

**ADHERENCE TO PULMONARY TUBERCULOSIS TREATMENT IN
MURANG'A COUNTY, KENYA**

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**A RESEARCH THESIS SUBMITTED IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE AWARD OF THE DEGREE OF MASTER OF
SCIENCE IN ENVIRONMENTAL HEALTH IN THE SCHOOL OF PUBLIC
HEALTH AND APPLIED HUMAN SCIENCES OF
KENYATTA UNIVERSITY**

MARCH 2020

DECLARATION

I declare that this thesis is my original work and has not been presented for a degree in any other University.

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DEDICATION

To the Almighty God for good health throughout the study period and after. To my family members Emma, Alvin and Victor for their support and understanding during the study duration.

ACKNOWLEDGEMENTS

I acknowledge my two supervisors, Dr Jackim Nyamari – Department of the Environmental and Occupational Health and Dr Judy Mugo – Department of Population, Reproductive Health and Community Resource Management for their support supervision and valuable suggestions in improving my study, their professionalism and patience remain admirable.

I would like to appreciate the Department of the Environmental and Occupation Health for giving supervisors. Am indebted to Kenyatta University Graduate School and the Ethics Review Committee for the useful inputs, Clearance and Research Authorisation. Many thanks to the National Council of Science Technology and Innovation for granting permission to carry out the research

A word of thanks to the Health Administration Murang'a County and Maragua Sub County for allowing me to carry the study and also thank Ministry of Interior for guaranteeing security.

Finally, to all respondents for sparing their time to attend to the interviews.

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ABBREVIATION AND ACRONYMS

AIDS	Acquired Immune Deficiency Syndrome
BCG	<i>Bacilla Calmette-Guerin</i> vaccine
CHW	Community Health Worker
DOTS	Directly Observed Treatment Strategy
ETH	Ethambutol
FGD	Focus Group Discussion
INH	Isoniazid
IUATLD	International Union against TB and Lung Disease
KDHS	Kenya Demographic Health Survey
KII	Key Informant Interviews
KTBPS	Kenya Tuberculosis prevalence Survey
LOK	Laws of Kenya
MDR-TB	Multi-Drugs Resistant Tuberculosis
MOH	Ministry of Health
MTB	Mycobacterium Tuberculosis
NACOSTI	National Commission for Science, Technology, and Innovation
NSPTLLH	National Strategic Plan for Tuberculosis, Leprosy and Lung Health
NTLP	National Tuberculosis and Leprosy Control Program
PTB	Pulmonary Tuberculosis
PZA	Pyrazinamide
RIF	Rifampicin
SPSS	Statistical Package for Social Sciences
TB	Tuberculosis
WHO	World Health Organization
XDRTB	Extensively Drug-Resistant Tuberculosis

OPERATIONAL DEFINITION OF TERMS

Adherent Factors – Social Economic and demographic, Disease and Medicine , Patient or health care system related – This entails various elements that lead to the patient not complying with the medications (World Health Statistics, 2015).

Adherence to TB Treatment – This is the easiness and willingness to undertake the prescribed medication as per the health professional instructions (WHO, 2012). This ensures that the patient adheres to the recommended dosages and frequencies. In this study the adherence was based on taking the TB drugs at the stated times, under the stated conditions for the stated period of time as per the healthcare professional guidelines (World Health Statistics, 2015). In this study the adherence meant completion of treatment of treatment within the specified duration(World Health Statistics, 2015).

BCG Vaccine – This is *Bacille Calmette - Guerin* vaccine which is a live vaccine against TB. It's derived from an attenuated strain of *Mycobacterium Bovis* and its efficacious in prevention of disseminated form of TB in Children (IUATLD, 2010).

Extensively Drug Resistant TB (XDR-TB) – A form of MDR_TB that resists to any of the 2nd line anti TB drugs (amikacin, kanamycin, capreomycin)

First-Line TB drugs – These are drugs used in the treatment of TB which is susceptible (WHO, 2010). These are Rifampicin, Isoniazid, Pyrazinamide, Ethambutol, and streptomycin (GOK, 2011). 2nd line drugs are used in the treatment of TB which is resistant and non-susceptible bacteria (GOK, 2011). These drugs are less effective and more toxic than 1st. line the drugs. They are *Ethionamide, Kanamycin, amikacin,*

ofloxacin, moxifloxacin, levofloxacin, terizidone, amoxicillin and clarithromycin (WHO, 2010).

In-depth interview - This is a qualitative research technique that involves conducting intensive individual interviews with a small number of respondents to explore their perspectives on a particular idea, program or situation.

New case- patient who has never had treatment of TB.

Non-Adherence – Missing more than one week for collection of oral drugs (defaulters) or defaulting for more than one month (abandoned treatment). This group includes patients who defaulted and were later retrieved through any means (letters, calls, home visits, or on their own accord (defaulter retrieval or abandoned defaulter retrieval).

Recurrence – Refers to re-diagnosis of smear positive TB in patients who were declared cured or treatment complete in the past with or without smear positive results.

Rifampicin -resistant TB (RR-TB) - TB caused by TB bacteria resistant to at least rifampicin, one of the most effective TB drugs. Requires 2nd line drugs like MDR TB patients.

Treatment Outcomes:-

Treatment failure – Either a patient having a positive smear or culture result at 5 months of treatment or later or poor clinical response at 5 months treatment or later

Treatment completion – Completing TB therapy without evidence of treatment failure and not having a record of a negative smear or culture result at the end of therapy and on one prior occasion (successful treatment outcome).

Treatment cure – Having confirmed TB and being smear or culture negative at the end of treatment and on at least one prior occasion (successful treatment outcome).

Treatment Regime – this regime has been implemented in Bangladesh which ranks among top 30 countries with high TB burden, for treatment of uncomplicated MDR TB (where bacteria are only resistant to the first line drugs, Rifampicin and isoniazid). The exclusion criteria are 2nd line drug resistance, extra pulmonary TB and pregnancy. Regime: Kanamycin, Moxifloxacin, Prothionamide, clofazimine, and Pyrazinamide.

Tuberculosis – This is an airborne bacterial infection caused by *Mycobacterium tuberculosis*. TB involving the lungs is called pulmonary TB (WHO, 2010) and when it attacks other body parts like bones, kidney, spine, etc. it's called Extra-pulmonary TB (IUATLD, 2010).

ABSTRACT

Non-adherence to Tuberculosis treatment is a major barrier for TB control programs because incomplete treatment may result in prolonged infectiousness, drug resistance, relapse and death. Successful treatment of TB involves taking anti TB drugs for at least six months as per the doctors advise. Currently, Tuberculosis has become a resurgent public Health problem in developing countries and is the leading cause of death from any single infectious agent. The purpose of the study was to identify factors contributing to non-adherence to TB treatment amongst pulmonary TB patients in Maragua Sub-County of Murang'a County. The objectives included were to determine the social-economic related, healthcare-related, patient-related and disease and medicine related factors associated with non-adherence of TB treatment amongst patients in Murang'a County. The study was guided by the Health Belief model as the theoretical framework. A cross-sectional survey study design was used. Census method was used and all 270 people were considered. Data was collected using a mixed method approach of interview guides, questionnaires and Focus Group Discussions. A total of 270 adult Pulmonary TB patients, amongst whom 59 (47%) were adherents and 67(53%) non adherents with TB treatment, who received treatment in 2017 and had completed treatment, Community Health workers, and Health Personnel in the TB clinic participated in the study. Data was entered to EPI INFO version 3.5.3 and analysed using Statistical Package for Social Sciences (SPSS) version 22. Multiple logistic regressions was used to identify associations and to control potential confounding variables. Chi Square was used to test independence of categorical variables with p value of less than 0.05 at 95% confidence interval being considered significant. Data presentation was done using figures and tables. From the results of the study only the distance taken to collect drugs in the health facility was found to be associated with non-adherence to TB treatment (n=9 ,13%). The study recommends that measures should be undertaken so as to reduce the non-adherence level to TB treatment by ensuring anti-Tb treatment is accessible to patients at the nearest Health facility from their residence. Additionally, the study proposes that the patients should be sensitized on the importance of adherence to TB drug medication. Interventions with Health promotion initiatives emphasizing the benefits of treatment adherence should be enhanced in the communities by further large scale multicentred studies and that an enabling environment which is conducive for good patient interactions should be created. The study concludes that there are challenges facing adherence of TB treatment which ought to be addressed. The study, suggests that measures to improve drug adherence such as improving health conditions, increasing the availability of drugs and conducting health educations to the patients is essential in minimizing the drug non-adherence to TB drugs.

CHAPTER ONE: INTRODUCTION

This chapter covers the study background, the problem statement, the objectives of the study, research questions that the study aimed to address, and justification of the proposed study.

1.1 Background to the Study

Tuberculosis (TB) is the top infectious killer worldwide with 1,7 million deaths attributed to it in 2014 (World Health Statistics, 2015). Tuberculosis is a highly communicable disease that is brought about by the infectious agent being transmitted from an infected individual or animal to a susceptible host. The disease is contagious and caused by a number of airborne microorganisms including; *M. Africanum*, *M. Tuberculosis*, and *M. bovis*, which are spread when infected persons cough, sneeze or speak and susceptible persons inhale the infected air, (Karumbi & Garner, 2015). Tuberculosis is highly ranked in all the lists of countries having high per capita burden of TB, TB/HIV list. And MDR-TB (WHO, 2017). Its however easily preventable (BCG at birth) and treatable if medication is taken as prescribed. The effectiveness of treatment is dependent on a combination of correct dosage, sufficient time and adequate drugs (Tang, Zhao, Wang, Yin, & Zhao, 2015).

According to WHO, (2018) there were at least 2.5 million individuals in Africa who fell ill as a result of TB in 2016 alone which accounts for at least a quarter of the new cases in the world. Additionally, 417,000 people in Africa died due to TB which accounts for 25% of all TB deaths occurring in the African region. The most affected countries in Africa include Nigeria and South Africa with TB also acting with the leading killer of HIV positive people in the region (40% of HIV deaths in 2016) (WHO, 2018).

Kenya uses a standard six months treatment for TB as guided by WHO but treatment adherence remains a major challenge to the effectiveness of treatment (GOK, 2007). Adherence to treatment is described as the extent to which the patients follow instructions on how the medication prescribed is to be undertaken (Osterberg & Blaschke, 2005). Factors associated with non-adherence can be categorised into Health- Care- System related or Individual (social Economic or Behavioural) related (Ali & Prins, 2016). In Ethiopia non-adherence was attributed to forgetfulness, medicine side effects, travelling, and distance to the health facility (Theron, Peter, Zijenah & Chanda, 2015). Stigma was found to be a hindrance to adherence in India (Kastien, Abulfathi, Rosenkranz, & Bennett, 2016). Other factors found to impact on adherence were lack of knowledge about TB, smoking, distance travelled to collect medicine and patient feeling well after few months of treatment (Kastien et al., 2016).

However, the factors contributing to non-adherence of TB treatment have not been previously studied in Maragua, therefore to identify the real factors influencing adherence in Maragua in the social context, a cross sectional survey design was carried out with the goal of providing policy makers with recommendations to improve on adherence which would benefit the individual, program and society at large.

1.2 Problem Statement

According to WHO, treatment is availed free of charge to all TB patients and the disease being highly treatable, the world should be tb free by 2030, among other epidemics (WHO, 2013). The national Strategic Plan on TB in Kenya aims to reduce TB incidence by 5%, reducing mortality by 3%, and raising treatment success to 95%, from 2014 figures, by 2018 (GOK, 2019).

However, despite the fact that a lot of resources have been directed towards making the world tb free, available data reveal that the incidence rate in Kenya ranges between 213-515 per 100,000 population, treatment success rate of 87%, and mortality rate ranges between 33-93% (GOK, 2019). Cases that are not notified to NTLLDP are unacceptably high at 55%, with prevalence: Notification ratio of 2.5:1. Murang'a county is not exempted from this data with its incidence rate confirmed at 513 per 100000 population and over 10% non-adherence rate (GOK, 2018). Maragua has an incident rate of 522 per 100,000 population and non-adherence rate of over 22% (GOK, 2018) making it rank top amongst all other sub counties in Murang'a. Tuberculosis is ranked 4th leading cause of death in Kenya, accounting for 6.3% of all deaths (KNBS, 2014) and 4th among the top 10 killer diseases in Murang'a. (GOK, 2016).

Treatment adherence is a key factor for treatment success and non-adherence is associated with adverse outcomes like high morbidity and mortality, development of Multi-Drug-Resistant TB (which is very expensive to treat), relapse among others. (NTLLDP, 2014). This study therefore aimed to determine the indices that influence non-adherence to pulmonary tuberculosis (*Mycobacterium Tuberculosis*) treatment in Murang'a County.

1.3 Research Questions

1. What are the socio-economic related factors responsible for non-adherence of TB treatment in Murang'a County?
2. What are the healthcare-related factors associated with non-adherence of treatment amongst TB patients in Murang'a County?
3. What are the patient-related factors associated with non-adherence of TB treatment amongst patients in Murang'a County?

4. What are the diseases and medicine related factors associated with non-adherence of TB treatment amongst patients in Murang'a County?

1.4 Objectives of the Study

1.4.1 Main Objective

The main objective of the study was to determine the indices that influence non-adherence to pulmonary tuberculosis (*Mycobacterium Tuberculosis*) treatment in Murang'a County.

1.4.2 Specific Objectives

1. To determine the socio-economic related factors associated with non-adherence of TB treatment amongst patients in Murang'a County.
2. To identify healthcare-related factors associated with non-adherence of treatment amongst TB patients in Murang'a County.
3. To establish the patient-related factors associated with non-adherence of TB treatment amongst patients in Murang'a County.
4. To establish the disease and medicine related factors associated with non-adherence of TB treatment amongst patients in Murang'a County.

1.5 Justification of the Study

In 2008, WHO estimated about 2300 cases of MDR-TB in Kenya, with twenty eight registered cases in Murang'a County and six cases in Maragua Sub-County (MOH, 2015). Maragua Sub-County has the highest prevalence rate of TB in Murang'a County, contributing over 20% (393) of the total TB patients enrolled in 2014 (MOH, 2015). According to data from MOH Department of Murang'a County in 2015, 8.2% of patients were non-compliant (MOH, 2015).

The Public Health Act, Chapter 242 Laws of Kenya, Section 27 has a provision for involuntary confinement and forced medication for defaulting patients with infectious diseases. However, this Law has been declared not only unconstitutional in Kenya but in violation of the Principles of Syracuse (Kenya Law Review, 2014). This leaves research into the factors that lead to default as the best approach in addressing non-adherence.

In keeping with the impact targets for the National Strategic Plan whose aims are reducing TB incidence by 5% from 2014 figures, reducing mortality by 3%, among others, this study and others of the same nature will contribute to the achievement of the same (MOH, 2014). The threat of MDR has provided a major momentum into the study of factors that determine patients' adherence to treatment. For the first time, the world is faced with a health threat against which the only effective barrier is not only medical but behavioral (Cockerham, 2001). No study in Maragua Sub-County or the greater Murang'a County is documented (MOH, 2015).

In keeping with the UN Sustainable Development goal 2030, Goal no, 3:3 aims at ending epidemics of HIV/Aids, tuberculosis and Malaria by year 2030 which makes it vital to examine factors that help alleviate the burden of TB (UN, 2015).

