finding out my status</b>	21(75%)	7(25%)	28
<b>Other, Specify</b>	24(57%)	18(43%)	42
<b>Total</b>			<b>200</b>

Pearson  $\chi^2(5) = 17.6261$  Pr = 0.003

### History of experiencing any side effects and history of feeling stigmatized

Among the participants 115 who experienced side effects, 44 – 38% were poorly adherent and of those who had history of feeling stigmatized, only 15 – 33% were poorly adherent. This was not significant with a p-value of 0.560 (Table 21). The side effects experienced included but not limited to burning of the feet 69 – 60%, nausea and vomiting 25 – 22%, visual impairment 11 – 10%, skin rashes 4 – 3%, deafness 3 – 3%; and swelling of the breasts, decreased urine put and others all making 3 – 2%.

Table 21: History of experiencing any side effects and feeling stigmatized by anti-TB treatment adherence status among TB patients on anti-TB treatment in Tororo District, 2016

<b>Factor</b>	<b>Status of Factor</b>	<b>Adherent N (%)</b>	<b>Poorly adherent N (%)</b>	<b>P-value</b>
<b>History of experiencing any side effects</b>	Yes	71(62%)	44 (38%)	0.193
	No	60(71%)	25 (29%)	
<b>History of feeling stigmatized because of TB</b>	Yes	31(67%)	15(33%)	0.777
	No	53(35%)	99 (65%)	

### Perceptions on acquisition of TB by anti-TB treatment adherence status

Among our participants who were not sure of the way they acquired TB, 29 – 45% were poorly adherent to anti-TB treatment. This was non-significant with a p-value of 0.110 (Table 22).

Table 22: Perceptions on acquisition of TB by anti-TB treatment adherence status among TB patients on anti-TB treatment in Tororo District, 2016

Perceptions on acquisition of TB	Adherent <i>N</i> (%)	Poorly adherent <i>N</i> (%)	Total
Not sure / don't know	35(55%)	29(45%)	64
Being bewitched	1(100%)	0(0%)	1
Cigarette smoking	9(90%)	1(10%)	10
Hospital	1(100%)	0(0%)	1
Through cough of a case	86(69%)	38(31%)	124
<b>Total</b>			<b>200</b>

Pearson  $\chi^2(4) = 7.5307$  Pr = 0.110

## **Bivariate (Logistic Regression) Results**

In this section are the bivariate analysis results of the factors that were found to have significant differences in their proportions on chi square test. This was done using interactive expansive logistic regression at a set p-value of  $< 0.05$ . Participants who had electricity in their houses were significantly associated with poor adherence to anti-TB treatment with an un-adjusted Odds ratio (OR) of 2.109 and a p-value of 0.017. Participants who experienced difficult in swallowing their drugs were significantly associated with poor adherence to anti-TB treatment with an un-adjusted OR of 2.717 and a p-value of 0.014. Participants who were on second line adult anti-TB treatment were significantly associated with poor adherence with an un-adjusted Odds ratio (OR) of 3.95 and a p-value of 0.006. Participants who had history of having been diagnosed with TB at least once before were significantly associated with poor adherence to anti TB treatment with an un-adjusted OR of 3.05 and a p-value of 0.04. Participants who thought that taking too many pills would make them quit their anti TB drugs were significantly associated with poor adherence to anti-TB treatment with an un-adjusted OR of 3.88 and a p-value of 0.029. Participants who agreed that the benefits of taking anti-TB drugs outweighs any difficulties they may encounter were significantly less likely to be poorly adherent with an un-adjusted OR of 0.51 and a p-value of 0.030. Participants who agreed that missing doses or taking them incorrectly can ruin their treatment outcome were significantly likely to be poorly adherent with an un-adjusted OR of 2.41 and p-value of 0.005. Participants who did not know that TB can be transmitted through the air were significantly less likely to be poorly adherent with an un-adjusted OR of 0.26 and a p-value of 0.024 (Table 23).

## MULTIVARIATE ANALYSIS

In this section are multivariate analysis results of factors that were found to be significantly associated with poor adherence to anti TB treatment after bivariate analysis using chi square test and interactive expansive logistic regression. This multivariate analysis was also done using interactive expansive logistic regression at a set p-value of 0.05.

Participants who had electricity in their houses were significantly independently associated with poor adherence to anti-TB treatment with an adjusted Odds ratio (OR) of 2.22 and a p-value of 0.045. Participants who were on second line adult anti-TB treatment were significantly independently associated with poor adherence with an adjusted Odds ratio (OR) of 3.39 and a p-value of 0.049. Participants who had history of having been diagnosed with TB at least once before were significantly independently associated with poor adherence to anti TB treatment with an adjusted OR of 3.94 and a p-value of 0.045. Participants who thought that taking too many pills would make them quit their anti TB drugs were independently associated with poor adherence to anti-TB treatment with an adjusted OR of 6.54 and a p-value of 0.010. Participants who agreed that missing doses or taking them incorrectly can ruin their treatment outcome were independently likely to be poorly adherent with an adjusted OR of 2.57 and p-value of 0.013 (Table 23).

Experiencing difficulties in swallowing drugs, not knowing that the benefits of taking anti-TB drugs outweighs any difficulties that may be encountered, and not knowing / disagreeing that TB can be transmitted through the air were not independently associated with poor adherence to anti-TB treatment (Table 23).

Table 23: A summary of bivariate and multivariate analysis results from logistic regression of factors associated with poor adherence to anti-TB treatment among TB patients on anti-TB treatment in Tororo District, 2016

Variable	Gradation/level	Number (N)	Un - AOR	P- Value	AOR	P- Value
<b>House hold electricity</b>	No	135	1.00		1.00	
	Yes	65	2.11	<b>0.017</b>	2.22	<b>0.045</b>
<b>Difficulties in swallowing</b>	No	170	1.00		1.00	
	Yes	29	2.72	<b>0.014</b>	2.55	0.056
<b>TB Regimen</b>	2HERZ/4HR or 2HERZ/6HE	147	1.00		1.00	
	2HRZ/4HR	31	0.87	0.749	0.44	0.125
	2SHERZ/1HERZ/5HER	20	3.95	<b>0.006</b>	3.39	<b>0.049</b>
	Other	2	-		-	
<b>Number of previous TB diagnoses</b>	Never	182	1.00		1.00	
	Once	15	3.05	<b>0.043</b>	3.94	<b>0.045</b>
	Twice or more	3	-		-	
<b>What would make a participant want to</b>	Pill taking length	28	1.00		1.00	
	Too many pills	42	3.88	<b>0.029</b>	6.54	<b>0.010</b>

<b>quit taking anti-TB drugs</b>	If I vomit my pills	22	1.75	0.440	1.21	0.820
	anti-TB drugs side effects	57	0.53	0.421	0.97	0.973
	Fear people discovering my status	19	1.25	0.754	1.59	0.567
	Other	32	2.81	0.108	2.47	0.228
<b>Benefits of taking anti-TB drugs outweighs any difficulties encountered</b>	Strongly agree	72	1.00		1.00	
	Agree	124	0.51	<b>0.030</b>	0.88	0.757
	Don't know	2	1.25	0.876	1.32	0.852
	Disagree	0	-		-	
	Strongly disagree	0	-		-	
<b>Missing doses or taking them incorrectly can ruin treatment outcome</b>	Strongly agree	108	1.00		1.00	
	Agree	81	2.41	<b>0.005</b>	2.57	<b>0.013</b>
	Don't Know	0	-		-	
	Disagree	0	-		-	
	Strongly disagree	6	1.36	0.729	1.21	0.849
<b>TB can be transmitted through the air</b>	Strongly agree	83	1.00		1.00	
	Agree	85	0.55	0.062	0.67	0.349
	DK	23	0.26	<b>0.024</b>	0.35	0.134

Disagree	8	0.41	0.298	0.92	0.928
Strongly disagree	0	-		-	

$N = 200$ ,

- = *Dropped (less than 5 observations in a cell)*

## CONCLUSION

This chapter presented the research findings and interpretation from our study's data analysis. It's clear that possessing electricity in the house, being on second line adult anti-TB treatment, history of having been diagnosed with TB at least once before, thoughts that taking too many pills would cause quitting anti TB drugs, and agreeing that missing doses or taking them incorrectly can ruin treatment outcome were independently associated with poor adherence to anti-TB treatment with p-values of  $< 0.05$ . On the contrary, experiencing difficulties in swallowing drugs, agreeing that the benefits of taking anti-TB drugs outweighs any difficulties that may be encountered, and not knowing that TB can be transmitted through the air were not independently associated with poor adherence to anti-TB treatment.

The next chapter will discuss the findings and their interpretations relating to published literature in order to draw conclusions and recommendations in the final chapter.

## CHAPTER FIVE: DISCUSSION

### INTRODUCTION

In this chapter is presented the discussion of our study results in relation to our study aims and objectives which were; - to describe the socio-demographic profiles of persons on anti-TB treatment, to determine the extent of poor adherence to anti-TB treatment, and to identify factors that influence TB treatment adherence among persons on anti TB Treatment for at least 2 months in Tororo district. As we focus on our study objectives through the discussion, we compare our results to already published literature from which we draw our chapter on conclusions and recommendations accordingly.

### SOCIO-DEMOGRAPHIC PROFILES OF PERSONS ON ANTI TB TREATMENT IN TORORO DISTRICT

Our study participants were mainly males (60.5%) than females. The lack of gender balance which was not due to inclusion because we enrolled all patients who could accept to participate in the study, was due to the fact that more males were affected by Tuberculosis than females. This is commensurate with Adane *et al* ( 2013) and WHO (2016) who also reveal the male gender to be more affected by Tuberculosis than the female gender (Adane *et al.*, 2013; WHO, 2016).