1.6 Significance of the Study

The study outcome will shed more light on why there are high default rates and subsequent low TB treatment success rates in Murang'a County. This will help government and health facilities to develop strategies which would help in improving the level of non-adherence among TB patients. The study will contribute to the existing literature on health-related and patient-related factors associated with poor TB treatment adherence in general and specifically for Murang'a County. This study will

also benefit patients as the findings will be used to overcome barriers and to develop policies on adherence to treatment and treatment default rates will be reduced.

1.7 Limitation of the Study

This study employed a cross-sectional design as such it has limitations in the sense that in order to determine indices associated with non-adherence, follow up is required. However, this design only enabled the researcher to collect data in a specific period in time as such for academic reasons and the exclusion criteria left out a number of respondents.

1.8 Delimitations of the Study

This study mainly focused on factors associated with non-adherence in Muranga county as such these findings cannot be generalized to other areas in the country.

1.9 Hypothesis

Null hypothesis

- 1) There is no association between socio-economic factors and non-adherence of treatment amongst TB patients in Murang'a County.
- 2) There is no association between healthcare-related factors associated with non-adherence of treatment amongst TB patients in Murang'a County.

1.10 Theoretical Framework

1.10.1 The Health Belief Model

This framework is based on selected components of the Health Belief Model namely perceived benefits of action, the perceived barrier to action, and perceived severity of ill health (Rosenstock, 1974). The HBM views health behavior change to be based on a rational appraisal of the balance between barriers to, and benefits of action and that

the perceived threat is influenced by cues to action (Rosenstock, 1974). The Health Belief Model is relevant to this study because it helps in understanding how the health behavior may be explained by the personal perceptions (Ali, 2002). Hence positive attitudes will lead to improved adherence.

In relation to the health belief model, peoples belief of the on a particular health issue or threat and the effectiveness of a particular health behaviour or action eventually contributes to an adoption of the health behaviour. This model is mainly derived from the psychological and behavioural theories which are composed of two components which are linked to health behavior which includes the desire to avoid illness and that a specific health action can prevent or cure particular health disease. However, an individual's course of action will be based on their perception of the benefits and barriers associated with the adoption of particular behaviour (Ali, 2002).

The HBM model is composed of six constructs with the first four being the original tenets of the model and the last two which were thereafter added. These are inclusive of perceived susceptibility (perception of risk of acquiring an illness or disease), perceived severity (Feelings associated with the seriousness of the illness or disease), perceived benefits (perception of the effectiveness of a particular action aimed at reducing particular disease or illness), perceived barriers (feelings on the obstacles associated with performing a recommended health action), Cue to action (Stimulus required in triggering the decision making process) and Self-efficacy (the level of confidence to successfully perform a particular behaviour) (Ali, 2002).

Evidence suggests that the more the prescribed medication is congruent with the patient's belief systems, the more likely they are likely to comply with the suggested treatment. (Marks *et al*, 2011)

According to previous research in and outside Kenya (Muture *et al.*, 2011; Obwoye, 2016), adherence to therapy is a multidimensional phenomenon which is determined by several factors including the patient's conditions, the social economic conditions related to the patients and healthcare conditions and that designing effective intervention strategies require a deep understanding of these factors (Muture *et al.*, 2011).

1.11 Conceptual Framework

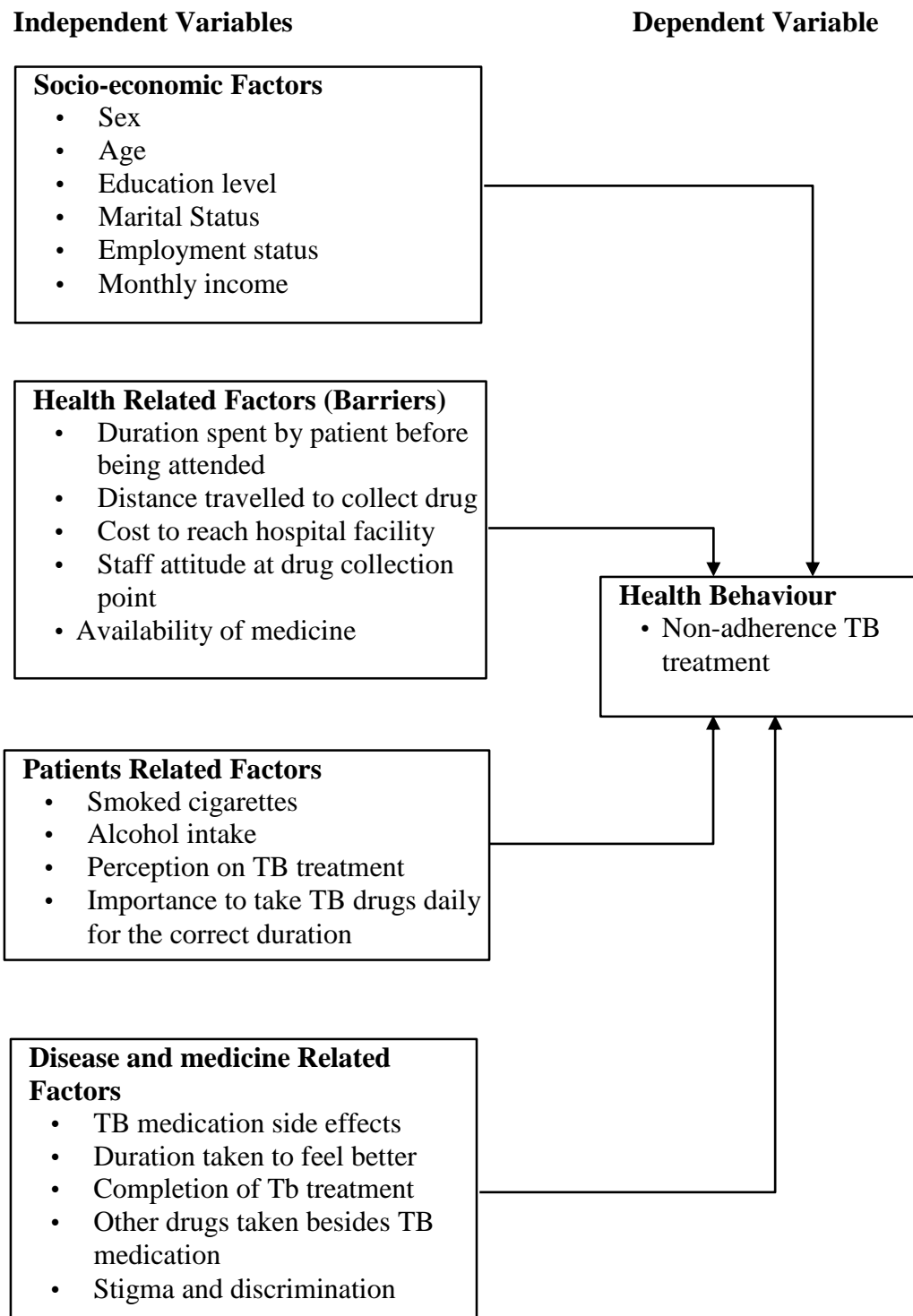


Figure 1.1: Conceptual Framework

Source: Uma & Rogan Gibson (2001)

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter reviews the relevant literature from the studies conducted earlier but pertaining to the factors associated with or contributing to TB treatment adherence or non-adherence. The scope aims to obtain empirical evidence from the latest Journals, World Health Organization Publications, MOH Reports, Internet, etc.

2.2 Tuberculosis Status in Kenya

Tuberculosis control in Kenya conforms to the WHO strategy which was previously eight months but a shorter six months' regime was introduced in 2007. Directly observed treatment was recommended in Kenya by the WHO in 1993. Currently, Kenya is ranked thirteenth among the twenty-two countries having a high burden of TB internationally (WHO, 2013). The TB incidences increased almost nine times from 11,625 cases in 1990 to 116,723 cases in 2007 mainly due to HIV pandemic (MOH, 2007).

Treatment success stagnated at 8%; despite the government's policies in providing free treatment. As such, a low adherence to the treatments given was the main contributor to the 85% global target not being met. The poor adherence to the TB treatment means the patients will remain infected for a long duration of time and are more prone to succumb to the illness or, in the worst case scenario, develop drug-resistant TB which would result in additional costs of treatment (Karumbi & Garner, 2015).

2.2.1 Initiation of TB Treatment

All patients who reveal the following symptoms are investigated for TB; fatigue, night sweats, and fever, loss of appetite and weight, sputum production which may be bloodstained, shortness of breath and chest pains and persistent cough for two weeks or

more (Cindy, 2013). Two sputum specimens are collected from patients with such symptoms.

The standard treatment procedure for TB patients aged eight years and above includes four drugs – *rifampicin*, *isoniazid*, *pyrazinamide*, and *ethambutol* – to the initial 2 months which are in the intensive phase. Following this is two drugs that are combined, that is *isoniazid* and *rifampicin* which are administered to the patient for four months (MOH, 2007). Those patients, who have interrupted their prescribed treatment for two months consecutively, are termed to be out of control as per WHO (WHO, 2011).

2.2.2 Adherence to TB Treatment

Adherence occurs when a patient picks drugs from the clinic on schedule, takes the prescribed medication without any interruptions for a period not less than two months and ensures the course is complete. This, in turn, pre-determines greatly whether the outcomes were positive or not (Pandit & Chaudhery, 2008). Adherence to TB treatment refers to taking TB treatment daily at the stated times and recommended dosages in line with the guidelines for TB treatment for about half a year until the patient is declared to be completely free from the infection (Mokgoadi, 2002). Adherence can also be termed as the level to which medical recommendations coincide with the patient's acceptance and behavior (Gandhi *et al.*, 2006). Local and appropriate measures should be taken to establish the various obstacles that may cause the patient to be non-compliant to the TB treatment (WHO, 2010). This has seen Kenya observe and adopt the DOTS strategy (WHO, 2011) and can either be Clinic-Based DOT, workplace DOT or Community-Based DOT (WHO, 2011).

2.2.3 Non-adherence to TB Treatment

The patients not being compliant to the TB treatment can be attributed to a number of factors. According to a study conducted in Colombo, these factors may include the medical personnel's incompetency in addressing the illness and the patients feeling to be cured and thus do not complete the dosage (Chani, 2010). Similarly, a study conducted in Thailand established that poor adherence to the TB treatment will result in various adverse medical conditions (Anuwatnonthakate *et al.*, 2008). Tuberculosis non-adherence rate in Kenya is now at 82% (MOH, 2015). Murang'a County at 81% with Maragua Sub-County recording the highest non-adherence and lowest cure rate of 78% (GOK, 2014). The main contributing factors to non-adherence are the long-term treatment and drug toxicity (Chowdary *et al.*, 2017). Adherence leads to reduced TB morbidity and mortality and hence disease burden reduction (WHO, 2011).

2.2.4 Factors Influencing Adherence to TB Treatment

These include patient-related factors, health service delivery factors, condition-related factors and social economic factors (Chani, 2010).

2.2.4.1 Patient-related Factors

These include age, sex, level of knowledge about TB disease, stigma, smoking habit and ignorance on the need to comply with treatment (Comlet *et al.*, 2010). TB patients aged more than 25 years tend to be more compliant to the given TB treatment as compared to those below that age. Being younger than 25 years may lead to patients being more impatient in acquiring medications (Fagundez, Perez-Freixo, Evene, Momo, & Bive, 2016). With regard to education, the adherence increased drastically with the literacy levels. Education promotes good health by not only generating economic resources

through better jobs but also by providing knowledge and skills by which people are able to manage illnesses and disease themselves (Danso *et al.*, 2015).

Knowledge of TB – It is also called treatment literacy. Adherence with TB treatment is significantly higher among patients who have knowledge on TB (Cremers, de Laat, & Kapata, 2015). Knowledge and attitude towards TB and its treatment vary due to culture, religion, and tradition. Lack of knowledge on symptoms and signs of TB may lead to late diagnosis and treatment.

Stigma, discrimination and co-morbidities – The fear that the patients will be stigmatized may prevent them from disclosing the disease (Chani, 2010). As such the TB and HIV patient stigmatization causes the patient to delay in seeking medical assistance (Furber, Hodgson, Desclaux, & Mukasa, 2004). Particularly, the HIV co-infected patients were found to have double the risk of defaulting during treatment in Nigeria (Daniel, Oladapo, & Alausa, 2006).

Perceived severity of ill health condition – This includes failure of the patient to acknowledge the dangers of not completing TB treatment because of subsiding TB symptoms or feeling better (Cindy, 2013). Studies conducted in various countries such as Malawi and Zambia showed that non-adherence was mainly brought about the patients being free from symptoms (Chani, 2010).

2.2.4.2 Socio-Economic Factors

These factors include low-income levels, low awareness, inadequate social support and not being able to purchase the medications (Dodor & Afenyadu, 2005). The duration and expenses involved in TB management will determine how the patients become compliant (Cindy, 2013). However, a study in India yielded contrary results as it didn't find any

significant association between social economic status and treatment adherence (Pandit & Chaudhery, 2008). According to a research done in Nairobi by Muture *et al.* (2011) inadequate food, being unmarried and low level of education are the major social factors associated with default.

2.2.4.3 Health Care System Factors

These constitute the poor attributes pertaining to the health care provision, which may range from the service providers' attitudes to their incompetence in delivering TB Treatments, TB drug shortages and long travelling time to treatment centre, long waiting time and accessibility or living near a facility (Daniel *et al.*, 2006; Wasonga, 2006). However, the proper and enhanced relationship between the provider and the patients will improve compliance (Dodor & Afenyadu, 2005). Additionally, the patient counseling and education, accompanied by TB care which is convenient to the patient will enhance the adherence levels to the TB treatments.

2.3 Measuring Non-adherence

This is a difficult task since patients and healthcare workers provide an inaccurate estimate. Generally, the two give a picture of higher adherence. Checking medical records to confirm follow-up and checking pharmacy records are more objective measures of adherence to medication (Friedman, 2002). The best objective measure of drug taking is by direct measure of the medication in the patient's body by means of tracer or the medical metabolic by-product (urine testing). However, measurement of adherence to TB treatment is not complicated since the patient is required to consistently report to the health facility to pick the pills. Failure to attend the health clinic would constitute non-adherence (Dodor & Afenyadu, 2005). The reviewed literature shows adherence and non-adherence to TB treatment should be understood from the health care personnel point of view and

also the patient perception. The complex array of factors that contribute to adherence behavior must, therefore, be understood based on the approach that is patient-centered (Pandit & Chaudhery, 2008).

2.4 Summary of Literature Review

In relation to the presented literature, TB in despite being controllable causes a significant number of deaths in the world as a result of non-adherence. Its initiation is associated with symptoms like fatigue, night sweats, and fever, loss of appetite and weight, sputum production which may be bloodstained, shortness of breath and chest pains and persistent cough for two weeks or more. Two sputum specimens are collected from patients with such symptoms. One of the biggest contributors to the continuous occurrence of TB cases in the world is non-adherence to TB medication from patients. The level of non-adherence in Kenya is recorded at 82% and at 81% at Maragua sub-county. Non-adherence among the patients to TB medication is attributed to patient-related factors like age, sex, level of knowledge about TB disease, stigma, smoking habit and ignorance on the need to comply with treatment; socio-economic factor like low-income levels, low awareness, inadequate social support and not being able to purchase the medications; and health care system factors like poor attributes pertaining to the health care provision, delivery of TB Treatments, TB drug shortages and long travelling time to treatment centre, long waiting time and accessibility or living near a facility.