## **EXTENT OF POOR ADHERENCE TO ANTI-TB TREATMENT IN TORORO DISTRICT**

Our study results clearly revealed that up to a third (34.5%) of the patients on anti-TB treatment in Tororo district were poorly adherent to their anti-TB medication. This is more than what was revealed from a literature review of four different manuscripts in sub-Saharan Africa that revealed a proportion of 11.3% to 29.6% of patients on anti-TB treatment to have defaulted treatment (Castelnuovo, 2010) but close to a retrospective study in Southern India that found 33% of the patients on anti-TB treatment to be poorly adherent (Gopi *et al.*, 2007).

## **FACTORS ASSOCIATED WITH POOR ADHERENCE TO ANTI-TB TREATMENT IN TORORO DISTRICT**

Participants who had a once previous diagnosis of TB were almost 4 times more likely to be poorly adherent to their anti-TB treatment as compared to participants who had never been diagnosed with TB before in an independent association with a p-value of 0.045. This is consistent with a study conducted in South Africa where patients who had defaulted on TB treatment before were found to default their anti-TB treatment (Finlay *et al.*, 2012).

The likelihood of poor adherence to anti-TB treatment was also 6 times more likely for participants who believed that having to swallow too many pills would cause them to quit their anti-TB treatment in an independent association with a p-value of 0.010. This is in agreement with a study conducted in Ethiopia which found having to swallow very many pills to be one of the reasons for poor adherence to anti-TB treatment (Nezenega *et al.*, 2013). More to this, another study conducted in Addis Ababa also in Ethiopia found one of the barriers to adherence to be pill burden (Gebremariam, BJune, & Frich, 2010)

Participants who agreed that missing doses or taking them incorrectly can ruin their anti-TB treatment outcome were about two and half times more likely to default their anti-TB treatment in an independent association with a p-value of 0.013 as compared to those who strongly agreed to the same. This finding concurs with Adane *et al* (2013) who found forgetfulness which led to missing doses to be associated with high rates of treatment default (Adane *et al.*, 2013).

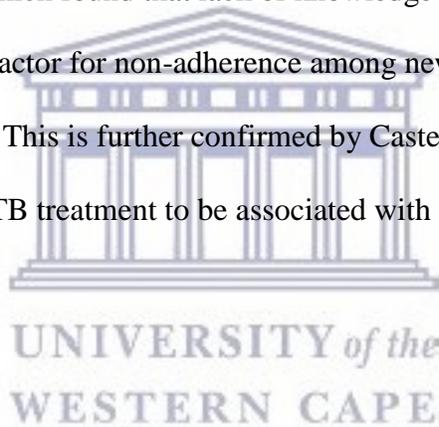
Participants who were on anti-TB re-treatment were 3 times more likely to be poorly adherent to their anti-TB treatment as compared to those on first time anti-TB treatment in a significant independent association with a p-value of 0.049. This is consistent with a study by Peltzer and Pengpid (2015) in which patients on anti-TB retreatment were associated with non-adherence to anti-TB treatment as compared to those on anti-TB treatment for the first time (Peltzer & Pengpid, 2015).

Surprisingly, our study also found that having electricity in the house hold was also independently associated with poor adherence to anti-TB treatment (odds ratio 2.22; p-value 0.045). This is contrary to a case-control study by Muture *et al* (2011) who revealed low income to be independently associated with default to anti-TB treatment (Muture *et al.*, 2011). Also because electricity as a form of energy has been discovered to be a key indicator of the standard/quality of living making it also a measure of the income and so economic status of a house hold (Joyeux & Ripple, 2004).

Though participants who did not know that TB can be transmitted through the air appeared to have a protective association with adherence to anti-TB treatment (un-adjusted odds ratio 0.26; p-value 0.024), no association was retained after confounding was adjusted for (adjusted odds ratio 0.35; p-value 0.134). This is commensurate with Peltzer & Pengpid (2015) who revealed

association between poor TB knowledge and non-adherence to anti-TB treatment in a bivariate analysis (Peltzer & Pengpid, 2015).

Also, though participants who agreed that benefits of taking anti-TB drugs outweighs any difficulties encountered appeared to be protected from poor adherence to anti-TB treatment as compared to those who strongly agree with an un-adjusted odds ratios of 0.51 and a p-value of 0.005, the association was not retained after adjusting for confounding (adjusted odds ratios 0.88; p-value 0.757). This reveals to us that any degree of lack of knowledge on TB treatment is associated with poor adherence. This is confirmed by a prospective cohort study conducted at 21 TB treatment centers in India which found that lack of knowledge of importance of regular treatment was an absolute risk factor for non-adherence among newly diagnosed pulmonary TB patients (Kulkarni *et al.*, 2013). This is further confirmed by Castelnuovo (2010) whose review revealed poor knowledge about TB treatment to be associated with defaulting anti-TB treatment (Castelnuovo, 2010).



## CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

### CONCLUSIONS

From our study on the predictors of poor adherence to anti-TB treatment, we conclude that males (>60%) were more affected than females, most of our study participants (71.5%) were 45 years and less, 21% did not receive any education, and majority (> 90%) lived alone. We also conclude that slightly more than a third (34.5%) of patients on anti-TB treatment in Tororo were poorly adherent to anti-TB treatment. We finally conclude that factors found to be independently associated with poor adherence to anti-TB treatment include; - a once previous diagnosis of TB, perceived anti-TB treatment pill burden, not strongly agreeing that missing doses or taking them incorrectly can ruin anti-TB treatment outcome, and surprisingly having electricity in the house hold.

### RECOMMENDATIONS

Patients with history of previous TB diagnosis who are to take adult anti-TB re-treatment should be counseled prior and during treatment for better adherence to their anti-TB treatment.

Patients with perceived pill burden should be counseled to swallow all their medication and to should be encouraged by the expected outcome of their anti-TB treatment when they complete it as prescribed. This will help abate the chances of quitting medication because of pill burden.

Fixed dose combinations should be encouraged and DOTS should be encouraged in the management of patients in whom pill burden can cause quitting of anti-TB drugs. Also research to condense and have the various drugs in one pill should be encouraged to have a long lasting solution to this cause of poor adherence.

We warrant further research to test and confirm the association between household electricity and poor anti-TB treatment adherence.

In a nutshell, all TB patients should be educated and counseled about anti-TB treatment before and during their treatment course with emphasis on relapse or re-infection cases, and we warrant a further study to understand the association between household electricity and poor adherence to anti-TB treatment.



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## APPENDICES

### APPENDIX 1: Definition of Key Terms

In the study, the following concepts are conceptually and operationally defined as follows:

#### **Adherence**

“Adherence to long-term therapy is defined as the extent to which an individual’s behavior corresponds to a health care provider’s agreed upon recommendations” (WHO, 2003:3). This concurs with the National Institute of Health (2008) where adherence is defined as how closely an individual follows a prescribed treatment regimen that includes the willingness to start and the ability to take medications as exactly directed. Also, it is defined as behaving according to particular rules and or following a set of beliefs (Oxford University Press, 2000:). This further concurs with MOH (2008) where it is noted that adherence to TB treatment is when a patient takes his/her drugs according to the prescription instructions, following the dosage, number of times and number of days without missing any sessions until all the medication is completely taken (MOH, 2008). In this study, adherence to anti-TB treatment will be measured as self-reported by the patient themselves. In our study, patients with history of missing one or more prescribed doses will be deemed non-adherent and will be graded by how much they missed their medication in the particular period spent on treatment.

#### **Antiretroviral therapy**

As per WHO (2006), antiretroviral drugs are drugs used to stop the HIV virus multiplication by acting through different stages of the HIV life cycle (WHO, 2006:24). Anti-retroviral therapy

involves using drug combinations to treat HIV infection where three or more different classes of antiretroviral drugs are used in combination. In this study, antiretroviral therapy refers to treating HIV using a combination of 3 antiretroviral drugs such as zidovudine, lamivudine and nevirapine or efavirenz as first line combination and other combinations such as Truvada plus Alluvia as second line combination.

### **Compliance**

Compliance is the continuous, correct and uninterrupted taking of prescribed medication as directed by the healthcare professional (Aït-Khaled N, Alarcón E, Armengol R, Bissell K, Boillot F, Caminero J A, Chiang C-Y, Clevenbergh P, Dlodlo R, Enarson D A, Enarson P, Fujiwara P I, Harries A D, Heldal E, Hinderaker S G, Lienhardt C, Monedero I, Rieder H L, Rusen I D, Trébucq A, Van Deun, 2010). In this study, compliance will be defined as taking anti-TB treatment as prescribed at the right time, for the right duration, and at a dosage in line with the TB treatment guidelines. Any non-compliance will be defined as not taking anti-TB as described above and this includes patients who miss any dose(s) of the TB treatment for whatever reason.

### **Directly observed therapy shortcourse (DOTS)**

This is an internationally recognized strategy used in the implementation of the basics of TB case-finding and cure. It is more than just a clinical approach. It is a strategy for management in public health systems and includes, political commitment, case-detection through quality bacteriology, short-course chemotherapy while ensuring patient adherence to anti-TB treatment, adequate drug supply, and comprehensive recording and reporting systems (WHO, 2006b).

## **Factors**

As defined by the Oxford Advanced Learner's Dictionary (2000), factors are one of the several things that cause or influence something or an outcome (Oxford University Press, 2000). In this case good or poor/non-adherence to anti-TB treatment. For this study, a factor will be anything that affects how patients take or adhere to their anti-TB treatment drugs.

## **First-Line TB drugs**

First-Line TB drugs are the drugs used in the treatment of susceptible TB (WHO, 2010:30) and for this study they are rifampicin, isoniazid, pyrazinamide, ethambutol and streptomycin.