2.5 Research Gaps

A majority of the literature presented mainly focuses on health facilities which are based in urbanized areas. Very little information focuses on the level of TB medication adherence in rural areas.

CHAPTER THREE: MATERIALS AND METHODS

3.1 Introduction

This chapter presents the research methodology that was used in the collection of data. It provides information on the target population, population sampling, data collection instruments and data analysis.

3.2 Research Design

The researcher applied both quantitative and qualitative approaches in order to explore and describe the factors influencing to non-adherence to treatment from majority of patient's point of view. This study employed a descriptive cross-sectional survey study design which aims at describing and identifying relationships among variables, this being the relationship between non-adherence to TB treatment and social-economic, healthcare systems and patient-related factors. This study design most suited the project as the study was conducted over a specified period of time.

3.3 Variables

3.3.1 Independent Variables

Independent variables can be defined as variables which can be controlled or changed in a particular study (Kothari, 2004). This is inclusive of socio-economic factors (Age, sex, and Education, marital status, employment status and monthly income, health-related factors (Duration spent by patient before being attended. Distance travelled to collect medicine, cost of reaching hospital, health staff attitude at medicine collection centre and medicine availability), patient related factors-smoking, alcohol intake, perception on TB treatment. Importance of taking TB medicine daily and for the correct duration) and disease and medicine related factors (side effects. Duration taken to feel better, completion of TB treatment, other medication, stigma and discrimination)

3.3.2 Dependent Variables

Health Behaviour - Non-adherence to TB treatment.

3.4 Study Area

The Study was conducted in Maragua Sub-County (Appendix 3). It is one of the eight sub-counties of Murang'a County. The study area is located along Murang'a – Sagana road it borders Kirinyaga, Embu, Machakos, and Kiambu counties in the North, East, South and west respectively (see the map appendix x). It's characterized by high poverty levels with over 34% living below absolute poverty line. It has a total population of over 300,000 with a male: female ratio of 1:1 and annual growth rate of 0.3%. Fifty-five (55%) of the population is above 18 years while 9.3% are elderly men and women above 60 years. This study area was selected because tuberculosis is prevalent (at 81% with Maragua Sub-County recording the highest non-adherence and lowest cure rate of 78% (GOK, 2014) in this area owing to high poverty levels, alcoholism and poor infrastructure and housing problems. It has 11 health facilities with TB patients being referred to, after registration at, Maragua level four, hospital (GOK, 2014).

3.5 Study Population

Group whose members possess specific attributes which the researcher is interested in studying. The target population (the full set of individuals with a particular aspect to be studied and for which the researcher would like to generalise the findings (Mugenda & Mugenda, 2003) and accessible population (a set of individuals from which the actual sample is drawn.)

The study population included all TB patients (pulmonary, adults, new and retreated patients) transferred in and out of the study area from 1st January to 31st December 2017

totaling to 270. (GOK, 2017). The hospital staff identified patients who registered between January 2017 and December 2017, had completed treatment and classified them to adherent or non-adherents Their details were available in the treatment cards.

3.6 Sampling Techniques and Sample Size

3.6.1 Sampling Techniques

The sampling frame is the sum of populations from where the study respondents are selected (De Vos, 2007) . Considering that the study was dealing with a special group of patients, i.e. TB patients, a non-probability sampling method, Purposeful sampling method, where elements are selected for a purpose was employed. Guidelines used for designing Purposeful sampling are Knowledge of the subject, willingness to talk and representation of the necessary range of points of view. Patients' register was used as the sampling frame to select the patients attending clinic from 1st January 2017 to 31st December 2017. The researcher approached eligible participants, explained about the study and recruited those who agreed to participate simple random technique.

3.6.2 Sample size determination

Since the study population was small (270 from Maragua level four, hospital) census method was applied. This is a type of purposeful sampling method that involves examining the entire population that has a particular set of attributes (experience, knowledge, or exposure to an event). Its applicable where the population size is relatively small, where the population shares an uncommon characteristic. It involves defining the population characteristics creating a list of the population and contacting all members in the list. It has the advantage of getting deep insights on the subject. The risk of missing potential insights is reduced and makes it possible to make analytical generalisations about the population being studied. (Burns & Groove, 2005). The total

number of patients who attended TB clinic between 1st January 2017 and 31st December 2017 were 270.

3.7 Data Collection Techniques

Qualitative techniques were used to profile TB patients by assessing their behavioral intentions, attitudes, and knowledge related to TB and to identify specific determinant which predicts non-adherence to treatment.

3.8 Data Collection Tools

This study was framed within phenomenology and a mixed method approach of structured questionnaires, interviews and focus group discussions. This was done by using structured, interviewer-administered questionnaires (Appendix 10 for the patients), interview guide (Appendix 13) and Focus Group Discussion administered by the data collector (Appendix 14). Each participant was traced to his/her home, or was summoned to the treatment center with the help of CHW who are actively involved in TB activities and thereafter an in-depth interview was conducted with randomly selected TB patients. Key Informant Interview (KII) was conducted to capture insights among staff in TB clinic. The research assistants visited the facility on their clinic days and used an observational checklist for assessment (Appendix 11).

Interviewer-administered questionnaires were used to collect data from patients. The questionnaires had the following parts; demographic information, social economic variables, client related variables, health system related variables, socio-economic barriers and disease and medicine related variables. Key Informant Interviews were conducted with health staff covering the details shown in the appendix (Appendix 13). Focus group discussions (Appendix 14) were held with the selected patients distributed evenly by age, sex, adherence, and non-adherence. Observation checklist was used to

assess the provision of the medical facility and staff-patient relationship. In-depth interview guides (Appendix 15) were used to interview individual patients.

3.9 Pre-Testing

This constituted a trial run (a small study) prior to the actual study, which allowed the researcher assess the process, determine the study variables, and test accuracy of research instruments and analysis parameters for the proposed study., and covered both qualitative and quantitative aspects (Kothari, 2004). Reasons for Performing pre-test are to test the Process (feasibility), the Resources (time and budget) ,Management (human and data optimisation problems) and the scientific aspects. This was carried out in a neighboring Sub-county of Kandara in Murang'a County with a total of 20 respondents.

3.10 Reliability and Validity

3.10.1 Reliability

This is a measure of internal consistence and the degree to which an assessment tool produces stable and consistent results. In this study, parallel forms of reliability and Test-retest reliability were ascertained during the Pretesting of the tools and with a Pearsons r score of +80, the tools were passed as reliable.

3.10.2 Validity

This is termed as the level of the accuracy of a claim (De Vos, 2007). This was attained mainly through training of the researchers (4No.) on the use of the instruments and pre-testing instruments for Content validity - adequate coverage of content. Face validity (expert review) was also ascertained by consulting experts in this research field for their opinion. Findings obtained from the pilot study were used to amend the data collection

tools prior to using it in the study. Coherence and accuracy of data collection tools and daily cleaning of data were ensured.

3.11 Data Analysis and Presentation

Qualitative data analysis was undertaken using thematic framework analysis (Kothari, 2009). After identifying recurring themes, inductive codes were developed and transcriptions catalogued according to the definitions. Codes were then compiled into larger categories. Transcriptions were manually coded on the coding frame developed on the basis of Beckens theories and was informed by themes and issues emerging from the materials. The quantitative data analysis on the other hand comprised of the demographic and personal characteristics of the population. To access the relationship between the research variables, regression analysis was undertaken. Variables in the univariate model which had p-values of less than 0.2 were included in the model with odds ratio and 95% confidence intervals calculated for each variable calculated. Specifically, p-values of less than 0.05 were termed to be significant. Data was analysed using SPSS version 22. Where the expected value in the 2x2 table was <5, Fisher's test was used to test significance. Data presentation was done using figures and tables .

3.12 Inclusion and Exclusion Criteria

3.12.1 Inclusion Criteria

All Pulmonary Tuberculosis patients, both male and female registered for anti-TB treatment in Maragua Sub-County Hospital between 1st January to 30th December 2017. Patients (18 years and above) who had completed TB treatment, those patients who are living in Maragua Sub-County, not admitted in hospital, patients of sound mind and those who provided informed consent to participate in the study were included.

All Health Care workers who had worked in the Sub-County TB Clinic for at least one year prior to commencement of the study (hence they were conversant with the patients), those that had undergone special training on TB patients Management and administration, environment and protection when handling the patients and those CHW's who had been trained on defaulters follow up. Same applies to key informants.

3.12.2 Exclusion Criteria

3.12.2.1 Patients

All TB patients appearing in the register between 1st January 2017 and 31st December 2017 whose completion of treatment status could not be determined, those under 18 years, the dead or untraceable , those who were too ill for interview, admitted in hospital or enrolled for clinical trials (reason being either comorbidities or failure to convert after TB treatment for three months hence still sputum positive) and, those who did not consent to the interview or had transferred out, were excluded.

3.12.2.2 Healthcare Workers

Those HCW's with comorbidities were also excluded due to the possibility of infecting others or inability to complete the study.

3.13 Logistical and Ethical Consideration

The study was completed using the revised Helsinki Declaration (2013). The research was on a highly infectious disease and the safety of the participants was a serious ethical matter. Current ethical considerations related to Tuberculosis infection (transmission) involve the threat posed by comorbidities, environment/space when providing services and mandatory vaccination. This research protocol provided mitigating measures to ensure reduction of risk to all the research participants, as detailed in the exclusion and inclusion criteria.

The respondents were only those patients who had not completed treatment. As indicated, the HCW's involved were well versed with care management administratively, environmentally and protective aspects of handling TB cases. By ensuring the above, all the principles of Human Dignity, Anonymity, Confidentiality, Beneficence and Justice were automatically answered.

Approval from Graduate School and Ethics Reviews Committee – Kenyatta University (Appendix 9) was sought and granted, Permission (consent) to carry out the research was sought from the National Commission of Science, Technology and Innovation (NACOSTI) (Appendix 5) and the same was granted. Written consent from respondents was sought and assurance given that one can withdraw from the study prematurely without any prejudice whatsoever (Appendix 11). A translator was used where necessary, to read and interpret the instruments of data collection in order to ensure that they understood the purpose of the study.

The Health Administration Murang'a County, Maragua Sub County granted permission for the study (Appendix 7) and the local security organs were informed of the intended study (Appendix 6).

The patients were also assured that their information would be handled with utmost confidentiality and their information would not be shared with any other individual who was not part of the study.

CHAPTER FOUR: RESULTS AND DISCUSSIONS

This chapter presents the results obtained from data analysis and discussions in line with the study objectives. The analysis starts with descriptive analysis followed by chi-square analysis and ends with discussion of the findings.

4.1 Adherence to TB Treatment

For the purposes of this study, adherence was defined as completion of the TB treatment regimen. Conversely, those who did not complete TB treatment were regarded as non-adherent. The statistics on adherence among the study respondents is shown in Figure 4.1. According to the figure, sixty-seven (53.17%) were non-adherent while Fifty-Nine (46.83 %) were adherent

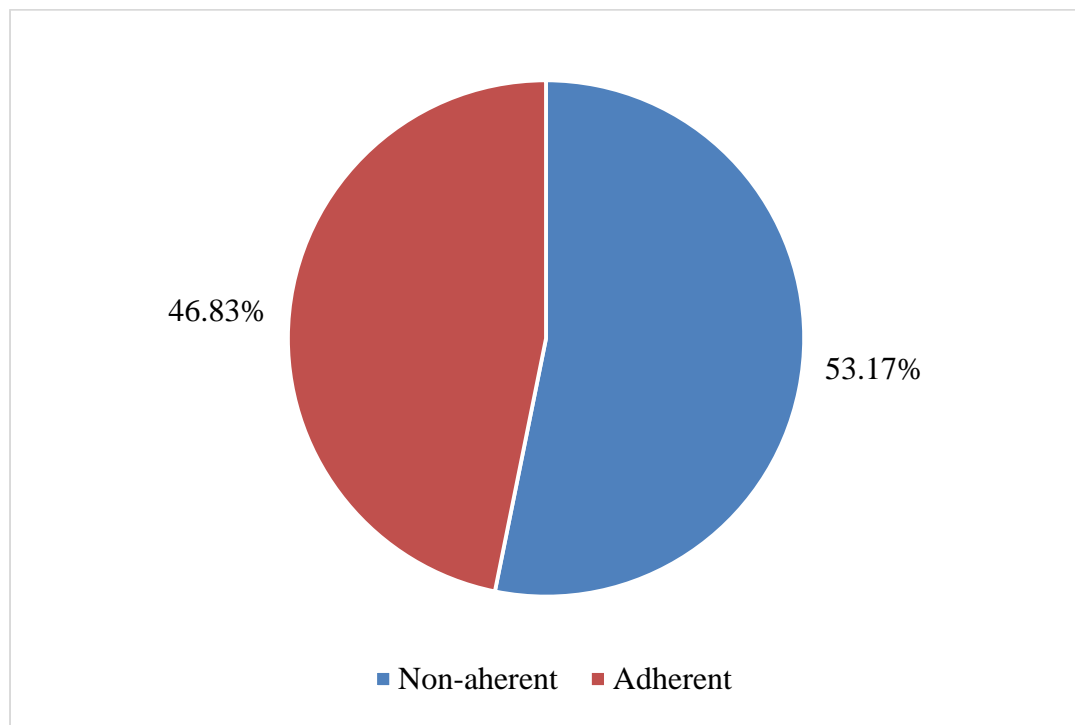


Figure 4.1: Distribution of Respondents by Adherence to TB Treatment

4.2 Socio-economic Factors

4.2.1 Socio-Demographic Characteristics of the TB patients

The study sought to determine the socio-demographic features of the TB patients in order to establish whether these factors influenced the non-adherence to TB treatment.

Table 4.1 shows the findings on sex, age, education level and marital status of the respondents.

Table 4.1: Socio-Demographic Factors

Factor	Category	Frequency (n)	Percent (%)
Sex	Male	71	56.3
	Female	55	43.7
Age	18-25	24	19
	26-33	42	33
	34-41	9	7
	42-49	19	15
	50-57	26	21
	58-65	6	5
Education level	None	5	4.0
	Primary	19	15.1
	Secondary	43	34.1
	Tertiary	59	46.8
Marital status	Single	48	38.1
	Married	35	27.8
	Separated	22	17.5
	Divorced	12	9.5
	Widow/widower	9	7.1

The findings show that a majority of the respondents were male (n=71, 56.3%). This implies a minimal difference in sex representation hence minimal bias. This also shows that gender plays minimal role as the predisposing factor to TB prevalence and adherence to the treatment. A thirds of the respondents were also aged 26-33 (n=42, 33%) with the least number of individuals being of age 50-57 (n=26, 21%). A majority

of the respondents had attained tertiary education (n=59, 46.8%) and the least number of individuals did not attain any education (n=5, 4.0%). This therefore indicates that the literary levels are high among the respondents. Education influences adherence in that the less educated respondents tend not to know much about TB, the method of spread, symptoms or the importance of treatment adherence. Lastly, a majority of the respondents were married (n=35, 27.8%) with the least number of individuals being widows/widowers (n=9, 7.1%). Marriage reduces non-adherence in that lack of partner translates to lack of adequate support or someone to encourage them to complete their treatment. However, the effect is considered as being minimal.

4.2.2 Economic Factors

The study sought to determine the social-economic related factors associated with non-adherence of TB treatment among patients in Murang'a County. This includes the income generating activities which highly affect their livelihood and their ability to purchase medications. Specifically, the study investigated the employment status, monthly income, availability of foods when taking TB drugs and assistance in taking drugs.

Table 4.2: Economic Factors

Factor	Category	<i>f</i>	%
Employment status	Formal Employment	45	35.7
	Self Employed	38	30.2
	Unemployed	43	34.1
Monthly income	< 3000 Ksh	52	41.3
	3000 – 6000 Ksh	35	27.8
	> 6000 Ksh.	39	31.0

The findings as shown in Table 4.2 indicate that only 35.7% had formal employment, 30.2% were self-employed while 34.1% were unemployed. Due to the TB drugs being provided free of charge in the health facilities, the lack of a reliable source of income

could contribute very little to the non-adherence to the medication. The findings also show that 41.3% had an income of less than Ksh 3,000, 31.0% had an income of more than Ksh 6,000 while 27.8% had an income of 3,000-6,000.

4.3 Health Care System Related Factors

The health care system related factors under investigation include the duration taken by a patient before being attended to at health facility, distance travelled to collect drugs, the cost to reach the hospital facility, staff attitudes at drug collection points, TB drugs taken daily by the patients and the availability of medicine.

Table 4.3: Healthcare System Related Factors

Factor	Category	(n)	(%)
Duration spent by patient before being attended	< 1 hour	55	43.7
	1 – 2 hours	45	35.7
	3 hours	26	20.6
Distance travelled to collect drugs (in kilometers)	< 5	28	22.2
	5 – 10	24	19.0
	11 – 15	21	16.7
	8 – 20	26	20.6
	> 20	27	21.4
Cost to reach hospital facility	Nothing	36	28.6
	<Ksh 20	25	19.8
	Ksh 20 – 40	30	23.8
	Ksh> 40	35	27.8
Staff attitude at drug collection point	Very friendly	29	23.0
	Friendly	21	16.7
	Neither friendly nor unfriendly	28	22.2
	Unfriendly	25	19.8
	Very unfriendly	23	18.3
Availability of medicine	Always available	67	53.2
	Sometimes not available	59	46.8

Table 4.3 shows majority of the respondents reported spending less than an hour before being attended to (n=55, 43.7%) and they travelled a distance of >20 kilometers to the

health facility (n=27, 21.4%). However, the transportation costs to the facility were little according to most of the respondents (n=36, 28.6%) and they reported that the staff attitude at the collection point was perceived by respondents as being very friendly (n=29, 23.0%) however, a fair number of respondents reported having encountered very unfriendly staff (n=23, 18.3%). A majority of the respondents noted that drugs were available (n=67, 53.2%) however, nearly half of the respondents noted that the drugs were sometimes unavailable (n=59, 46.8%).

4.4 Patient-Related Factors

The study investigated patient related factors associated which were smoking, alcohol consumption, perception of TB, availability of treatment support, knowledge, symptoms of TB, duration of taking TB drugs and the economic and social factors.

According to Table 4.4, at least half of the respondents (n=47, 51.6%) had smoked cigarettes in the last 6 months and nearly half of the respondents (n=43, 48.9%) consumed alcohol. A majority of the respondents believed that taking TB drugs daily prevents drug resistance (n=89, 79.6%), helps in provision of a cure (n=89, 70.6%), prevents the spread of TB (n=112, 88.9%) and helps prevent death (n=117, 92.9%).

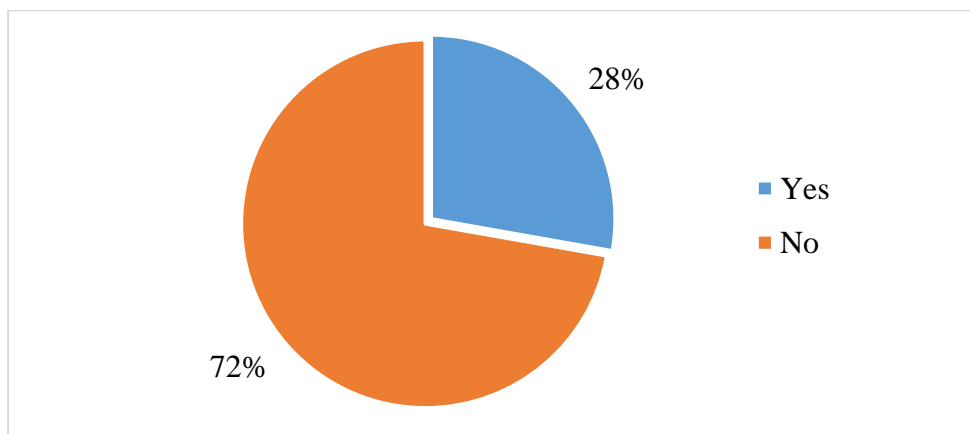
Table 4.4: Patient Related Factors

Factors	Categories	(n)	(%)
Smoked cigarettes in the last 6 months	Yes	47	51.6
	No	44	48.4
Alcohol intake	Yes	43	48.9
	No	45	51.1
Perception of TB treatment	Yes	67	53.2
	No	59	46.8

Importance to take TB drugs daily for the correct duration	Yes		No	
	<i>f</i>	%	<i>f</i>	%
To prevent drug resistance	84	66.7	42	33.3
To be cured	89	70.6	37	29.4
To prevent spread of TB	112	88.9	14	11.1
To prevent death	117	92.9	9	7.1

4.4.1 Availability of treatment support

The treatment support involves the individuals who help the patients in taking their medicines.

**Figure 4.2: Availability of Treatment Support**

The findings show that only 28% did agree to have support while 72% disagreed. The majority did not have support as per Figure 4.2. The lack of support from the health facility may contribute greatly to non-adherence in case the patients experience any challenges in taking the medication.

4.4.2 Knowledge of the Importance of TB drug adherence

Drug adherence refers to the patients ability to stick to their medication as prescribed by their doctors. The results are shown in Figure 4.3 shows that a majority of the patients had knowledge on the importance of drug adherence.

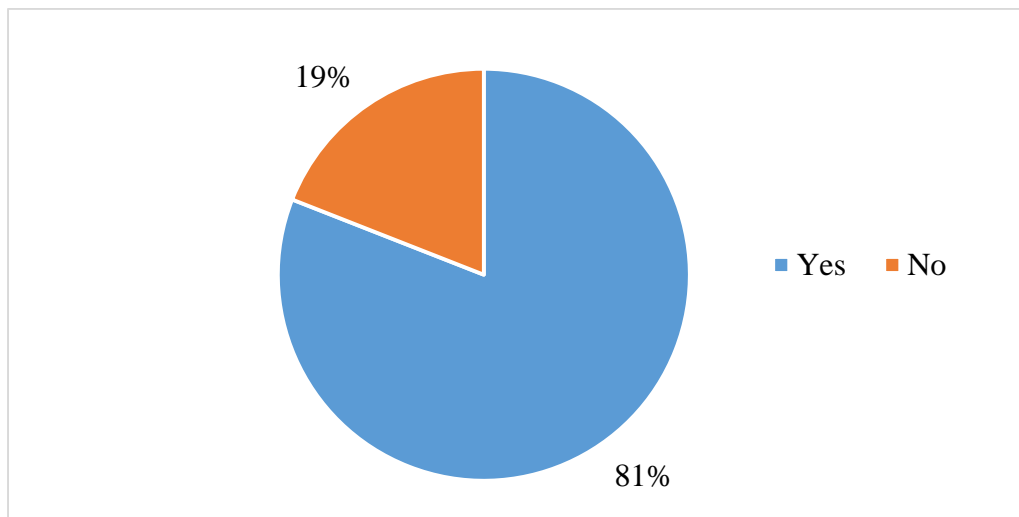


Figure 4.3: Knowledge of importance of drugs adherence

4.4.3 Symptoms of TB

Tuberculosis is a health condition that manifests itself in a wide range of symptoms which are mainly dependent on the particular patient. The study sought to establish some of the symptoms that the patients perceived to be associated with TB.

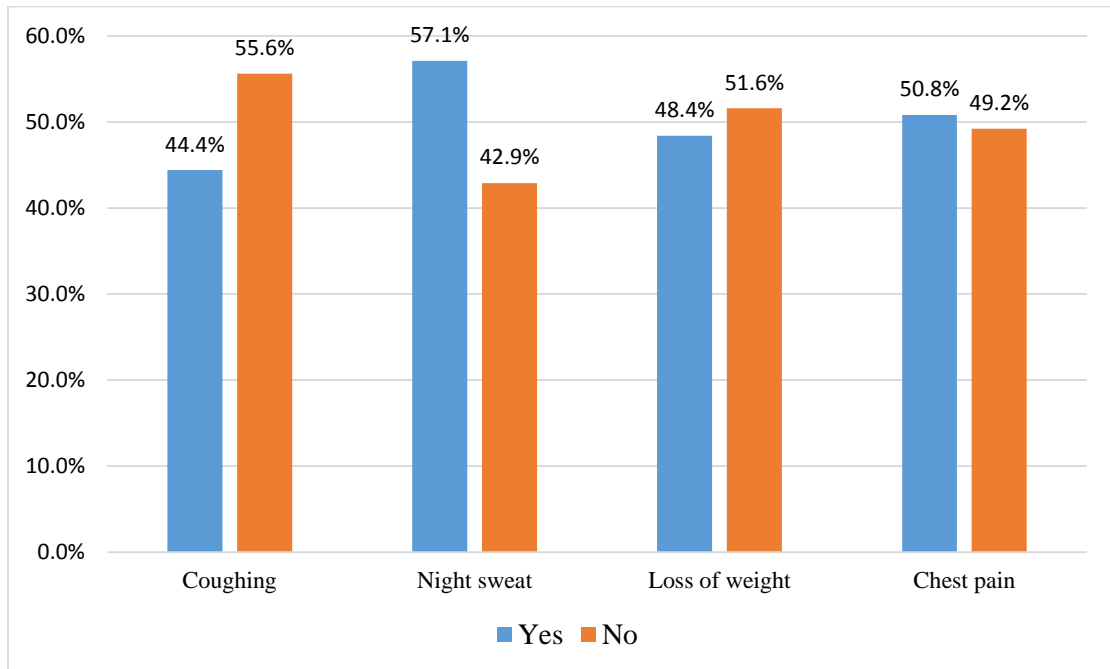


Figure 4.4: Symptoms of TB

The findings obtained showed that 44.4% experienced coughing while 55.6% did not, 57.1% had night sweats while 42.9% did not, 48.4% had weight losses while 51.6% did not 50.8% experienced chest pains while 49.2% did not as per Figure 4.4. Other symptoms indicated by the patients included fatigue, fever, sputum production and shortness of breath.

4.4.4 Duration of taking TB drugs

The duration for which the drugs are taken refers to the period between taking the first and the last TB drug of the specified dose. This section sought to establish for how long the patients took the TB drugs.

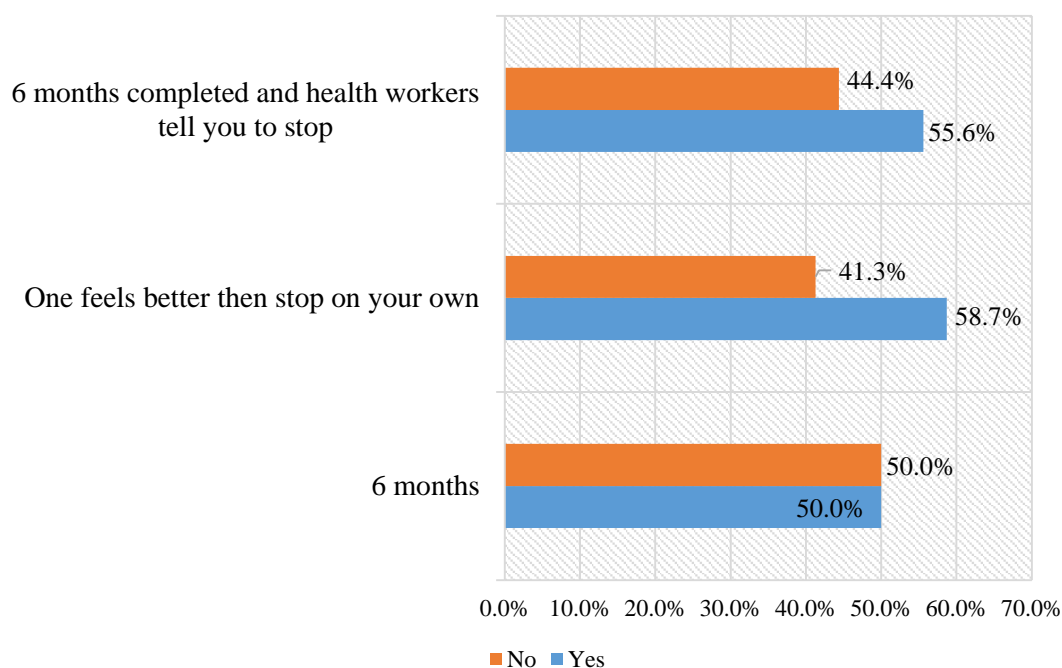


Figure 4.5: Duration of taking TB drugs

The findings obtained show that, 50% agreed that the TB drugs should be taken for a period of 6 months while 50% disagreed, 58.7% agreed that the drugs should be taken until one feels better while 41.3% disagreed, whereas 55.6% agreed that one should undertake the drugs for the duration specified by the health workers while 44.4% disagreed as shown in Figure 4.5. Taking drugs for a long duration of time tends to make the patients be tired of taking the drugs hence the non-adherence.

4.4.4.1 Availability of Foods when taking TB drugs

Pertaining to the availability of foods when taking TB drugs, as shown in Figure 4.6, 25.4% indicated that the food was always available to take with medicine and that it was available most of the time, 23.8% indicated that the food is not always available, while 26.2% indicated that food was never available. This shows that most respondent's food was always available with only a few not having food regularly.

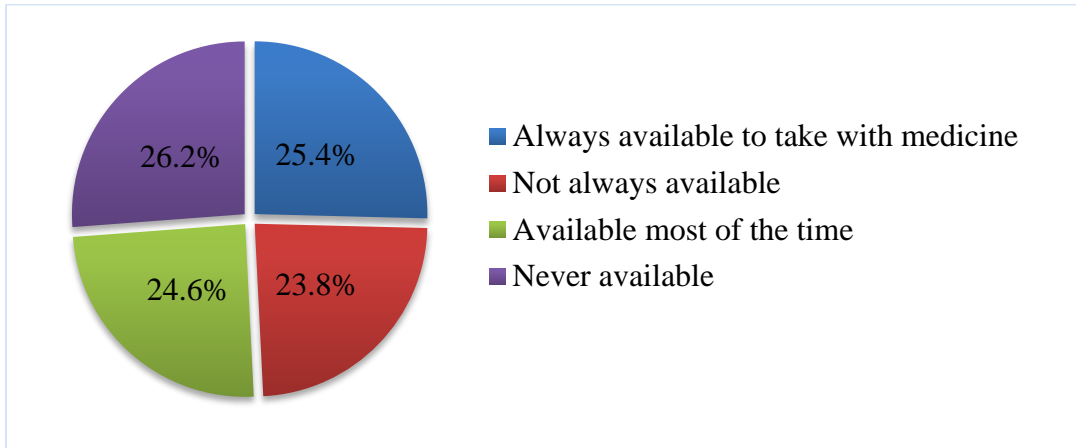


Figure 4.6: Availability of foods when taking TB drugs

4.5 Disease and Medicine Related Factors

The study sought to determine the disease and medicine related effects pertaining to TB treatments and whether these factors influence the treatment adherence.