In line with WHO, these five drugs are recommended by the Uganda National Tuberculosis and Leprosy program for treatment of TB most of the time (MOH, 2010:27).

## **Incidence**

Incidence is a measure of the probability of occurrence of a given condition in a population within a specified period of time. Incidence proportion (cumulative incidence) is the number of new cases with a particular condition (which is TB in our study) in a specified period of time per population initially at risk (Rothman, Lash, & Greenland, 2008).

## **Multidrug-resistant tuberculosis (MDR-TB)**

This is tuberculosis caused by organisms that do not respond to or show resistance to at least two of the most powerful first line anti-TB drugs – rifampicin and isoniazid (WHO, 2014a, 2016). In this study, MDR-TB meant exactly as defined above.

## **Prevalence**

Prevalence is the number of cases with a particular condition per 10,000 or 100,000 population. In this study we used period prevalence which is the number of cases per 100,000 people that had Tuberculosis during a one year period, and includes people who already had the condition at the start of the study period as well as those who acquired it during that period (Rothman, 2012:53).

### **Rural Uganda**

According to the Oxford Advanced Learner's Dictionary (2000) rural is connected with or like the countryside (Oxford University Press, 2000:1035). In this study rural Uganda refers to the remote parts of Uganda accessed only through marram roads where most of the local people are peasants who depend on subsistence farming with limited or no access to hydroelectric power, and limited clean water and health facilities.

### **Tuberculosis (TB)**

Tuberculosis is a chronic infectious disease caused by an organism called *Mycobacterium tuberculosis* or *Mycobacteria bovis*, transmitted through droplet infection when the infected person sneezes or coughs, or through drinking of unpasteurized milk from an infected animal; presenting with clinical features such as cough, chest pain, sputum production, weight loss, fevers and night sweats. It can cause pathology in the lungs, the bones, the kidneys and the spine (Aït-Khaled N, Alarcón E, Armengol R, Bissell K, Boillot F, Caminero J A, Chiang C-Y, Clevenbergh P, Dlodlo R, Enarson D A, Enarson P, Fujiwara P I, Harries A D, Heldal E, Hinderaker S G, Lienhardt C, Monedero I, Rieder H L, Rusen I D, Trébucq A, Van Deun , 2010:5; MOH, 2012:90-91). For this research, Tuberculosis refers to Tuberculosis that may be affecting the lungs, spine, kidneys, bones, and other parts of the body, diagnosed by a medical

doctor or physician assistant who will have initiated treatment for the patient. In Tororo, TB is a chronic infection caused by bacteria with clinical features that include but not limited to chronic cough of two weeks or more, fevers with excessive night sweats, weight loss, and lymph nodes enlargement. A TB diagnosis is confirmed by two sputum ZN stain for alcohol acid fast bacilli (AAFB) or polymerase chain reaction (PCR) Gene xpert test for HIV positive patients (MOH, 2012).



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## APPENDIX 2: QUESTIONNAIRE

### Questionnaire in English

DETERMINANTS OF TB TREATMENT ADHERENCE IN CLIENTS PRESCRIBED ANTI  
TB TREATMENT IN TORORO DISTRICT, UGANDA. SURVEY QUESTIONNAIRE

Enumerator instructions: *Bold Italics*

Name of Health facility (*Circle one*):

Tororo Hospital

Mukujju Health Center

Nagongera Health center

STUDY NUMBER:  <i>(Facility Specific)</i>				
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To be assigned by Data collector e.g. T001, T002 (T for Tororo hospital), M001 (M for Mukujju Health Center), N001 (N for Nagongera Health Center).

Date	___ / ___ / <u>2015</u> ( <i>dd/mm/year</i> )
Result of Interview	Completed  Not completed

FINAL STUDY NUMBER:				
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To be assigned by principle researcher.



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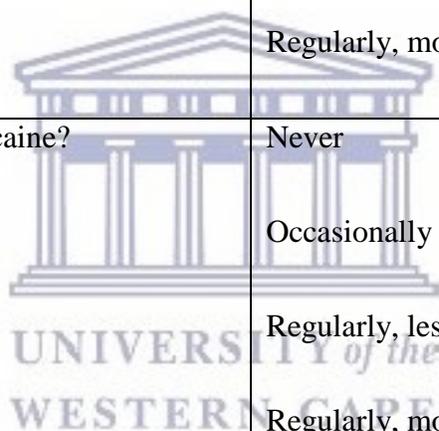
100	General information ( <i>Circle one</i> )	
101	Age of Respondent (Years)	<input type="radio"/> < 18 <input type="radio"/> 18-25 <input type="radio"/> 26-35 <input type="radio"/> 36-45 <input type="radio"/> Above 45
102	Sex of Respondent	<input type="radio"/> Female <input type="radio"/> Male
103	Marital Status.	<input type="radio"/> Married <input type="radio"/> Single <input type="radio"/> Divorced <input type="radio"/> Separated <input type="radio"/> Cohabiting
104	Are you the head of the household?	<input type="radio"/> Yes <input type="radio"/> No
105	Have you disclosed your TB status to any one?	<input type="radio"/> Yes <input type="radio"/> No

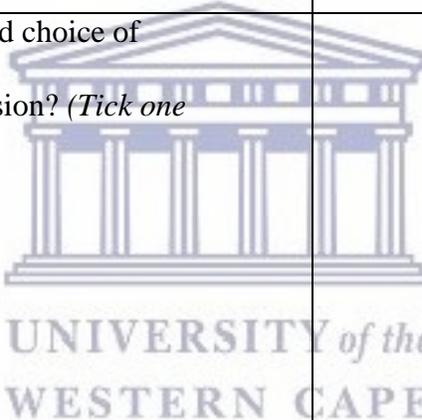
106	To whom have you disclosed your TB status?	Spouse  Father  Mother  Sibling  Friend  Other ( <i>Specify</i> ):
107	Do you know your HIV status? ( <i>If yes go to 108, if no go to 111</i> )	Yes  No
108	What is your HIV status? ( <i>If positive go to 109, if otherwise go to 111</i> )	Positive  Negative  Do not want to disclose
109	Are you also on ARVs (drugs for HIV/AIDS)?	Yes  No
110	Does your spouse know you are HIV positive?	Yes  No
111	Are you the Head of your household?	Yes  No

112	Are you a permanent or temporary resident in the district?	Permanent Temporary
113	What is your education level?	No education Primary Secondary Post-Secondary
114	What is your occupational category?	Peasant Business Professional Self-employed Laborer Others ( <i>Specify</i> )
115	What is your average monthly income (UGX)	_____
116	Who do you live with?	Alone Family Friends Other ( <i>Specify</i> ) ... ..

117	How many people live in the house including you?	$\leq 3$ 4 – 6 7 – 9 $\geq 10$
118	How many bedrooms are in the house? <i>(Circle one)</i>	1      2      3      >3
119	What is your type of water supply?	Piped into the house Stand pipe Bore hole Well/Spring Other Specify .....
120	Is there electricity in your house?	Yes No
121	How often do you drink alcohol?	Never Rarely/Occasionally Weekly, less than 5 drinks Daily, less than 3 drinks Daily, more than 3 drinks

122	How often do you smoke cigarettes?	<p>Never</p> <p>Occasionally</p> <p>Regularly, less than 5 cigarettes/day</p> <p>Regularly, more than 5 cigarettes/day</p>
123	Do you smoke marijuana?	<p>Never</p> <p>Occasionally</p> <p>Regularly, less than 5 cigarettes/day</p> <p>Regularly, more than 5 cigarettes/day</p>
124	Do you use crack/cocaine?	<p>Never</p> <p>Occasionally</p> <p>Regularly, less than 5 times/day</p> <p>Regularly, more than 5 times/day</p>



200	Access to Information on TB	
201	What is your main source of information on anti-TB treatment? ( <i>Tick one response</i> )	Media Health workers Relatives Friends TASO Drama group Other (specify).....
202	What is your preferred choice of information transmission? ( <i>Tick one response</i> )	 <ol style="list-style-type: none"> <li>1. Media</li> <li>2. Health workers</li> <li>3. Relatives</li> <li>4. Friends</li> <li>5. TASO Drama group</li> <li>6. Other (specify).....</li> </ol>
203	How else do you access information about TB treatment adherence? ( <i>Ask respondent to indicate preferred source of information</i> )	<ol style="list-style-type: none"> <li>1. Media.</li> <li>2. Booklets</li> <li>3. Relatives</li> <li>4. Friends</li> <li>5. TASO Drama group</li> <li>6. Other (specify).....</li> </ol>

204	Have you attended any TB awareness campaign in your community?	1. Yes 2. No
205	If Yes, By Who?	1. Ministry of Health 2. TASO Drama group 3. NGO 4. Others Specify.....

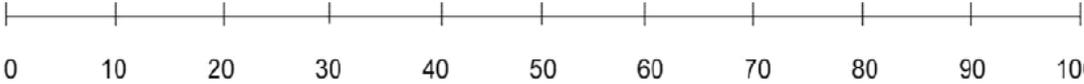
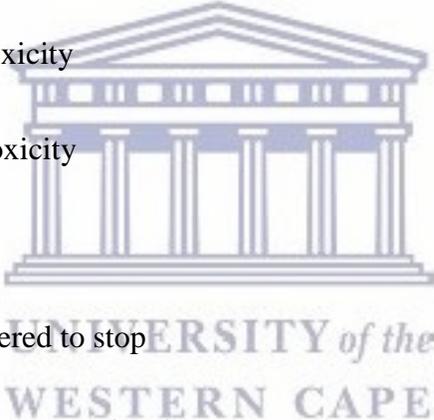


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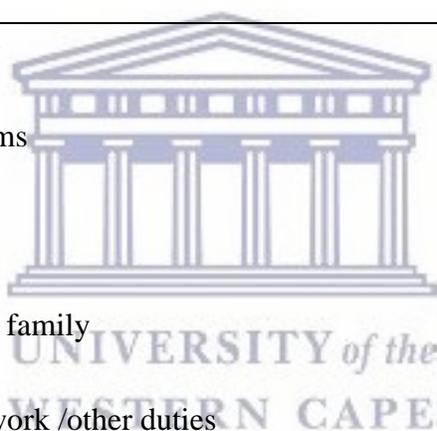
300	Adherence	
301	<p>What TB Regimen are you taking currently?</p> <p><i>(Tick One Option. Request to look at the patients' card if available to get more information on this).</i></p>	<p>1. 2HERZ/4HR or 2HERZ/6HE</p> <p>2. 2HRZ/4HR</p> <p>3. 2SHERZ/1HERZ/5HER</p> <p>4. Other, Specify .....</p>
302	<p>How long have you been taking anti-TB drugs? <i>(Tick the most approximate)</i></p>	<p>1 month</p> <p>2 months</p> <p>3 months</p> <p>4 months</p> <p>&gt; 4 months</p>
303	<p>How many days do you swallow tabs in a week? <i>(Indicate the total number)</i></p>	<p>.....days a week</p>
304	<p>How many tablets do you swallow per day/week?</p>	<p>.....tabs a day/.....tabs a week.</p>
305	<p>Does anyone monitor or help you with drug taking e.g. reminding you to swallow drugs?</p>	<p>Yes</p> <p>No</p>
306	<p>If yes, who?</p>	<p>Spouse</p>

		Father Mother Sibling Friend Other ( <i>Specify</i> ):
307	Except drugs for HIV/AIDS, are you currently taking any other drugs for other diseases?	Yes No
308	<i>If yes to the above question, Which other disease(s)?</i>	High blood pressure Kidney disease Diabetes Hepatitis Psychiatric condition Other Specify .....
<p><i>Use the phrase in quotes to help respondent get ready for the next set of questions.</i></p> <p>“I would like to ask you about the TB drugs pills that you are taking. Some people on long-term treatment may miss medicines some of the time. It is possible that you may have missed a few doses in the past two weeks....”</p>		

309	What do you think can happen if you miss one or more doses of your anti-TB drugs?	Nothing  Feel better  Feel worse  TB can worsen  I can get complications  Pills stop working  Not sure/I don't know
310	What do you think can happen if you miss one or more doses of your anti-TB drugs?	Yes  No
311	Have you ever missed pills/doses since you commenced this anti-TB treatment? <i>(If Yes, continue with question 310; If No, skip to question 400)</i>	Yes  No
312	Please indicate on the line below the point showing your best guess about how much of your medication you have taken in the last two weeks <i>(Guide respondent on how to use visual analogue scale)</i>   <div style="display: flex; justify-content: space-around; text-align: center;"> <div data-bbox="321 1696 529 1822"> <p><i>Swallowed</i></p> <p><i>None/few drugs</i></p> </div> <div data-bbox="800 1696 943 1822"> <p><i>Swallowed</i></p> <p><i>averagely</i></p> </div> <div data-bbox="1182 1696 1380 1822"> <p><i>Swallowed</i></p> <p><i>most/all drugs</i></p> </div> </div>	

	 <p>.....%</p>
	<p><i>For 313 to 316, please tick all that apply. Basing on the last time you missed your pills, can you choose from the reasons below why you probably missed your doses?</i></p>
313	<p>Clinical Reasons</p> <p>Fear of side effects/toxicity</p> <p>Having side effects/toxicity</p> <p>Too sick to swallow</p> <p>Treatment failure/ordered to stop</p> <p>Frequency of dosing inconveniencing</p> 
314	<p>Medication Access</p> <p>Ran out of drug supply at home</p> <p>Unable to get to facility for drugs (<u>transport</u>)</p> <p>Unable to get to facility for drugs (<u>sickness</u>)</p> <p>Drug out of stock at hospital/clinic</p>

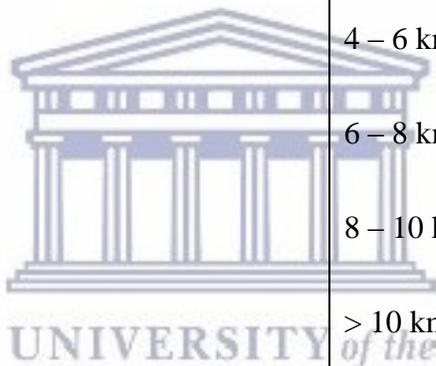
315	<p>Patient Error</p> <p>Forgot to take dose</p> <p>Felt better and so stopped taking doses</p> <p>Shared medications with others</p> <p>Lost medications</p> <p>Use of traditional medicines instead</p> <p>Had travelled and forgot drugs</p>
316	<p>Situation in the home</p> <p>Food security problems</p> <p>Family crisis</p> <p>Lack of support from family</p> <p>Lack of time due to work /other duties</p> <p>Depression</p>
317	<p>Administrative Issues</p> <p>Clinic hours of operation not convenient?</p> <p>Long queues/waiting time at clinic?</p> <p>Lack of confidentiality at clinic?</p> <p>Discomfort with clinical staff</p>



318	<p>Other patient Concerns</p> <p>No privacy to take medication</p> <p>Fear of disclosure of TB status</p> <p>Poor health care provider attitude</p> <p>Interference with daily issues</p>
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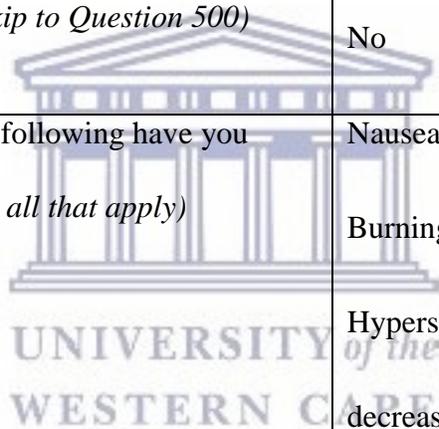
400	Barriers to Adherence	
401	Before this time, how many times have you been diagnosed with TB?	<p>Never</p> <p>Once</p> <p>Twice</p> <p>Thrice or more</p>
402	Did you complete treatment when you were previously diagnosed?	<p>Yes</p> <p>No</p>
403	If no, why not? ( <i>If yes proceed to 404</i> )	<p>Pill taking length</p> <p>Too many pills</p> <p>If I vomit my pills</p> <p>If I get anti-TB drugs side effects</p>

		Fear people finding out my status  Other, Specify
404	Do you think you can take pills as prescribed for 6 or 8 months?	Yes  No  Don't know
405	How far is the hospital from your home (Km)  <i>(One response required)</i>	< 2 km  2 – 4 km  4 – 6 km  6 – 8 km  8 – 10 km  > 10 km
406	On average how much time do you take to move to and from the hospital to pick your anti-TB drugs (minutes.) <i>(One response required)</i>	<30 minutes  30 – 60 minutes  60 – 90 minutes  90 – 120 minutes  >120 minutes, Specify ... ..  .....



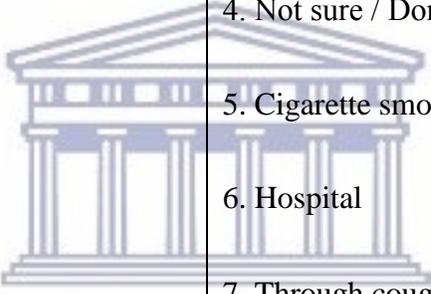
407	Do you have to take time off work to pick up your drugs?	Yes No
408	How do you travel to pick your drugs?	Walk Bicycle Motor cycle Car Mini-bus Other, Specify .....
409	Do you have to pay any transport fare to get to the hospital?	Yes No
410	Have you ever been treated for a Psychiatric illness?	Yes No
411	Have you ever had any difficulties in taking your TB drugs regularly?	Yes No
412	Have you ever had any difficulties in taking your TB drugs on time?	Yes No
413	Have you ever been or felt stigmatized for having TB?	Yes No

414	Which one of the following could most possibly make you want to quit taking your TB drugs? ( <i>Circle one</i> )	Pill taking length  Too many pills  If I vomit my pills  If I get anti-TB drugs side effects  Fear people finding out my status  Other, Specify .....
415	Have you experienced any side effects due to TB drugs? ( <i>If No, Skip to Question 500</i> )	Yes  No
416	If Yes, Which of the following have you experienced? ( <i>Circle all that apply</i> )	Nausea and Vomiting  Burning in the feet  Hypersensitive reaction (skin rashes)  decreased urine output  Swelling of breasts (males)  Deafness  Visual impairment  Other, specify .....



500	Perspective on benefits and/or costs of TB treatment ( <i>Tick one</i> )	Strongly Agree	Agree	DK	Disagree	Strongly Disagree
501	The benefits of taking my anti-TB drugs outweigh any difficulties I may encounter.					
502	Taking anti-TB drugs is too cumbersome					
503	I believe that taking my anti-TB drugs is better than not taking them.					
504	Taking anti-TB drugs will help me be healthy.					
505	I don't think there can be improvement in my health if I don't follow my anti-TB treatment plan.					
506	TB is life threatening.					
507	TB can worsen HIV/AIDS.					
508	Taking anti-TB drugs poorly can lead to complicated TB, drug resistant TB, and/or death secondary to TB.					

DK – Don't Know.