4.5.1 Side effect when on TB Treatment

The study aimed at determining whether there were any side effects obtained upon using TB treatment. The findings are presented in Figure 4.7.

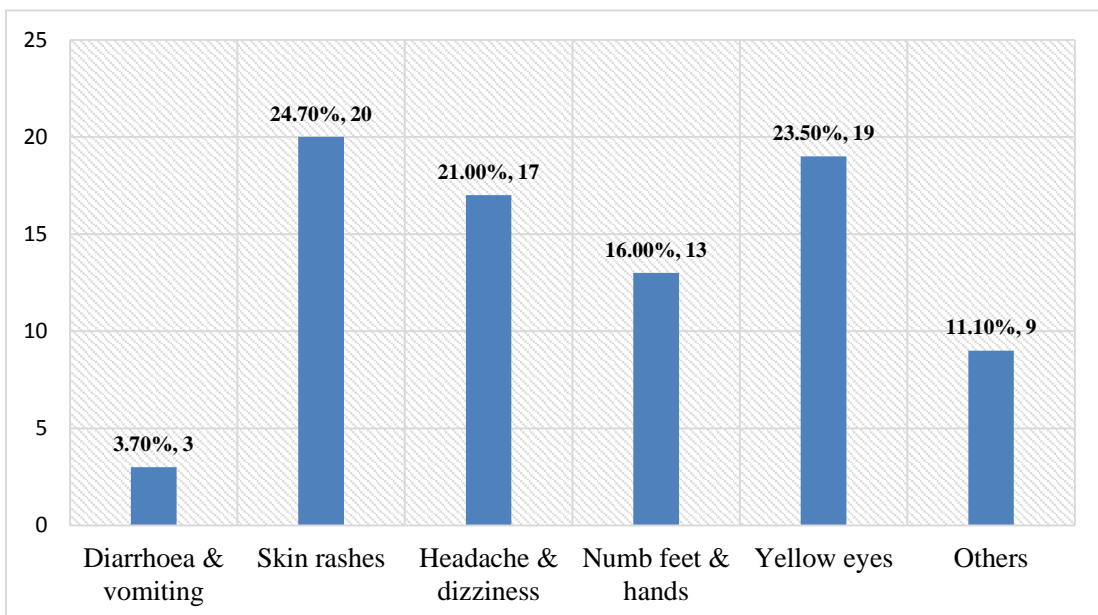


Figure 4.7: Respondents side effect when on TB Treatment

Majority of the respondents agreed that they experienced side effects (n=80, 63.4%) while only (n=46, 36.5%) disagreed. Some of the side effects established include Skin rashes with a percentage frequency of 24.7%, Yellow eyes with a percentage frequency of 23.5%, Numb feet and hands with a percentage frequency of 16%, Diarrhea and vomiting with a percentage frequency of 3.7% and 11.1% had other side effects.

4.5.2 Duration taken for patients to feel better

The study sought to determine the duration after which the patient felt better after taking TB Treatment.

Table 4.5: Duration taken for patient to feel better

Duration till feeling better (Weeks)	Frequency	Percent
'<2	31	24.6%
'2-4	33	26.2%
'5 – 6	33	26.2%
Didn't feel better	29	23.0%

According to Table 4.5, a majority of the respondents took either 2-4 weeks to feel better (n=33, 26.2%) or 5-6 weeks (n=33, 26.2%). This shows that the drugs was effective.

4.5.3 Other drugs taken beside TB treatment

On there being other drugs taken beside TB treatment, 59.5% agreed while 40.5% disagreed as shown in Figure 4.8. The other drugs taken included; pyrazinamide and Streptomycin (S).

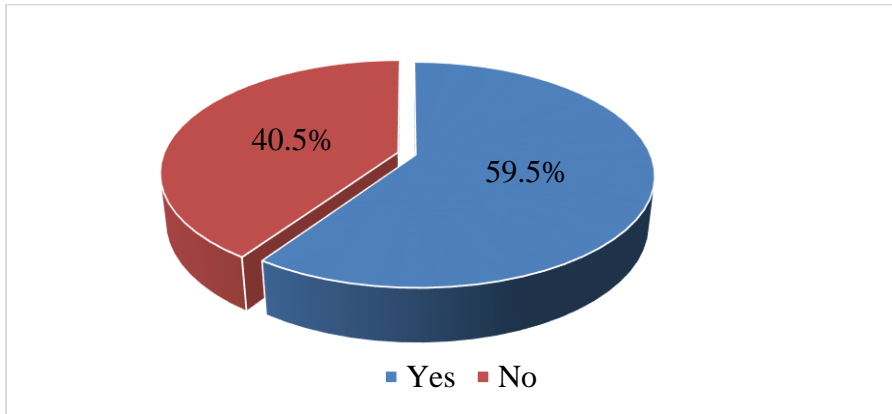


Figure 4.8: Other drugs taken beside TB treatment

4.6 Stigma and Discrimination

Stigma and discrimination refer to the fear of being open about a particular medical condition due to doubt of how they may be treated by the other parties. This leads to failure of disclosure and delay in obtaining medical attention. Particularly, the study investigated Informing family/friends on being on TB Treatment and Medicine Collection.

4.6.1 Informing family/friends on being on TB Treatment

On informing family/friends on being on TB Treatment, the findings obtained are presented in Figure 4.9.

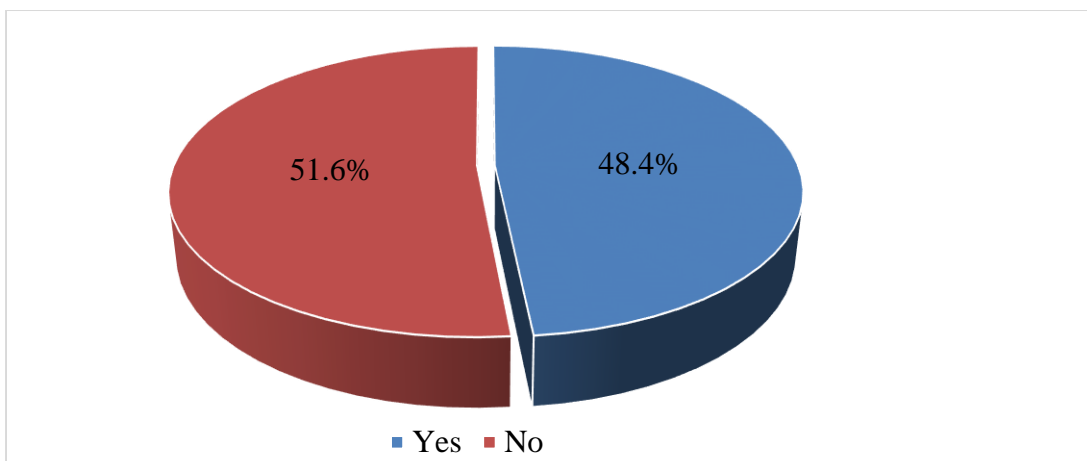


Figure 4.9: Informing family/friends on being on TB Treatment

As depicted in Figure 4.9, at least half of the respondents had not informed their family and friends on TB treatment (51.6%) while the rest informed their family and friends (48.4%).

4.6.2 Medicine Collection

The study also sought to determine where the patients collected their medicines. The findings are presented in Figure 4.10.

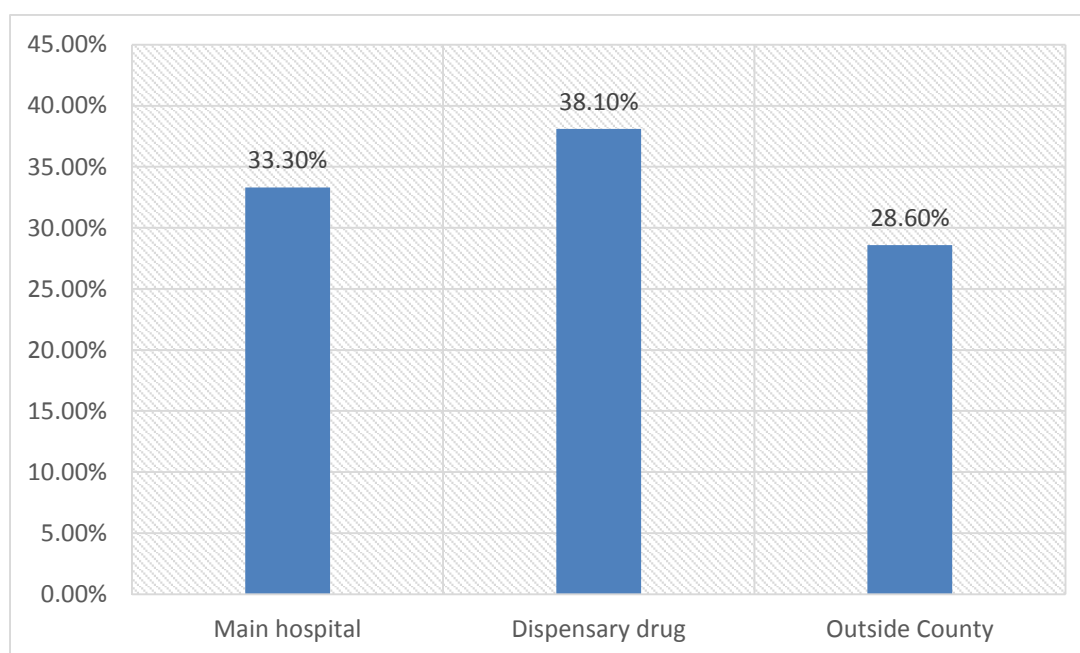


Figure 4.10: Medicine Collection

The findings were that 38.1% collected from the dispensaries, 33.3% collected from the main hospital while 28.6% collected from outside the area. The reasons given as to why some opted to collect the medicines outside the area was due to drug shortage (48.4%) and long distance to health facility (51.6%). Thus, showing that the available medical collection points were not sufficient in meeting the patient's medical demands.

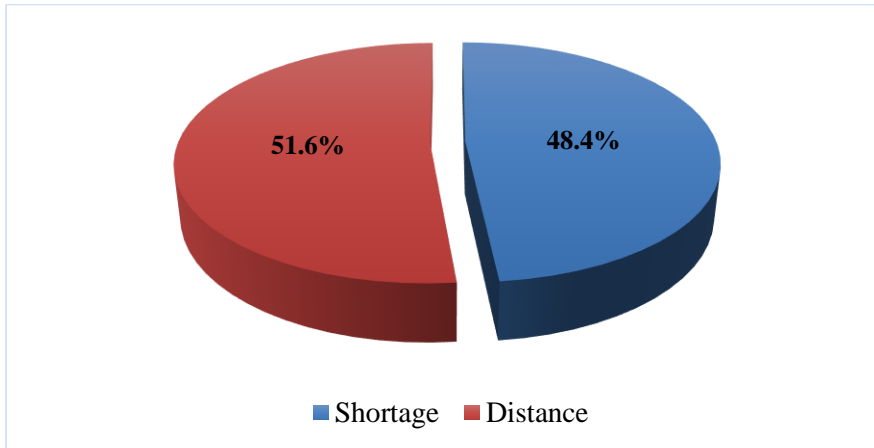


Figure 4.11: Reasons given for collecting medicine outside the area

4.7 Default Factors

The default factors refer to the pre-existing conditions that the respondents have minimal to no control over thus increasing their level of non-adherence. The study sought to determine whether these factors influenced nonadherence to TB treatment among the patients.

4.7.1 Number of Individuals the respondents live with

This section sought to establish the number of Individuals the respondents live with. The findings obtained as shown in Figure 4.12 show that 27.0% had families larger than 6 and families of 1-3 each, 23.8% had families of 4-6 while only 22.2% lived alone. This therefore depicts that the respondents were highly likely to be living with at least one individual.

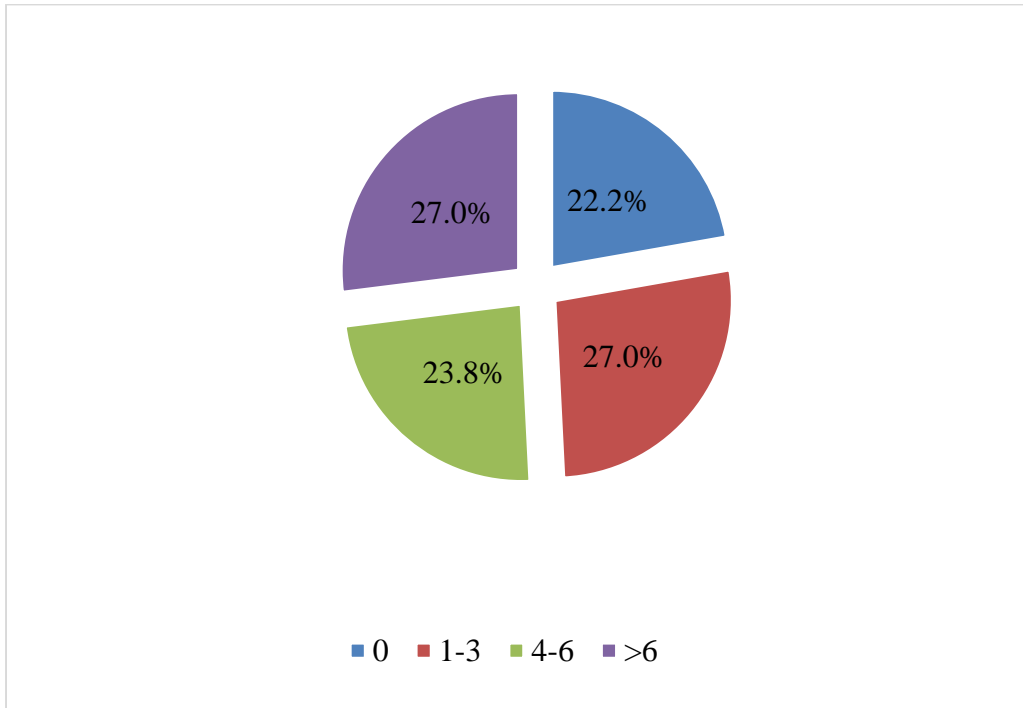


Figure 4.12: Number of Individuals the respondents live with

4.7.2 Size of Respondents Dwellings

Table 4.5 shows the size of the dwellings of the respondents in the study.

Table 4.6: Size of Respondents Dwellings

Dwelling home (No. of bedrooms)	Frequency	Percent
1 – 2	35	27.8%
3-4	44	34.9%
>5	47	37.3%

A majority of the respondents lived in dwellings with at least five bedrooms (n=47, 37.3%) and a considerable number lived in dwellings with bedrooms with 3-4 bedrooms (n=44, 34.9%).