700	Beliefs and myths about TB. The following statements attempt to capture your knowledge and beliefs about TB. <i>For 701, circle the most appropriate response</i>					
701	Through which of the following ways do you think you acquired TB?	 <ul style="list-style-type: none"> <li>1. Being bewitched</li> <li>2. Angering the ancestors</li> <li>3. Being cursed</li> <li>4. Not sure / Don't know</li> <li>5. Cigarette smoking</li> <li>6. Hospital</li> <li>7. Through cough of a case</li> <li>8. Other (specify).....</li> </ul>				
<i>For 702 – 710, tick the most appropriate</i>		Strongly Agree	Agree	DK	Disagree	Strongly Disagree
702	Traditional healers can help heal TB.					
703	Even if I don't complete my anti-TB treatment, TB can completely cure.					

704	TB can be transmitted through the air?					
705	Living in congested houses with poor circulation increases chances of transmitting/contracting TB?					
706	Taking and completing my anti-TB treatment as prescribed is vital for my healing from TB?					
707	After the first two weeks of regularly swallowing my anti-TB drugs, the chances of transmitting TB to my family decreases.					
708	I have to swallow anti-TB drugs for 6 or 8 months.					
709	The time at which the medication is taken will influence its effectiveness					
710	Missing doses, taking them late/incorrectly can ruin my treatment outcome					

*DK – Don't Know.*

Thank you for your time and patience.



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## Questionnaire in Swahili

VIGEZO YA KIFUA KIKUU MATIBABU UZINGATIAJI KATI YA WAGONJWA JUU YA  
KUPAMBANA NA KIFUA KIKUU MATIBABU KATIKA TORORO, UGANDA

DODOSA YA UTAFITI

Maelekezo ya Enumerator *Italiki ni ujasiri:*

Jina la hospitali (*Jibu majibu moja*):

Tororo Hospital

Mukujju Health Center

Nagongera Health center

STUDY NUMBER:  ( <i>Kutoka hospitali ya mgojwa</i> )				
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Kuwekewa Data collector e.g. T001, T002 (T ya Tororo hospital), M001 (M ya Mukujju Health Center), N001 (N ya Nagongera Health Center).

Tarehe	___ / ___ / <u>2015</u> ( <i>siku/mwezi/mwaka</i> )
Kutokana ya Mahojiano	1. Kukamilika 2. Si kukamilika

FINAL STUDY NUMBER:				
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Kupewa principle researcher.



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100	Mkuu wa habari (Uwanja moja)	
101	Umri wa Mhojiwa (Miaka)	< 18 18-25 26-35 36-45 Zaidi ya 45
102	Jinsia (Ngono) ya kujibu	kike Kiume
103	Hali ya ndoa	Ndoa Si ndoa Talaka Kinachotenganishwa Kinyumba na
104	Je, wewe ni mkuu wa kaya?	Ndiyo Hapana
105	Je, ilisema hali yako kifua kikuu kwa mtu yeyote?	Ndiyo Hapana

106	Ambaye je wazi hali yako kifua kikuu?	Mke  Bwana  Baba  Mama  Ndugu/dada  Rafiki  Nyingine ( <i>Taja</i> ):
107	Je, unajua hali yako ya VVU? ( <i>Kama ndiyo kwenda 108, kama hakuna kwenda kwa 111</i> )	Ndiyo  Hapana
108	Hali yako ya VVU ni nini? ( <i>Kama chanya kwenda 109, ikiwa vinginevyo kwenda 111</i> )	Chanya  Si chanya  Je, si unataka kufichua
109	Je, pia kumeza dawa kwa ajili ya VVU UKIMWI?	Ndiyo  Hapana
110	Je, mke wako anajua una VVU?	Ndiyo  Hapana
111	Je, wewe ni Mkuu wa kaya yako?	Ndiyo

		Hapana
112	Je, wewe ni kudumu mkazi au ya muda mkazi katika wilaya?	Kudumu mkazi Muda mkazi
113	Masomo yako iliofika wapi?	Sija soma Msingi Sekondari Nili pitia-Sekondari
114	Una fanya kazi gani?	Wakulima Biashara Mtaalamu Kujijaji Mfanyakazi Wengine ( <i>Taja</i> )
115	Kila Mwezi, unapata pesa ngapi? (Shilingi ya Uganda)	_____
116	Na ninyi je kuishi na?	Peke yangu Familia Na wa rafiki

		Wangine ( <i>Taja</i> ) ... ..
117	Watu wangapi wanaishi katika nyumba ikiwa ni pamoja na wewe?	$\leq 3$ 4 – 6 7 – 9 $\geq 10$
118	Jinsi vyumba wengi katika nyumba? ( <i>Chaguwa au mduara moja</i> )	1    2    3    > 3
119	Ni aina yako ya ugavi wa maji ni nini?	Bomba ndani ya nyumba Bomba ingye Bore shimo Naam / spring Nyingine ( <i>Taja</i> ).. .. .
120	Je, kuna umeme katika nyumba yako?	Ndiyo Hapana
121	Ni mara ngapi wewe kunywa pombe?	Kamwe Mara chache / mara kwa mara Kila wiki, chini ya vinywaji 3 Kila siku, chini ya vinywaji 3

		Kila siku, zaidi ya vinywaji 3
122	Ni mara ngapi wewe moshi sigara?	Kamwe  Mara kwa mara  Mara kwa mara, chini ya sigara 5 / siku  4. Mara kwa mara, zaidi ya sigara 5 / siku
123	Je, moshi bangi?	Kamwe  Mara kwa mara  Mara kwa mara, chini ya bangi 5 / siku  Mara kwa mara, zaidi ya bangi 5 / siku
124	Je, matumizi ya ufa / cocaine?	Kamwe  Mara kwa mara  Mara kwa mara, chini ya mara 5 / siku  Mara kwa mara, zaidi ya mara 5 / siku

200	Kupata habari juu ya kifua kikuu	
201	Chanzo yako kuu wa habari juu ya matibabu ya kupambana na kifua kikuu ni nini? ( <i>Jibu majibu moja</i> )	Vyombo vya Habari  Afya wafanyakazi  Jamaa

		<p>Marafiki</p> <p>Kundi ya TASO ya mchezo wa kuigiza</p> <p>6. Nyingine (<i>Taja</i>).....</p>
202	<p>Uchaguzi wako preferred ya maambukizi habari ni nini? (<i>Jibu majibu moja</i>)</p>	<p>Vyombo vya Habari</p> <p>Afya wafanyakazi</p> <p>Jamaa</p> <p>Marafiki</p> <p>Kundi ya TASO ya mchezo wa kuigiza</p> <p>Nyingine (<i>Taja</i>).....</p>
203	<p>Jinsi ywingine gani unaweza kupata habari kuhusu uzingatiaji matibabu kifua kikuu? (<i>Waulize kujibu zinaonyesha preferred chanzo cha habari</i>)</p>	<p>1. Vyombo vya habari.</p> <p>2. Viji tabu</p> <p>3. Jamaa</p> <p>4. Marafiki</p> <p>5. Kundi ya TASO ya mchezo wa kuigiza</p> <p>6. nyingine (<i>Taja</i>).....</p>
204	<p>Je, kuhudhuria kifua kikuu yoyote kampeni ya ufahamu katika jamii yako?</p>	<p>1. Ndiyo</p> <p>2. Hakuna</p>

205	Kama ndiyo, na nani?	<ol style="list-style-type: none"> <li>1. Wizara ya Afya</li> <li>2. Kundi ya TASO ya mchezo wa kuigiza</li> <li>3. Shirika ya siyo ya kiserikari</li> <li>4. Wengine (<i>Taja</i>) ..... ..</li> </ol>
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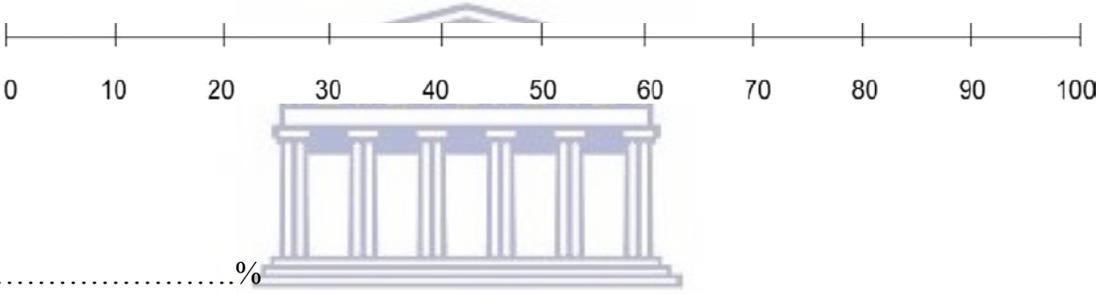


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300	Kuzingatia	
301	Nini kifua kikuu Regimen ni wewe kuchukua kwa sasa? ( <i>Jibu Moja chaguo. Ombi kuangalia kadi wagonjwa 'kama ipo kupata habari zaidi juu ya hili).</i>	<ol style="list-style-type: none"> <li>1. 2HERZ/4HR or 2HERZ/6HE</li> <li>2. 2HRZ/4HR</li> <li>3. 2SHERZ/1HERZ/5HER</li> <li>4. Nyingine, (<i>Taja</i>) .....</li> </ol>
302	Kwa muda gani umekuwa kutumia dawa kifua kikuu? ( <i>Jibu takriban zaidi</i> )	<ol style="list-style-type: none"> <li>1. Miezi 2</li> <li>2. Miezi 3</li> <li>3. Miezi 4</li> <li>4. Kupita Miezi 4</li> </ol>
303	Siku ngapi unameza tabo katika wiki? ( <i>Zinaonyesha jumla ya idadi</i> )	Siku ..... kwa wiki moja
304	Jinsi tabo (vidonge) ngapi unameza kwa siku au kwa wiki?	Tabo ..... kwa siku / Tabo ..... kwa wiki

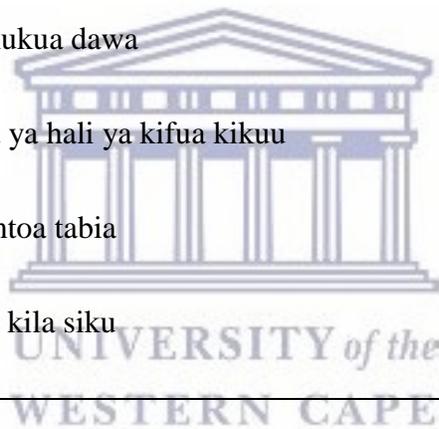
305	Je, mtu yeyote kufuatilia au kukusaidia na kumeza dawa, mfano kuku kumbusha kumeza dawa yako?	Ndiyo Hapana
306	Kama ndiyo, nani?	1. Mke 2. Baba 3. Mama 4. Sibling 5. Rafiki 6. Nyingine ( <i>Taja</i> ) .....
307	Ukiwache dawa za VVU UKIMWI, je sasa una chukua dawa nyingine yoyote kwa ajili ya magonjwa mengine?	Ndiyo Hapana
308	<i>Kama ndiyo kwa swali hapo juu</i> , ugonjwa mwingine yupi?	Shinikizo la damu Ugonjwa wa Figo Kisukari Ugonjwa wa Maini Ugonjwa wa kuzungumika kichwa Nyingine ( <i>Taja</i> ) ....

	<p><i>Kutumia maneno katika <u>kunukuu</u> kusaidia kujibu kupata tayari kwa ajili ya kuweka pili ya maswali. "Napenda kukuuliza kuhusu dawa za TB dawa kuwa wewe ni kuchukua. Baadhi ya watu juu ya matibabu ya muda mrefu inaweza miss madawa baadhi ya wakati. Inawezekana kwamba unaweza kuwa amekosa dozi chache katika wiki mbili zilizopita .... "</i></p>	
309	<p>Unafikiri yanaweza kutokea kama miss dozi moja au zaidi ya madawa ya kulevya yako ya kupambana na kifua kikuu?</p>	<ol style="list-style-type: none"> <li>1. Hakuna</li> <li>2. Kujisikia Vizuri</li> <li>3. Sikiya Vibaya</li> <li>4. Kifua Kikuu Inaweza Kuwa Mbaya</li> <li>5. Naweza Kupata matatizo</li> <li>6. Vidonge kuacha kufanya kazi</li> <li>7. Uhakika / Sijui</li> </ol>
310	<p>Je, amekosa dawa yoyote / dozi katika kipindi cha wiki 2 zilizopita?</p>	<p>Ndiyo</p> <p>Hapana</p>
311	<p>Umewahi amekosa dawa / dozi tangu kuanza matibabu hayo kupambana na kifua kikuu? <i>(Kama Ndiyo, kuendelea na swali 312, Kama ni hapana, ruka swali 400)</i></p>	<p>Ndiyo</p> <p>Hapana</p>
312		

	<p>Tafadhali eleza kwenye mstari chini ya kiwango kuonyesha nadhani wako bora kwa kiasi gani dawa zako wamechukua katika kipindi cha wiki mbili zilizopita (<i>Uongoza mujibu juu ya jinsi ya kutumia wadogo Visual analog</i>)</p> <p><i>Kukata tamaa</i> <span style="margin-left: 200px;"><i>na kukata tamaa</i></span></p> <p><i>Nimemeza</i></p> <p><i>Hakuna / madawa chache</i> <span style="margin-left: 100px;"><i>huvyo hivyo</i></span> <span style="margin-left: 150px;"><i>zaidi / dawa</i></span></p> <p><i>zote</i></p>  <p>.....%</p>
	<p><i>Kwa 313-316, tafadhali Jibu zote zinazotumika. Kutgemeana na mara ya mwisho j'olimekosa dawa yako, unaweza kuchagua sababu chini kwa nini pengine amekosa dozi yako?</i></p>
<p>313</p>	<p>Hospitali Sababu</p> <p>Hofu ya madhara / simu</p> <p>Kuwa na madhara /simu</p> <p>Wugonjwa sana kumeza</p> <p>Matibabu kushindwa / kuamuru kuacha</p>

	Mzunguko ya dozi
314	<p>Dawa Kupata</p> <p>Mbio nje ya usambazaji wa madawa ya kulevya nyumbani</p> <p>Haiwezekani kupata kituo kwa ajili ya madawa ya kulevya (usafiri)</p> <p>Haiwezekani kupata kituo kwa ajili ya madawa ya kulevya (ugonjwa)</p> <p>Dawa nje ya hisa katika hospitali / kliniki</p>
315	<p>Mgonjwa Kosa</p> <p>Umesahau kuchukua dozi</p> <p>Nilisikia bora na VVU yo kusimamishwa kuchukua dozi</p> <p>Pamoja dawa na wengine</p> <p>Waliopotea dawa</p> <p>Matumizi ya dawa za asili badala</p> <p>Alisafiri na kusahau madawa</p>
316	<p>Hali katika nyumba</p> <p>Matatizo Usalama wa chakula</p> <p>Familia mgogoro</p> <p>Kukosekana kwa msaada kutoka kwa familia</p> <p>Ukosefu wa muda kutokana na kazi / majukumu mengine</p>

	Unyogovu
317	<p>Tawala Masuala</p> <p>Kliniki masaa ya kazi si rahisi?</p> <p>Muda foleni / kusubiri muda katika kliniki?</p> <p>Ukosefu wa usiri katika kliniki?</p> <p>Usumbufu na wafanyakazi kliniki</p>
318	<p>Wasiwasi nyingine mgonjwa</p> <p>Hakuna faragha kuchukua dawa</p> <p>Hofu ya kutoa taarifa ya hali ya kifua kikuu</p> <p>Huduma Afya duni mtoa tabia</p> <p>Kuingilia masuala ya kila siku</p>



400	Vikwazo vya Kuzingatia	
401	<p>Kabla ya wakati huu, ni mara ngapi umekuwa kukutwa na kifua kikuu?</p>	<p>1. Kamwe</p> <p>2. Mara</p> <p>3. Mara mbili kwa</p> <p>4. Mara tatu au zaidi</p>

402	Je, matibabu kamili wakati wewe hapo awali kukutwa?	Ndiyo Hapana
403	Kama hapana, kwa nini? ( <i>Kama ndiyo kuendelea na 404</i> )	1. Kidonge kuchukua urefu 2. Dawa Wengi mno 3. Kama mimi matapishi dawa yangu 4. Kama mimi kupata kupambana na kifua kikuu na madhara ya madawa ya kulevya 5. Hofu watu kutafuta hali yangu 6. Nyingine, ( <i>Taja</i> )... ..
404	Je, unafikiri unaweza kuchukua dawa kama ilivyoagizwa kwa ajili ya 6 au 8 miezi?	1. Ndiyo 2. Hapana 3. Sijui
405	Jinsi mbali ni hospitali kutoka nyumbani kwako (Km) ( <i>majibu moja inahitaji</i> )	< 2 Km 2 – 4 Km 4 – 6 Km 6 – 8 Km 8 – 10 Km

		> 10 Km
406	Kwa wastani ni kiasi gani wakati gani kuchukua kwa hoja na kutoka hospitali ili kubaini kupambana na kifua kikuu yako ya kulevya (dakiika) ( <i>majibu moja inahitaji</i> )	dakiika < 30 dakiika 30 – 60 dakiika 60 – 90 dakiika 90 – 120 dakiika >120 ( <i>Taja</i> ) ..... ..
407	Je, una kuchukua muda mbali na kazi kuchukua dawa yako?	Ndiyo Hapana
408	Jinsi gani unaweza kusafiri ili kubaini dawa yako?	1. Kutembea 2. Baiskeli 3. Pikipiki 4. Gari 5. Mini-bus 6. Nyingine, ( <i>Taja</i> ) .....
409	Je, una kulipa nauli yoyote usafiri wa kupata hospitali?	Ndiyo Hapana
410	Umewahi kutibiwa kwa ugonjwa wa akili	Ndiyo Hapana

411	Umewahi matatizo yoyote katika kutumia dawa yako kifua kikuu mara kwa mara?	Ndiyo Hapana
412	Umewahi matatizo yoyote katika kutumia dawa yako kifua kikuu kwa wakati?	Ndiyo Hapana
413	Je, umewahi kuwa au waliona unyanyapaa kwa kuwa na kifua kikuu?	Ndiyo Hapana
414	yupi moja ya yafuatayo inaweza zaidi uwezekano wa kufanya unataka kuacha kutumia dawa yako kifua kikuu? ( <i>Uwanja moja</i> )	<ol style="list-style-type: none"> <li>1. Kidonge kuchukua urefu</li> <li>2. Dawa Wengi mno</li> <li>3. Kama mimi matapishi dawa yangu</li> <li>4. Kama mimi kupata kupambana na kifua kikuu na madhara ya madawa ya kulevya</li> <li>5. Hofu watu kutafuta hali yangu</li> <li>6. Nyingine, (<i>Taja</i>) .....</li> </ol>
415	Je, uzoefu madhara yoyote kutokana na madawa ya kulevya kifua kikuu? ( <i>Kama ni hapana, Ruka kwa swali 500</i> )	Ndiyo Hapana