4.7.3 Factors associated with non-adherence listed by patients

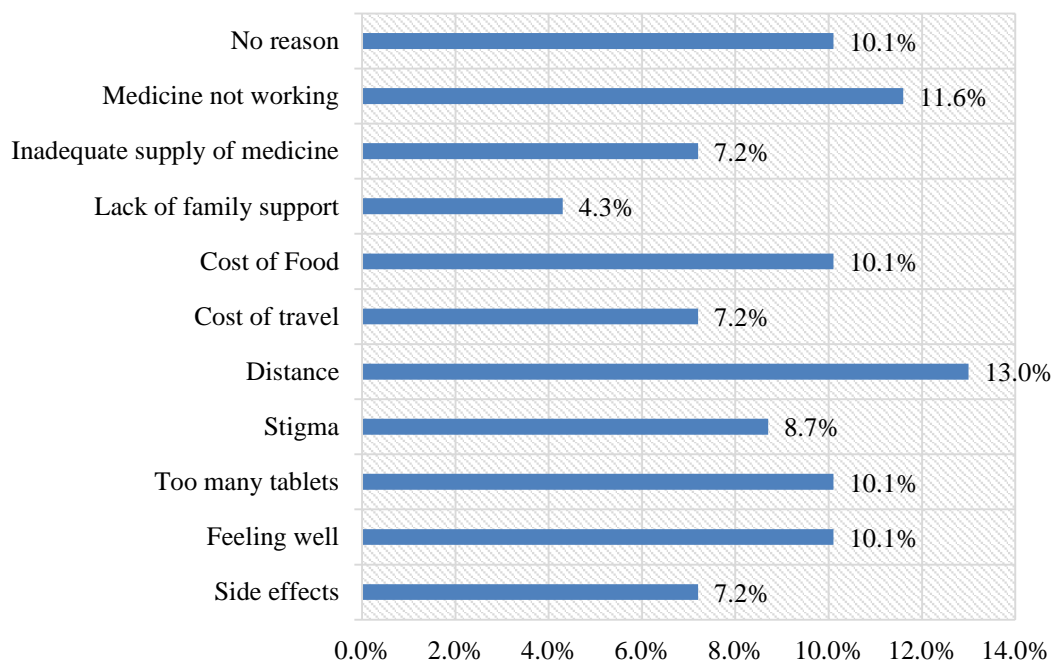


Figure 4.13: Reasons for not completing TB treatment

The reasons given for stopping their treatment included; Long distance to get the medicines (n=9, 13.0%), Medicine not working (n=8, 11.6%), cost of food (n=7, 10.1%), feeling better (n=7, 10.1%), too many tablets (n=7, 10.1%), stigmatization (n=6, 8.7%), cost of travel (n=5, 7.20%), inadequate medicine supply (n=5, 7.20%), many side effects (n=5, 7.20%), lack of family support (n=3, 4.3%) while some stated purely no reason at all (n=7, 10.1%). Thus, implying that the long distance to get the medicine was the most common reason for stopping the drugs, with there being no reason to stop was the least.

4.8 Factors Associated with Non-adherence to TB treatment

4.8.1 Bivariate Analysis

4.8.1.1 Socio-demographic Variables versus Adherence

In relation to the bivariate analysis conducted, none of the socio-demographic factors were found to be associated with adherence as shown in Table 4.7.

Table 4.7: Socio-demographic Variables versus Non-Adherence

Variable	Category	Adherence				Chi-square test		
		non-adherent		adherent		χ^2	df	p-value
		N	%	n	%			
Age	18 – 25	22	37.3	20	29.9	3.989	5	0.551
	26 – 33	10	16.9	14	20.9			
	34 – 41	13	22.0	13	19.4			
	42 – 49	10	16.9	9	13.4			
	50 – 57	3	5.1	6	9.0			
	58 – 65	1	1.7	5	7.5			
Gender	Male	30	50.8	41	61.2	1.365	1	0.243
	Female	29	49.2	26	38.8			
Education	None	2	3.4	3	4.5	0.905	3	0.824
	Primary	10	16.9	9	13.4			
	Secondary	18	30.5	25	37.3			
	Tertiary	29	49.2	30	44.8			
Marital Status	Single	23	39.0	25	37.3	3.322	4	0.505
	Married	14	23.7	21	31.3			
	Separated	11	18.6	11	16.4			
	Divorced	8	13.6	4	6.0			
	Widow/widowe	3	5.1	6	9.0			

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4.8.1.2 Economic Variables versus Adherence

A bivariate analysis was conducted on economic/social variables which included the employment status, monthly income, food situation when taking drugs and individuals who offered assistance when taking drugs. The analysis revealed that none of the factors were found to be associated with adherence as shown in Table 4.8.

Table 4.8: Economic Variables versus Adherence

Variable	Category	Adherence				Chi-square test		
		non-adherent		Adherent		χ^2	df	p-value
		n	%	n	%			
Employment status	Formal Employment	20	33.9	25	37.3	2.323	2	0.313
	Self Employed	15	25.4	23	34.3			
	Unemployment	24	40.7	19	28.4			
What's your monthly income	< 3000 Ksh	23	39.0	29	43.3	1.087	2	0.581
	3000 – 6000 Ksh	19	32.2	16	23.9			
	> 6000 Ksh.	17	28.8	22	32.8			

4.8.1.3 Healthcare Factors versus Adherence

The number of healthcare factors were tested against adherence of medication which included distance travelled to collect drugs most convenient TB clinic opening time, Place of collecting TB drugs, waiting time, Cost to reach the facility, Staff Attitude, informed of importance of taking drugs regularly and to completion, and Drug Availability. The analysis depicted that only distance travelled to collect drugs ($\chi^2(4) = 10.270, p=0.036$) was statistically significantly associated with adherence despite all the factors being barriers in the access of medication and adherence to TB medication.

Table 4.9: Healthcare Factors versus Adherence

Variable	Category	Adherence				Chi-square test		
		non-adherent		adherent		χ^2	df	p-value
		n	%	n	%			
Convenient TB clinic opening time	<8.00 a.m. – 5.00 p.m	8	13.6	16	23.9	2.842	3	0.417
	8.00 a.m. – 5.00 p.m	9	15.3	8	11.9			
	8.00 a.m. – >5.00 p.m	17	28.8	21	31.3			
	< 8.00 a.m. – >5.00 p.m	25	42.4	22	32.8			
Distance travelled to collect drugs	< 5	8	13.6	20	29.9	10.270	4	0.036*
	5 – 10	8	13.6	16	23.9			
	11 – 15	12	20.3	9	13.4			
	8 – 20	17	28.8	9	13.4			
	> 20	14	23.7	13	19.4			
Cost to reach the facility	Nothing	16	27.1	20	29.9	2.220	3	0.528
	<sh 20	11	18.6	14	20.9			
	sh 20 – 40	12	20.3	18	26.9			
	sh> 40	20	33.9	15	22.4			
Staff Attitude	Very friendly	14	23.7	15	22.4	0.612	4	0.962
	Friendly	9	15.3	12	17.9			
	Indifferent	12	20.3	16	23.9			
	Unfriendly	13	22.0	12	17.9			
	Very unfriendly	11	18.6	12	17.9			
Drug Availability	Always available	31	52.5	36	53.7	0.018	1	0.897
	Sometimes not available	28	47.5	31	46.3			

4.8.1.4 Patient Related Factors versus Adherence

The analysis revealed that there were no patient related factors that were significantly associated with adherence as depicted in Table 4.10.

Table 4.10: Patient Related Factors versus Adherence

Variable	Category	Adherence				Chi-square test		
		non-adherent		adherent		χ^2	df	p-value
		n	%	n	%			
Tobacco Use (6 months)	Yes	24	40.7	23	34.3	1.835	2	0.400
	No	22	37.3	22	32.8			
	Cannot recall	13	22.0	22	32.8			
Alcohol use (6/12 months)	Yes	17	28.8	26	38.8	1.509	2	0.470
	No	22	37.3	23	34.3			
	Cannot recall	20	33.9	18	26.9			
Did you have treatment support	Yes	27	45.8	28	41.8	0.201	1	0.654
	No	32	54.2	39	58.2			
Informed of importance of taking drugs regularly and to completion	Yes	32	54.2	3	47.8	0.526	1	0.468
	No	27	45.8	3	52.2			

4.8.2 Multivariate Analysis

Only one variable was found to be statistically significantly associated with adherence: Distance to facility. As a result, no multivariate analysis was carried out since it was not necessary to test for confounding.

4.9 Measures to Reduce Non-adherence to TB treatment

Key informant interviews and indepth interviews were conducted. KII was conducted using a non-random group of experts with knowledge on TB, and the interviewee framed questions spontaneously, probe for information and took notes which were elaborated later (USAID,1996). This gave an understanding of perspectives, behavior and motivations to explain the shortcomings and success of TB treatment. The indepth interviews (also called Semi Structured Interview-SSI) was done to uncover issues that came up during the KII. The participants included all stakeholders in TB matters and not necessarily experts. The FGDs were undertaken with a homogeneous group..i.e TB

patients and lasted for 60-90 mins with a moderator and note taker, The purpose was to stimulate discussion, generate new ideas and promote explanation of the unknown (USAID 1996).

4.9.1 Individual In-depth Interview

Principal researcher conducted face to face, qualitative interview and tape recorded (conducted after consent) the responses. Each interview lasted for 45 – 60 minutes. Questions were open-ended and emerging from other interviews were explored. Number of respondents were thirty (30), fifteen (15) adherents and fifteen (15) non-adherents). In-depth interview was also conducted with three (3) Nurses, two (2) Lab Technologists, one (1) Public Health Officer and one (1) Community Health Worker – the team that manages TB patients. Note the interview was administered consecutively with the administered questionnaire. Participants characteristics shown in Table 4.11.

Table 4.11: Characteristics of the 7 health workers, 15 non-adherents, 15 adherents and 3 No. patients relatives who were interviewed individually.

Characteristic	Health Personnel (n-7)	Adherent patient	Non-adherent patient	Others
Gender	Male	4	7	7
	Female	3	8	8
Health staff	Nurse	3		
	Lab Technologist	2		
	PHO	1		
	CHW	1		
Patients Relatives				3

4.9.2 Focus Group Discussions

Two focus group discussions with TB patients were arranged after the in-depth interviews. Patients with diverse characteristics were chosen. Each group discussion lasted for 1½ - 2 hours.

Moderated by research assistant trained on this job, Principal researcher` introduced the topic related to particularly interesting findings from the in-depth interviews for further interrogations and the discussions were tape recorded.

Table 4.12: Characteristics of patients who had completed treatment and were interviewed in 2 focus groups

Characteristics	Category	No. of patient
Gender	Male	8
	Female	8
Age	18 – 25	2
	26 – 33	6
	34 – 41	2
	42 – 49	2
	50 – 57	2
	58 – 65	2
Education	Nil	1
	Primary	2
	Secondary	5
	Tertiary	8
Marital Status	Single	4
	Married	6
	Separated	4
	Widow/Widower	2

4.9.3 Focus Group discussions and in-depth interviews Analysis

The author and research assistant interrogated and clarified the tape-recorded interviews. Conceptual maps, themes and issues to be explored, and a memo (notes on each person) were developed. Research assistant translated each interview verbatim and the discussion in the FGD.

Data on factors affecting patients' management of TB treatment was used for systematic text condensation according to phenomenological analysis (Glorgis, 1985)

4.9.4 Analysis of FGD and in-depth interviews

The four stages of preparing for the analysis were followed namely; ready all materials (for impression), identifying units of meaning (factors affecting treatment and coding for these), condense/summarizes content of each coded group and integrate the results of condensed meanings into generalized descriptions.

From a qualitative perspective, the study sought to determine the various measures which the respondents thought would be helpful in reducing the non-adherence to TB treatment in Murang'a County. The responses obtained indicated that patient counseling and education, accompanied by TB care which is convenient to the patient will enhance the adherence levels to the TB treatments. The respondents also indicated having support from the friends and family members will go a long way in reducing non-adherence. Hence, they suggested that the family members and friends should be sensitized on the importance of encouraging the patients to take their drugs.

The distance and cost covered to get the drugs also proved to be a burden to most TB patients. In this regard, they suggested that if the possible door to door distribution of the TB drugs to be initiated as this will save on cost and time. Additionally, the respondents indicated that most health facilities were not conducive. Hence measures to improve the conditions at the hospitals should be made to both the facilities and the personnel. As such, the hospitals and drug collection points should be expanded so as to accommodate all the patients. The facilities should also be equipped with the best resources and adequate drugs. The health officers should also be well trained to know how to meet the patients' drugs requirements and how to encourage their patients to complete their doses.

4.10 Key Informants Interview

This section aimed at obtaining the information concerning the study using questionnaire guided interviews. The interviews were done with key informants who were the health care providers while covering a broad range of issues. The interviews were necessary for the collection of in-depth information from the respondents on factors which contributed to non-adherence. In addition, it enabled acquisition of information that was not captured in the handwritten questionnaires. Several themes emerged during analysis as presented below.

4.10.1 Health Care Provider

On the availability of the health workers in the hospital facilities and the drug collection points, most healthcare providers stated that they were available during the operational hours, with absenteeism being highly discouraged. However, there are certain durations during the day when the patients turn out is relatively low. This leaves most of the health care providers unoccupied and some of them may tend to leave the hospitals earlier than the required time.

On the health care's opinion on the anti-TB drugs, the Anti-TB drugs were viewed to be very effective in reducing the TB prevalence in the region. The respondents indicated that it has led reduction in the severity of the disease with the number of deaths resulting from TB reducing very significantly. This has encouraged more patients to seek medical attention and collect the medicines, as over 80% of them completely resolved the illness.

The study aimed at assessing the availability of the TB drugs. The health workers indicated that the TB drugs had minimal shortages. This is due to the government and various NGOs efforts in ensuring that the drugs were free and readily available to the

patients. This has improved the earlier condition of drug shortages which was being experienced. The availability of drugs has made the hospital and drug collection points to be more reliable, luring more patients to seek medical attention.

On the duration when the patients collected the medicines, the patients were observed by the health care providers to collect their drugs mostly during the morning and mid-morning hours. This led to challenges being encountered during the administration of the anti-TB drug as congestion was experienced. Hence the health workers were not able to provide their services to each patient as much as they would have wanted to.

On the patients' adherence to the TB treatment, the health care providers noted that though most patients were willing to take the medicines, not all of them were able to complete the prescribed dosages. This could be due to them feeling much better. The patient could start the drug collection well, but fail to show up for the subsequent drug collections. Initially, TB treatment was taking eight months, but a shorter six months' regime was introduced in 2007 to improve the adherence. The rifampicin and isoniazid drugs which are in the 2nd phase are to be collected weekly, but not all come to collect.

On the mechanisms put in place for tracing treatment defaulters, the health care providers indicated that there were no well-defined mechanisms for tracing treatment defaulters. This led to most of those who are noncompliant to the drugs to go unnoticed. The health care providers suggested that the best ways to improve the adherence to the medicines would be through educating the patients on the importance of the drug adherence. This will ensure that the adherence was patient initiated.

4.10.2 Patient interview

An interview guide that covered beliefs about TB treatment as well as factors that were likely to impact on adherence, certain health beliefs, interaction between patients and health workers, economic and social factors were crucial dimensions in understanding adherence (Becker & Maiman, 1975)

On the mode of infection of TB by the patients, most patients indicated that they were not fully aware of how exactly they got infected, with some indicating that the sources of infection could be due to occupation risks and social gatherings. This is attributed to the fact that TB is a communicable disease, transmitted mainly through the air. Hence it is not possible to notice when one inhales air that has been contaminated with the TB bacteria. This also makes it difficult to prevent the spread of contamination of TB.

On the patient's knowledge on TB, they were well informed on how the disease was acquired which was through inhaling contaminated air. The patients were also knowledgeable on the key symptoms of TB which was prolonged cough. Thus, upon experiencing prolonged and extensive cough, the patients had to seek medical attention. However, the patients were less informed on the side effects of using TB treatment and the importance of taking the medicines to completion.

The interview also intended to establish the exact situation the patients were when they were first infected with TB. The patients were continuing with their daily lives which were affected slightly. However, having TB led to the patients having hindrances in conducting their day to day lives. This is because the symptoms of TB such as extreme coughing, fatigue, and fever made the patients skip their daily routines.