416	Kama Ndiyo, yupi kati ya zifuatazo na wewe na uzoefu? ( <i>Uwanja zote zinazotumika</i> )	<ol style="list-style-type: none"> <li>1. Kichefuchefu na kutapika</li> <li>2. Kusikia Motto katika miguu</li> <li>3. Vipele kwenye ngozi</li> <li>4. Ilipungua pato mkojo</li> <li>5. Kuvimba ya matiti (wanaume)</li> <li>6. Uziwi</li> <li>7. Kuharibika</li> <li>8. Nyingine, (<i>Taja</i>).....</li> </ol>
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500	Mtazamo juu ya faida na / au gharama za matibabu kifua kikuu ( <i>jibu moja</i> )	Kubali sana	Kubaliana	Sijui	Hawakubaliani	Hawakubaliani sana
501	Faida za kutumia dawa zangu za kupambana na kifua kikuu zina shinda matatizo yoyote ninaweza kukutana.					
502	Kuchukua madawa ya TB ni mbaya mno					

503	Naamini kuwa kutumia dawa za kupambana na kifua kikuu yangu ni bora kuliko kutopata yao.					
504	Kuchukua madawa ya TB itanisaidia kuwa na afya.					
505	Sidhani kuna kuwa uboreshaji katika afya yangu kama mimi hawafuati matibabu mpango wangu kupambana na kifua kikuu.					
506	Kifua kikuu ni kutishia maisha					
507	Kifua kikuu inaweza kuwa mbaya VVU / UKIMWI.					
508	Kuchukua madawa ya kifua kikuu vibaya inaweza kusababisha ngumu kifua kikuu, na kifua kikuu sugu, na / au kifo sekondari kwa kifua kikuu.					

700	Imani na imani potofu kuhusu kifua kikuu. Kauli ifuatayo kujaribu kukamata maarifa na imani yako kuhusu kifua kikuu. <i>Kwa 701, mduara majibu sahihi zaidi</i>
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701	Njia ambayo ya njia zifuatazo unafikiri alipewa kifua kikuu?	<ol style="list-style-type: none"> <li>1. Kuwa rogwa</li> <li>2. Kuwaudha Mababu</li> <li>3. Kuwa walaani</li> <li>4. Si uhakika / Sijui</li> <li>5. Kuvuta sigara</li> <li>6. Hospitali</li> <li>7. Kupitia kikohozi ya kesi</li> <li>8. Nyingine (<i>Taja</i>) .....</li> </ol>				
<i>Kwa 702-710, Jibu sahihi zaidi</i>		Kubali sana	Kubaliana	Sijui	Hawakubaliani	Hawakubaliani sana
702	Waganga wa jadi wanaweza kusaidia kuponya TB.					
703	Hata kama mimi si kukamilisha matibabu yangu kupambana na kifua kikuu, kifua kikuu wanaweza kabisa tiba.					
704	kifua kikuu huweza kuambukizwa kwa hewa?					

705	Wanaoishi katika nyumba msongamano na ongezeko maskini mzunguko nafasi ya kupeleka / kuambukizwa kifua kikuu?					
706	Kumeza na kukamilisha matibabu yangu kupambana na kifua kikuu kama ilivyoagizwa ni muhimu kwa ajili ya uponyaji wangu kutoka kifua kikuu?					
707	Baada ya wiki mbili za kwanza mara kwa mara kumeza dawa yangu kupambana na kifua kikuu, nafasi ya kupeleka kifua kikuu kwa familia yangu itapungua.					
708	Nina kumeza madawa ya kifua kikuu kwa ajili ya 6 au 8 miezi.					
709	Wakati ambapo dawa ni kuchukuliwa kuwa na mvuto ufanisi wake					

710	Kukosa dozi, kuwapeleka marehemu / kimakosa unaweza uharibifu matibabu yangu matokeo					
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Asante kwa muda wako na uvumilivu



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## **APPENDIX 3: PARTICIPANT INFORMATION SHEET**

### **INFORMATION SHEET**

**Project Title: *Determinants of TB Treatment Adherence among patients prescribed anti-TB treatment in Tororo Hospital, Uganda***

#### **What is this study about?**

This is a research project being conducted by Barasa Alex Wanyama at the University of the Western Cape. We are inviting you to participate in this research project because you are a patient prescribed anti TB drugs in Tororo hospital, you have been on these drugs for at least a month, and this study is to describe poor adherence and factors that influence adherence among persons on anti-TB treatment in Tororo hospital. This study purpose is to give us the actual picture of the factors associated with poor adherence to TB treatment among persons prescribed anti-TB treatment in Tororo hospital Uganda. This will consequently be used to improve the management of Tuberculosis through addressing the determinants of poor adherence to TB treatment.

#### **What will I be asked to do if I agree to participate?**

You will be asked to participate in the above research where you will be asked questions by an interviewer who will ask you questions while and recording your responses into the questionnaire. The study will be conducted in Tororo hospital, and it will take an average of about 20 – 30 minutes for the interviewer guided questionnaire to be completed. The questions to be asked will be structured and closed ended with options for you to choose. The questionnaire

will include questions such as your age, sex, religion, marital status, education level, financial status, anti-TB treatment history, anti-TB treatment adherence status, distance from health facility, and presence of co-infections.

### **Would my participation in this study be kept confidential?**

We will do our best to keep your personal information confidential. To help protect your confidentiality, we shall assign a number instead of your name, your name will not appear on any data collection instrument, the data collected will be kept in a confidential place under lock and key and will require a secret code in order to be accessed on the computer. Through the use of an identification key, the researcher will be able to link your survey to your identity; and only the researcher will have access to the identification key. If we write a report or article about this research project, your identity will not be revealed.

### **What are the risks of this research?**

There may be some risks from participating in this research study. These include staying longer as you are being interviewed, or getting your service a little late because of your participation in the study after having the questionnaire completed.

### **What are the benefits of this research?**

This research is not designed to help you personally, but the results may help the investigator learn more about determinants of anti-TB treatment adherence. We hope that in the future, other people will benefit from this study through better understanding and improved policies of anti-TB treatment especially as regards to adherence to treatment, and the best way to implement these policies to achieve best results for people on anti-TB treatment.

**Do I have to be in this research and may I stop participating at any time?**

Your participation in this research is completely voluntary. You may choose not to take part at all. If you decide to participate in this research, you may stop participating at any time. If you decide not to participate in this study or if you stop participating at any time, you will not be penalized or lose any benefits to which you otherwise qualify.

**Is any assistance available if I am negatively affected by participating in this study?**

Any assistance that you may need if negatively affected by the research study procedures will be accorded you such as counselling and referral for care and any other.

**What if I have questions?**

This research is being conducted by **Barasa Alex Wanyama** at the University of the Western Cape. If you have any questions about the research study itself, please contact **Barasa Alex Wanyama** at: **P. O. Box 34104 Kampala Uganda, Tel +256 79 176 2709, and E-mail [alex2ug@gmail.com](mailto:alex2ug@gmail.com)**. Should you have any questions regarding this study and your rights as a research participant or if you wish to report any problems you have experienced related to the study, please contact:

**Director:**

Prof Helene Schneider

School of Public Health

University of the Western Cape

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Bellville 7535

[hschneider@uwc.ac.za](mailto:hschneider@uwc.ac.za)

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Prof Jose Frantz

University of the Western Cape

Private Bag X17

Bellville 7535

[chs-deansoffice@uwc.ac.za](mailto:chs-deansoffice@uwc.ac.za)



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**This research has been approved by the University of the Western Cape's Senate Research Committee and Ethics Committee.**

**APPENDIX 4: CONSENT FORM**

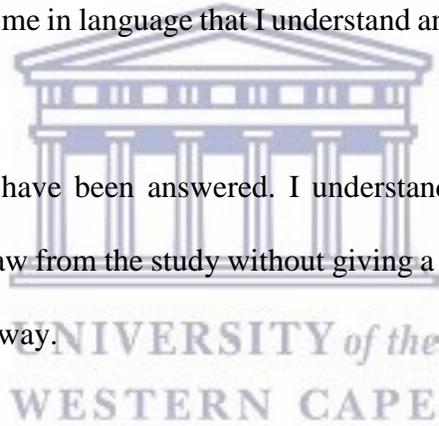
**CONSENT FORM**

**Title of Research Project:**

*Determinants of TB Treatment Adherence among patients on anti-TB treatment in Tororo district, Uganda*

The study has been described to me in language that I understand and I freely and voluntarily agree to participate.

My questions about the study have been answered. I understand that my identity will not be disclosed and that I may withdraw from the study without giving a reason at any time and this will not negatively affect me in any way.



Participant's name : .....

Participant's signature : .....

Date : .....