Pertaining to the patients undertaking their treatment, most had taken the drugs according to the instructions. However, they stopped at some point when they felt better and some when they reacted to the drugs. This is because they saw no essence of continuing to take the medicines when according to them they were healed. Also, the patients stopped taking the medicines when they traveled or were unable to collect the medicines. The long treatment also stimulated the patients to not being compliant to the TB drugs. The drugs which were not taken were disposed of by either throwing them away or just leaving them unattended to.

On whether the patients were receiving advice from other people other than the medical personnel, the respondents stated that they were not getting advice and/or treatment from anyone else besides the nurses and doctors that treat them in the clinic. However, some indicated that they were following the advice of the family members and close friends who had previously been diagnosed with TB. This may be misleading as some could advise them to stop the treatment before the recommended time.

The study also sought to determine the view of patients in relations to HIV and TB treatment nonadherence. Though some had agreed to take HIV testing, others did not see the importance. As such, they did not understand how HIV and TB treatment was related. However, the few who had tested for HIV stated that it led to non-adherence due to there being an increase in bulk of medicines being taken. This discourages most patients from completing the entire treatments.

4.11 Focus Group Discussion Review

This section aimed at obtaining detailed information concerning the study through using focus group discussions. The discussions were used so as to enable the respondents' comment openly about the phenomenon, express their feelings about it and be able to

have a collective view in the theme. Key representatives of each group of respondents were selected for this activity. This included; single focus group including; 1 chief, 3 healthcare practitioners (nurse and lab technician) and 2 TB health workers in the clinic at Maragua health center with the facilitator being the principal investigator and research assistance co-facilitator.

The discussion group brought out various ways in which TB is spread such as when infected people cough, sneeze or speak and those people who are exposed and susceptible inhale and become infected. The mode of spread was thus agreed to be airborne and mostly in places where people are overcrowded. Hence it was suggested that people should avoid overcrowded places and ensure that their homes are well ventilated.

On the non-adherence to TB treatment, it was agreed that a large portion of people in Murang'a County do not complete the recommended doses. The reasons were given for non-adherence included; patients being ignorant of the importance of completing the treatment, poor relations between the patients and the medical personnel, long distances to the drug collection points and low living standards. These factors, among others, acted as a demotivating factor towards drug adherence.

Various measures that may be used in reducing non-adherence levels in the patients came out in the focus group discussions. The key one was educating the TB patients. The members suggested that it was only through education, that the patients will have the self-drive to ensure they adhere to the recommended treatments. Other ways suggested to improve drug adherence were; monitoring all those under treatment, ensuring that the health workers advice the patients accordingly, encouraging the

victims to engage in income generating activities so as to create an enabling environment for taking the drugs.

4.12 Discussion on Field Notes

The study also sought to determine the current phenomenon that exists in Murang'a County as pertains to the TB treatment by undertaking field notes. This was achieved by observing how the patients conducted themselves both at home and at the hospital settings and also the interactions between the patients and hospital facilities. The field observation was important as it enables clearer understanding of situation that exists.

On the patients who utilize the health setting, it was observed that the majority were adults, with very few children being brought to the hospital. This was an indication that age may be a susceptibility factor for the infection due to occupation and reduced immunity levels. It was also observed that most patients visited the hospitals mostly early in the morning and mid-day. This could be attributed to patients having to attend to other duties during the day. As a result of this, overcrowding and congestion were witnessed during the morning hours with the hospitals being less busy during the afternoons.

On the field visits to the community, it was observed that those who were affected by TB found it difficult to continue with their daily activities. As such, the TB symptoms such as extensive coughs made them uncomfortable during most of the times. Also, TB wasn't an openly discussed topic as most individuals did not perceive TB to be a very severe predicament like other diseases including cancer and HIV/AIDs. Hence, not all the individuals were fully aware of TB, its mode of spread, symptoms, and treatment. This made most of them discover the disease only after it had spread in the body.

On the interactions between the patients and the health worker, it was noticed that the interaction was fairly good. However, the interactions were noticed to vary among the individuals. While some other health workers were very friendly and concerned with the patients' wellbeing, others were just there to do their job and nothing more. This influenced the patient's openness to the health workers. Additionally, the interactions varied with the number of patients available at the health utilities. Whereby, when the patients were few, the health workers were relaxed calm and willing to give the best health care to all the patients, whereas when the patients were many, they gave their services very rapidly.

4.13 Discussion of the Findings

4.13.1 Socio-Demographic Characteristics of the TB patients

The study sought to determine the socio-demographic characteristics of the TB patients, so as to establish whether these factors influenced the non-adherence to TB treatment. Particularly, the socio-demographic characteristics investigated include; gender of the respondents, the age of the respondents, education of the respondents, marital status, employment and monthly income.

The study however revealed that none of the socio-demographic factors were found to be associated with adherence TB medication. On age, there were two main peaks in the age distribution of the patients in the study, 26 – 33 years who are mainly the youths and 50 – 57 year olds. This implies that these are the most prone groups to TB infection. The bivariate analysis also revealed that age does not play any role in the adherence of TB treatment. However a study by Ruru, Matasik, Oktavian, Senyorita, & Mirino, (2018) in Ogun state in Nigeria indicated that most defaulters were in the age group 26-30. The study also concurs with a study in Karachi Pakistan by Raviglione & Poznyak,

(2017) on determinants of default in TB treatment which concluded that age is the only variable associated with default.

Additionally, no other socio-demographic factors were found to be associated with non-adherence. However a study conducted by DeRiemer (2001) found out that low education background was a high-risk factor for defaulting treatment. This concurs with studies conducted by Vernon (2013) and Al-Hajjaj and Al-Khatim (2000).

Another study conducted by Ali and Prins (2016) revealed that an individual's residential locality, patients changing their locality absence of family support and an individual's occupation were associated with non-adherence. A similar study conducted by Herrero et al., (2015), revealed that male individuals were highly likely not to be associated with non-adherence and those who faced transportation difficulties.

4.13.2 Socio-economic related factors associated with non-adherence of TB treatment amongst patients in Murang'a County.

Pertaining to the availability of foods when taking TB drugs, most respondents indicated that food was always available with only a few not having food regularly. This implies that food was not a problem to most respondents. However, on the assistance of drugs, only a few individuals had treatment support. As established by WHO (2004), patients who lack assistance and support are more likely not to adhere to medication. The bivariate analysis results indicated that social economic related factors had no significant effect on Health Behaviour - Non-adherence or adherence to TB treatment.

The study also sought to determine the social-economic related factors associated with non-adherence to TB treatment among patients in Murang'a County. Specifically, the

study investigated the employment status, monthly income, and assistance in taking drugs. In relation to the employees' employment status, the majority were either unemployed or self-employed. However, due to the drugs being provided free of charge, it had minimal impact on the non-adherence levels. On the monthly income, the majority had an income of less than Ksh. 6,000. This is related to non-adherence as the patients pay less attention to taking treatments as they focus on other income-generating activities. According to (Kastien et al., 2016), the socio-demographic and socio-economic factors of the patient can influence their non-adherence to TB medication.

The bivariate analysis depicted that there was no association between socio-economic related factors with adherence. These factors include the employment status, monthly income, food situation when taking drugs and individuals who offered assistance when taking drugs. According to a study conducted by Herrero et al., (2015), individuals who lacked transportation costs were associated with poor adherence. Similarly, another study captures 9,655 participants to determine the association between psycho-emotional and socio-economic support and adherence among TB patients.

4.13.3 Health-care-related factors associated with non-adherence of treatment amongst TB patients in Maragua Sub-County.

The study also sought to determine the health care related factors that influence the patients' nonadherence to TB treatment. The health-care related characteristics investigated include; TB clinic opening time and duration at the clinic before being attended, location of collecting TB drugs, distance travelled to collect drugs, cost to reach hospital facility, staff attitude on drug collection points, importance of drugs adherence, TB drugs are taken daily, availability of medicines, symptoms of TB and duration of taking TB drugs. The findings show that the clinics operated for a

considerable duration of time so as to ensure the patients have ample time to get the services offered with majority operating between 8 am and 5 pm. According to (Tang et al., 2015), the distance to the health facility is one major risk factor to TB medication non-adherence. Additionally, the bivariate analysis also depicted that only distance travelled to collect drugs ($\chi^2 (4) = 10.270, p=0.036$) was statistically significantly associated with adherence. The additional cost incurred by the patients to the drug collection points induces non-adherence as established by Murray, Oxlade and Lin (2011).

(Hailu, Azar, & Shojaezadeh, 2015), found out that distance from the health centre, time of treatment and long waiting time were associated with adherence to TB treatment among patients. Another study also revealed that the frequency of visits and the waiting time was associated with patient adherence (Triasih, Padmawati, & Duke, 2016).

4.13.4 Patient-related factors associated with non-adherence of TB treatment amongst patients in Murang'a County.

In relation to patient-related factors, a majority of the respondents reported to having support however a substantial number reported not having support. This in turn contributed to their non-adherence due to the challenges they experienced when taking medication. This can be connected to a study conducted by (van Hoorn, Jaramilo, & Collins, 2016) which revealed that the type of support that a particular patient acquires can be associated with unsuccessful treatment of tuberculosis. Another study conducted by (Tola, Shojaezadeh, Tol, & Garmaroudi, 2016), revealed that all forms of psychological support/counselling and education which if guided by the health belief model can be instrumental in the reduction of non-adherence amongst the patients.

It is also critical to note that some of respondents were unaware of the importance of drug adherence. This can also be related to a study that was conducted in Equatorial Guinea which revealed that lack of education, support and medical advice was a critical factor in re-infection of TB patients in the region (Fagundez et al., 2016). Another study also recommends that in order to reduce the level of patient non-adherence to TB treatment it is critical to ensure that there is access to health care services and a routine provision of education on TB and its treatment especially among young patients and among individuals with a history of TB (Ruru et al., 2018).

The bivariate analysis revealed that no patient related factors were associated with the adherence. This includes factors like alcohol, tobacco use, daily treatment for correct duration can cure TB, suffering from TB, untreated TB kills and individuals are all associated with the improvement of the patient's health. However, according to Raviglione and Poznyak, (2017), harmful consumption of alcohol is highly associated with non-adherence to TB medication and it is also a major risk factor for various diseases. Another study also found a significant correlation between non-adherence and heavy alcohol use (Theron, Peter, Zijenah, & Chanda, 2015).

4.13.5 Other factors associated with non-adherence of treatment amongst TB patients in Maragua Sub-County.

The study also aimed at determining other factors that influenced non-adherence to TB treatment namely stigmatization, the default factors, and the disease and medicine related factors. These factors were established to only have a minimal impact on non-adherence levels. Particularly, stigmatization had minimal influence as TB is not perceived to be a terrible and transmittable disease as compared to HIV/AIDs. Hence the patients were not afraid to be associated with TB. While on the default factors, the

current living conditions were found to have minimal, to no impact at all on the non-adherence levels. On the disease and medicine related effects, patient feeling well was the most common reason for stopping the drugs, and there is no reason for stoppage was the least. On HIV status, most respondents were not willing to disclose their HIV status or even go for checkup themselves. With those who had tested positive, being more unlikely to adhere to TB treatments. This could be due to stigmatization and increased bulk in taking the medicines.

CHAPTER FIVE: SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

5.1 Introduction

This chapter presents a summary of key findings obtained from the study as per the research objectives. The chapter also constitutes the conclusions thus made and recommendations for future action and studies.

5.2 Summary

Tuberculosis constitutes a main public health problem as it results in many cases of morbidity and mortality both locally and globally. However, a huge population of the TB patients tends to not comply with the treatment specified. This study aimed at determining whether the same situation of non-adherence exists in Murang'a County and the exact underlying factors. This study employed a cross-sectional study design which aims at describing and identifying relationships among variables, these being the relationship between non-adherence to TB treatment and the social- economic, health care systems and patient-related factors. The respondents were active adult TB patients diagnosed with pulmonary TB at the TB clinic in 2017 and were identified through the Sub-county TB control program register, and health personnel working in the clinic. The study found out the following as per the study's objectives;

5.2.1 To establish the patient-related factors associated with non-adherence of TB treatment amongst patients in Murang'a County.

The study aimed at determining the patient-related factors that influence the patients' nonadherence to TB treatment. Most respondents were found out to have smoked cigarettes and taken alcohol. Drug and substance abuse is an inducer to non-adherence in that patients may tend to forget when to take the medicines or portray negligence.

This is thus highly discouraged when undertaking the TB treatment. On whether the respondents believed that TB can be cured if treatment is taken daily for the correct treatment duration, most respondents agreed. On whether the respondents perceived to be suffering from TB, most of them were affirmative. All the respondents were fully aware of non-treatment to TB resulting in death and this was a source of encouragement to the patients to seek medication promptly to avoid the consequences. With regards to the importance of taking TB drugs daily for the correct duration, prevention of death and TB spread were the main reasons for taking drugs. The results obtained further showed that only a few patients were given support by friends and family. This implies that the patient-related factors did have an influence on the non-adherence to the TB medications. However, the nature of the effect varied with some discouraging non-adherence while others encouraged it. Chi-square test results indicated that patient related factors had no significant effect on Health Behaviour - Non-adherence or adherence to TB treatment.

5.2.2 To identify healthcare-related factors associated with non-adherence of treatment among TB patients in Maragua Sub-County.

The study also sought to determine the health care related factors that influenced the patients' nonadherence to TB treatment. The findings show that the clinics operated for a considerable duration of time so as to ensure the patients had an ample time to get the services offered with majority operating between 8 am and 5 pm. On the waiting duration in the hospitals, majority of the respondents had to wait more than 1 hour before being attended to. On the distance travelled to collect the drugs, most of the respondents (78%) had to walk more than 10 kilometers so as to collect the drugs. On the cost incurred to reach to the hospitals, only 29% incurred no expenses at all in

reaching the hospital facility while the remaining 71% had to spend so as to get to the hospital. On the staff's attitudes, majority of the staff at the collection points were indifferent (42%), with only 3% being very friendly. The low friendly levels may be an inducer to non-adherence. Concerning the Knowledge about the importance of drugs, 81% agreed, while only 19% disagreed on the drug availability, majority of the patients indicated that the drugs were not readily available. The inadequate drug supply acted as a discouragement to the patients to go to the drug collection centers. The healthcare-related factors therefore mostly acted to induce the patients not to complete their treatment due to the unfavorable environment created. Chi-square test results indicated that health related factors had significant effect on Health Behaviour - Non-adherence or adherence to TB treatment.

5.2.3 To determine the social-economic related factors associated with non-adherence of TB treatment amongst patients in Murang'a County.

The study also sought to determine the social-economic related factors associated with non-adherence of TB treatment among patients in Murang'a County. In relation to the employees' employment status, the majority were either unemployed or self-employed. However, due to the drugs being provided free of charge, it had minimal impact on the non-adherence levels. On the monthly income, the majority had an income of less than Ksh. 6,000. This implies that most respondents were under low living standards. Pertaining to the availability of foods when taking TB drugs, most respondents indicated that food was always available with only a few not having food regularly. However, on the assistance of drugs, only a few individuals had treatment support. Hence the low living standards and lack of support played a huge role, in influencing non-adherence to TB treatment. Chi-square test results indicated that social economic

related factors had no significant effect on Health Behaviour - Non-adherence or adherence to TB treatment.