## **APPENDIX 5: TERMS OF REFERENCE FOR DATA COLLECTORS AND COORDINATOR**

### **Determinants of TB Treatment Adherence in Clients Prescribed Anti-TB Treatment in Tororo District, Uganda.**

#### **Data collection**

#### **Terms of reference for Data collectors (Interviewers)**

1. Recruit and introduce the study participants to the study and provide an information sheet to the study participant
2. Facilitate and acquire signed informed consent from the study participants
3. Assign facility specific study number (criteria is explained in the questionnaire)
4. Guide and assist the respondent through the questionnaire as an interviewer
5. Ensure accurate and complete data is collected
6. Proof read questionnaire for completeness
7. Keep completed questionnaires safe from anyone else awaiting handing them to the coordinator
8. Adhere to ethics during the whole data collection exercise

**Determinants of TB Treatment Adherence in Clients Prescribed Anti-TB Treatment in  
Tororo District, Uganda.**

**Data collection**

**Terms of reference for Coordinator**

1. Recruit and introduce the study participants to the study and provide an information sheet to the study participant
2. Facilitate and acquire signed informed consent from the study participants
3. Assign facility specific study number (criteria is explained in the questionnaire)
4. Guide and assist the respondent through the interviewer guided questionnaire
5. Receive all the answered questionnaires
6. Proof read all answered questionnaires for completeness
7. Assign the final study number
8. Keep all the questionnaires in a safe place (lockable cabin) to ensure confidentiality
9. Coordinate the data collection process between the 3 health facilities
10. Ensure accuracy and timelines of data
11. Pay remuneration/compensation to the data collectors
12. Enter data into excel spreadsheet
13. Contact principle researcher in case of any queries
14. Adhere to ethics during the whole data collection exercise

## APPENDIX 6: UWC RESEARCH PROJECT REGISTRATION AND ETHICS



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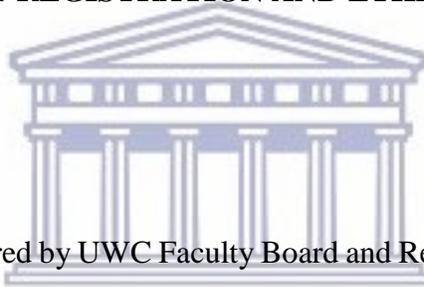
DEPARTMENT OF RESEARCH DEVELOPMENT

CLEARANCE APPLICATION

SR1

UWC RESEARCH PROJECT REGISTRATION AND ETHICS CLEARANCE

APPLICATION FORM



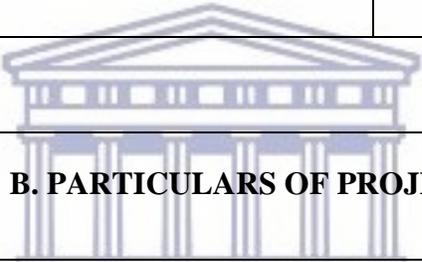
This application will be considered by UWC Faculty Board and Research Committees, then by the UWC Senate Research Committee [SR]. SR may also consult outsiders on ethics questions, or consult the UWC ethics subcommittees, before registration of the project and clearance of the ethics. No project should proceed before project registration and ethical clearance has been granted.

### A. PARTICULARS OF INDIVIDUAL APPLICANT

NAME: Barasa Alex Wanyama

TITLE: Doctor

DEPARTMENT:	FACULTY: Community and Health Sciences
FIELD OF STUDY: Public Health	
ARE YOU:	
A member of UWC academic staff?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
A member of UWC support staff?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
A registered UWC student?	Yes <input checked="" type="checkbox"/> No <input type="checkbox"/>
From outside UWC, wishing to research at or with UWC?	Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>



<b>B. PARTICULARS OF PROJECT</b>
PROJECT NUMBER: TO BE ALLOCATED BY SENATE RESEARCH COMMITTEE:
EXPECTED COMPLETION DATE:
PROJECT TITLE:  Determinants of TB Treatment Adherence among patients on anti TB Treatment in Tororo district, Uganda
THREE KEY WORDS DESCRIBING PROJECT:  Tuberculosis (TB), anti-TB treatment, determinants of TB treatment adherence

PURPOSE OF THE PROJECT:

M-DEGREE: MPH (Mini Thesis)

D-DEGREE:

POST GRADUATE RESEARCH:

**C. PARTICULARS REGARDING PARTICULAR RESEARCHERS**

	FAMILY NAME:	INITIALS:	TITLE:
PRINCIPAL RESEARCHER:	Barasa	A W	Doctor

OTHER RESEARCH PROJECT LEADERS:

OTHER CO-RESEARCHERS:



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THESIS: STUDENT RESEARCHER: Barasa Alex Wanyama

THESIS: SUPERVISOR: Ms Verona Mathews

**D. GENERAL INFORMATION**

STUDY LEAVE TO BE TAKEN DURING PROJECT (days):

IS IT INTENDED THAT THE OUTCOME WILL BE SUBMITTED FOR PEER REVIEWED PUBLICATION?

YES  NO

COMMENTS: DEPARTMENTAL CHAIRPERSON:



SIGNATURE OF THESIS STUDENT RESEARCHER – WHERE APPROPRIATE:

A handwritten signature in blue ink.

DATE: April 30, 2015

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SIGNATURE OF THESIS SUPERVISOR – WHERE APPROPRIATE:

DATE

SIGNATURE OF PRINCIPAL RESEARCHER – WHERE APPROPRIATE:

DATE:

SIGNATURE OF DEPARTMENTAL CHAIRPERSON:

DATE:

NOTE: THESE SIGNATURES IMPLY AN UNDERTAKING *BY THE RESEARCHERS*, TO CONDUCT THE RESEARCH ETHICALLY, AND AN UNDERTAKING BY THE THESIS SUPERVISOR (WHERE APPROPRIATE), AND THE DEPARTMENTAL CHAIRPERSON, TO MAINTAIN A RESPONSIBLE OVERSIGHT OVER THE ETHICAL CONDUCT OF THE RESEARCH.

## E. DESCRIPTION OF PROJECT AND RESEARCH ETHICS STATEMENT

### Abstract

Poor adherence to treatment remains a barrier to management and control of many infections including Tuberculosis (TB). Adherence to TB treatment is the strongest determinant of tuberculosis treatment outcome, and can result into treatment failure, multi-drug resistant TB (MDR-TB), or death if not addressed. Poor adherence to TB therapy is one of the major obstacles in the global fight against TB, and there is need to identify treatment default predictive factors. Uganda is one of the high TB burden countries in Africa with an incidence of 166 per 100,000 population, a prevalence of 0.154% and a mortality of 11 per 100,000 population (WHO, 2015). Prevention and control of TB is one of the priority services of the Ugandan health sector. In Tororo hospital, no study of poor adherence to anti-TB treatment has been done before and the level and factors that lead to poor adherence in patients on anti-TB treatment in Tororo hospital are not known.

**Aim:** Our study aim is to investigate adherence levels and explore factors that influence adherence among persons on anti TB Treatment in Tororo district.

**Study Design:** Cross-sectional Study Design.

**Study Population:** All TB patients on anti TB Treatment for at least 2 months in Tororo hospital.

**Data Collection:** Two trained research assistants will be employed to collect data through administering questionnaires. Participants will be recruited and interviewed on drugs refill days.

**Analysis:** The data collected from the questionnaire will be captured into Epi info software and analyzed for descriptive statistics such as frequency distributions, and measures of central tendency and dispersion. Inferential analysis will be conducted using logistic regression for both bivariate and univariate analysis using a 5% level of significance.

#### **ETHICS CONSIDERATIONS**

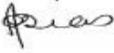
An application for ethics approval to undertake the study will be submitted to the UWC Ethics committee. Permission to collect data from patients in Tororo hospital will be requested from Tororo Hospital authorities. Participation will be voluntary without any form of coercion. Information sheets explaining the study details, benefits, the study's voluntary nature, and assurance of confidentiality and privacy will be availed to the participants in both English and Swahili and will be explained further by the research assistants. Informed consent will be sought and only signed by patients who accept to participate in the study. Privacy will be enhanced by administering the questionnaire to one patient at a time in the absence of other patients. The identities of all participants will be kept secret by using codes instead of participants' names, and all collected information will be stored privately in a lockable cabinet. Participants who may develop psychological or emotional harm will be referred to the health counsellor for help.



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## APPENDIX 7: LETTERS OF APPROVAL TO CONDUCT THE STUDY

### Letter of approval from University of Western Cape Ethics committee

 <p><b>UNIVERSITY of the WESTERN CAPE</b></p>	<p><b>OFFICE OF THE DEAN DEPARTMENT OF RESEARCH DEVELOPMENT</b></p>
<p>11 June 2015</p>	
<p><b>To Whom It May Concern</b></p>	
<p>I hereby certify that the Senate Research Committee of the University of the Western Cape approved the methodology and ethics of the following research project by: Dr AW Barasa (School of Public Health)</p>	
<p>Research Project:</p>	<p>Determinants of TB treatment adherence among patients on anti TB treatment in Tororo district, Uganda.</p>
<p>Registration no:</p>	<p>15/4/55</p>
<p>Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.</p>	
<p>The Committee must be informed of any serious adverse event and/or termination of the study.</p>	
	
<p><i>Ms Patricia Josias Research Ethics Committee Officer University of the Western Cape</i></p>	
<p>Private Bag X17, Belville 7535, South Africa T: +27 21 959 2988/2948 . F: +27 21 959 3170 E: pjosias@uwc.ac.za www.uwc.ac.za</p>	<p>A place of quality, a place to grow, from hope to action through knowledge</p>



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Letter of approval from Tororo District Local Government Health Office

**TORORO DISTRICT LOCAL GOVERNMENT**

**DISTRICT HEALTH OFFICE**

TELEPHONE: DHO ..... +256-0772457360

E-mail: ..... daudicyrus@gmail.com



THE REPUBLIC OF UGANDA

TORORO DISTRICT

P. O. BOX 1

TORORO

IN CASE OF ANY CORRESPONDENCE ON  
THIS SUBJECT PLEASE QUOTE REF. NO.

August 10, 2015

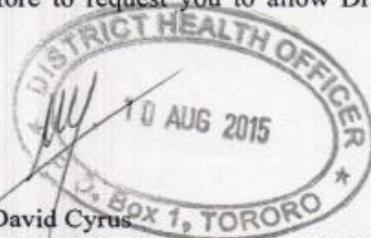
The Medical Superintendent  
**Tororo Hospital**

In charge Mukuju / Nagongera HC IV

**RE: Research on Determinants of TB treatment adherence among patients on anti TB treatment in Tororo District, Uganda.**

The above mentioned/captioned project has been approved by the relevant research review board.

This is therefore to request you to allow Dr. Baraza A. W to collect data from your institution.



Dr. Okumu David Cyrus  
**DISTRICT HEALTH OFFICER, TORORO.**



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