5.3 Conclusion

The study found out that the adherence to TB treatment is a multidimensional phenomenon that is determined by several factors which include; patient-related conditions, social economic conditions related to the patients and healthcare conditions. The study concludes that the social-economic related factors associated with non-adherence of TB treatment among patients in Murang'a County in the bivariate analysis include the employment status, monthly income, and assistance in taking drugs. Particularly, the low income and lack of assistance in taking the TB drugs are concluded to be the social-economic related factors with the most influence.

The study also concludes that the health-care related factors associated with non-adherence of TB treatment amongst patients in Murang'a County include; TB clinic opening time and duration at the clinic before being attended, location of collecting TB drugs, distance travelled to collect drugs, cost to reach hospital facility and staff attitude on drug collection points. The unfavorable health-care related factors have been concluded to demotivate the patients from collecting and taking the TB drugs.

Comparatively, the study concludes that the patient-related factors that influence the patients' non-adherence to TB treatment to be cigarettes smoking, alcohol intake, the importance of taking TB drugs daily for the correct duration and availability of treatment support. The patients' related factors are concluded to have the least impact on non-adherence to the TB drugs and thus may be easily prevented through educating the patients.

Finally, the study concludes that there are challenges facing adherence of TB treatment which ought to be addressed. The study, suggests that measures to improve drug adherence such as improving health conditions, increasing the availability of drugs and conducting health educations to the patients is essential in minimizing the drug non-adherence to TB drugs.

5.4 Recommendations

The study established that non-adherence does exist among the TB patients in Murang'a County. The study thus recommends that measures should be undertaken so as to reduce the non-adherence level. The study established that some patients traveled away or were unavailable from the treatment centers and this resulted in non-adherence. The mistreatment of patients from health personnel and poor service delivery from health facilities also forces the patient not adhere to their medication. This study recommends health facilities implement strategies to ensure that patients are better served and treated in the health facility.

Therefore, the study recommends that additional drugs should be provided so as to cater for the duration in which the patients will be away. The patients should also be encouraged to take drugs from the nearest drugs centers to them in case they run out of drugs.

Patients mostly consumed alcohol and smoked cigarretes which contributed to the non-adherence as substance abuse is associated with forgetfulness and negligence. This study recommends that these individuals should be taken to counselling and constantly followed up with the health facility to ensure they take their medication

Patients who tested positive for TB were unwilling to disclose their status as a result of stigmatization. Measures like counselling should be put in order to help patients in such circumstance to deal with these issues and to progress with their treatment

5.5 Recommendation for further research

The study mainly concentrated on one region only which was Murang'a County, which may not provide a fair representation of other Counties in Kenya. This study, therefore, recommends that a similar study is conducted in other counties in the country to establish whether a similar situation exists. To enable comprehensive determination of the phenomenon that exists, the study also suggests that further multicentre studies be conducted while taking into consideration other factors not investigated in the study. A comparative study could also be conducted in a different time frame in the same region to determine whether the situation would have improved.

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APPENDICES

Appendix 1: Consent Form

Title: INDICES INFLUENCING NON-ADHERENCE TO PULMONARY TUBERCULOSIS (*Mycobacterium Tuberculosis*) TREATMENT IN MURANG'A COUNTY.

Primary investigator: Charles Muthui Gitonga (Bsc Environmental Health)

Names of Co-investigators:

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Purpose of the study

My name is Charles Muthui Gitonga. I am undertaking a Master's degree study at the Department of Environmental and Occupational Health Department, Kenyatta University. You are being kindly asked to participate in a research on study about indices influencing non-adherence to TB treatment in Murang'a County. The study will give the relevant authority a detailed understanding of the relationship between prevalence of treatment absconding and the related factors, and hence make correct decisions to avoid development of Multi Drug Resistant TB which is very expensive to treat and may lead to death. You are selected as a possible participant in this study because you have undergone TB treatment or you are still on treatment. Please go through this form and ask any questions before deciding on participation on this study.

Study procedures

If you agree to be a participant in this research, you will be asked about yourself and anything about your TB medication. If you do not wish to answer any of the questions posed during the interview, you may say so and the interviewer will move on to the

next question. The interview will take place in a set up with no one else apart from the interviewer.

Duration involvement

The expected duration of the interview is about 20 minutes.

Risks and Benefits to being in the study

This research has the slight risk that you may share some personal or confidential information by chance or that you may feel uncomfortable about talking some of the topics. However, you may refuse to answer any question or not to take part in a portion of the interview if answering the questions makes you uncomfortable. There will be no direct benefit to you, but your participation is likely to help us find out more about how Tuberculosis drug intake can be improved. Any positive findings from the study will be used for purpose of better client management strategies. The result will also benefit the policy makers in their provision and distribution of remarks to the affected areas and guidelines on management of TB.

You will not be given any monetary benefits; neither will you incur any loss regarding services you are getting from the hospital. Your participation is likely to help us find out more about how we can best offer Tuberculosis treatment to people of Murang'a County.

Costs

There will be no charge to you and you will not be provided with any incentive to take part in the research.

Confidentiality

All information collected during this study will be kept strictly confidential to the extent allowed by the law. By joining this study, you will be given a study identification number. All information will be collected on coded forms using this number. Your name will not appear on any of these forms but only on a master list kept separately under lock and key by the primary investigator. Your name will never be used in any of the databases where this information is stored or in connection with any scientific papers or reports published, which may result from the study findings. Information collected during the study will only be viewed by researchers involved in the study. It will only be shared with your medical doctor if it is deemed important in your treatment to improve your health, and upon your authorization.

Voluntary Nature of the Study

If you choose not to participate, it will not affect your current or future relations with the health facility here in any way. You will still be offered the standard medical care. If you decide not to answer any questions you will not be penalized by anyone.

Summary of your rights as a participant in this research study

Your participation in this research study is voluntary. Refusing to participate will not alter your usual health care or involve any penalty or loss of benefits to which you are otherwise entitled. If you decide to join the study, you may withdraw at any time and for any reason without penalty or loss of benefits. If information generated from this study is published or presented, your identity will not be revealed. In the event new information becomes available that may affect the risks or benefits associated with this study or your willingness to participate in it, you will be notified so that you can decide whether or not to continue participating.

Authorization to Use and Disclose your Information

You are authorizing the Principal Investigators, Director Health Murang'a County and Kenyatta University to use and disclose information concerning you information may also be disclosed or used by others involved in overseeing the study including Kenyatta University (KU) ethics review committee.

You may withdraw authorization to collect additional information about you at any time by writing to the local Principal Investigator, but information already collected may continue to be used and disclosed. This authorization has no expiration date.

Please understand the following principles apply to all participants of the study.

1. Your participation in the study is voluntary and if you decide to participate, you will not be denied any services that are normally available to you.
2. Your confidentiality will be safeguard and no names of the participant will appear in any final report or publication resulting from the study.
3. No risk will be incurred in participating in the study

Contact Information

If you have concerns now or in the future regarding your rights in this study or research related injury, you may contact me or my supervisor through this number 0721792666 or the Chairman Kenyatta University (KU) Ethical Review: P.O. Box 43884-00100 Nairobi, Kenya.

You can also contact the investigators of the study: Dr. Jackim Nyamari (0722 589 335) or Dr Judy Mugo (070720671286) both of Kenyatta University. During the study period, the research team will readily avail Dr Juliana Mbutia (0722297800), the Sub County medical officer Maragua for any consultation.

Consent Form to be signed by the study respondents

Signing below indicates that you have been informed about the research study in which you voluntarily agree to participate; that you have asked any questions about the study

that you may have; and that the information given to you has permitted you to make a fully informed and free decision about your participation in the study. By signing this consent form you do not waive any legal rights and the investigators are not relieved of any liability they may have. A copy of this consent form will be provided to you.

The above details about the study and the basis of participation have been explained to me in English/Kiswahili/kikuyu and I agree to take part in the study. I understand that I am free to choose to be part of the study or not. I give consent to be questioned on matters TB drugs intake.

Participant signature/Thumb mark.....Date.....

Research assistant: signature.....Date.....

Principal investigator: signature.....Date.....

(Affirming subject eligibility for the study and that informed consent has been obtained).

Appendix 2: Patient Questionnaires

Individual patient's questionnaire number

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Date of Interview

Section A: Demographic Information

1. Village
2. Age in years:
 - a) 18 – 25 [] b) 26 – 33 [] c) 34 – 41 []
 - d) 42 – 49 [] e) 50 – 57 [] f) 58 – 65 []
 - f) 66 – 73 [] g) above 73 []
3. Religion a) Christian [] b) Islam []
 c) Others
4. Gender: a) Male [] b) Female []
5. Education: a) None [] b) Primary []
 c) Secondary [] d) Tertiary []
6. Marital status: a) Married [] b) Single [] c) Separated []
 d) Divorced [] d) Widow/widower []

Section B: Health Care System Related

7. What would be the most convenient TB clinic opening time for you?
 - a) <8.00 a.m. – 5.00 p.m. [] c) 8.00 a.m. – 5.00 p.m. []
 - b) 8.00 a.m. – >5.00 p.m. [] d) < 8.00 a.m. – >5.00 p.m. []
8. How long do you wait at the clinic before being attended.
 - a) < 1 hour [] b) 1 – 2 hours [] c) 3 hours []
9. Where do you collect your TB drugs?
 - a) Kenol [] e) Gitethi [] i) Maragwa []
 - b) Maragua [] f) Kahuro [] j) Maragua Ridge []
 - c) Makuyu [] g) Kambiti [] k) Kianjugu []
 - d) Kamahuha [] h) Katibaya []
10. How long (distance) do you travel to collect drugs (kms).
 - a) < 5 [] b) 5 – 10 [] c) 11 – 15 []
 - d) 8 – 20 [] e) > 20 []

11. How much does it cost to reach the facility (Kshs?)
 a) Nothing [] b) <Ksh 20 [] c) Ksh 20 – 40 [] d) >Ksh. 40 []
12. How do you rate the staff attitude where you collect drugs?
 a) Very friendly [] b) Friendly [] c) Indifferent []
 d) Unfriendly [] e) Very unfriendly []
13. Were you told the importance of taking drugs regularly and to completion?
 a) Yes [] b) No []
14. What drugs are you supposed to take daily?
 a) Isoniazid [] c) Riampicim []
 c) Pyrazinamide [] d) Ehtambutol []
15. When you go to pick drugs, what would you say about the availability of medicines?
 a) Always available [] b) Sometimes not available []
16. What do you know about symptoms of TB?(tick all the ones applicable)
 a) Coughing [] Yes [] No
 b) Night sweat [] Yes [] No
 c) Loss of weight [] Yes [] No
 d) Chest pain [] Yes [] No
17. TB drugs should be taken until
 a) 6 months [] Yes [] No
 b) One feels better then step on your own [] Yes [] No
 c) 6 months completed and health workers tell you to stop. [] Yes [] No

Section C: Patient-Related Factors

18. Have you smoked cigarettes in the last 6 months?
 a) Yes [] b) No [] c) Cannot recall []
19. Did you drink alcohol in the last 6 months?
 a) Yes [] b) No [] c) Cannot recall []
20. TB can be cured if treatment is taken daily for the correct treatment duration
 a) Yes [] b) No []

30. If No, why?
 a) Fear of being isolated by friends and relative []
 b) No one to visit []
31. Where do you collect your medicine?
 a) Main hospital [] b) Dispensary [] c) Outside this area []
33. If (c) above, why?
 a) Shortage [] b) Distance [] c) Other reasons

Section F: Default Factors

33. Whom do you live with?
 a) Family [] b) Friend [] c) Alone []
 d) Others
34. How many other people live with you?
 a) 0 [] b) 1 – 3 [] c) 4 – 6 [] d) >4 []
35. How big is your dwelling home (No. of bedrooms)
 a) 1 – 2 [] b) 3 – 4 [] c) > 5 []
36. How long have you stayed in your current dwelling/home.
 a) < 3 months [] b) 3 – 12 months [] c) > 12 months []

Section G: Disease and Medicine Related Factors

37. Do you experience any side effect when you were taking TB Treatment?
 a) Yes [] b) No []
38. If yes, which side effects? (Tick all applicable)
 a) Diarrhoea and vomiting [] b) Skin rashes []
 c) Headache and dizziness [] d) Numb fee and hands []
 e) Yellow eyes [] f) others []
39. From starting taking drugs, how long did you take before feeling better (month)
 a) < 2 [] b) 2 – 4 [] c) 5 – 6 [] d) Didn't feel health []
39. Did you complete your TB Treatment?
 a) Yes [] b) No []

40. If No, what were the reasons for stopping taking? (Tick all that apply)
- a) Side effects [] b) Feeling well c) Too many tablets []
 - d) Stigma [] e) Distance f) Cost of travel []
 - h) Cost of food [] i) Lack of family support []
 - j) Inadequate supply of medicine [] k) Medicine not working []
 - l) No reason [] m) others.....
41. Disease classification (Tick (3) according to card or register).
- a) PTB – SM⁺ [] b) PTB – SM⁻ [] c) EPTB []
 - d) PTB and EPTB [] e) Not indicated []
42. Was the patient taking other drugs besides TB treatment?
- a) Yes [] b) No []
43. If yes to the above question, which drugs are the patient takings?
- a) HAART [] b) Psychiatric [] c) Anti-hypertension []
 - d) Others
44. In your opinion, what could make patients complete their TB treatment?
-
-
-

Appendix 3: Checklist Tool

Name of health facility

Date of interview

(The investigator should see the materials)

Record cards	1) Available []	2) Not available []
Record daily	1) Available []	2) Not available []
Patient register	1) Available []	2) Not available []
Defaulters' register	1) Available []	2) Not available []
Counselling room	1) Available []	2) Not available []
Examination gloves	1) Available []	2) Not available []
Spirit and alcohol	1) Available []	2) Not available []
Literature on TB at the (HFC)	1) Available []	2) Not available []
Leaflets	1) Available []	2) Not available []
Booklets	1) Available []	2) Not available []
Posters	1) Available []	2) Not available []
Flowcharts	1) Available []	2) Not available []
Flip charts	1) Available []	2) Not available []
Newsletter for clinic provider	1) Available []	2) Not available []
Available drugs	1) Available []	2) Not available []

How are drugs stored.....

Are they kept in a cool place? Yes [] No []

Are they kept in a dark place? Yes [] No []

If No, drugs are available, what are the reasons?

.....

.....

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.....

.....

.....

.....

Appendix 4: Field Notes

These notes should cover about every component in the study

1. Patient who utilize the health setting
2. Field visits to the community
3. Verbal and nonverbal communication during interaction with health workers, community health worker and interview respondents
4. Health worker – patient interaction
5. Interpersonal relationship and work

Appendix 5: Health Care Provider Interview Guide

1. Are you readily available at the TB Clinic?
2. What is your view on anti-TB drugs?
3. Do you experience drug shortages?
4. At what period interval do patient collect their drugs?
5. What challenges do you encounter while administering anti-TB drugs?
6. What do you think about patient adherence to TB treatment?
7. What mechanism is in place for tracing treatment defaulters?
8. What importance would you suggest to enhance adherence?

Appendix 6: Patient interview guide

1. Tell me about the time you were first told that you have TB. How do you get to think you got infected?
2. Tell me how much you know about TB?
3. What was happening in your life at the time you were diagnosed with TB?
4. What is your experience of being a person with TB?
5. What is your experience of taking the treatment that the nurses in the clinic give you?
6. What are some of the reasons that could contribute to non-adherence?
7. Have you been able to take your treatment exactly the way the nurses have advised you to?
8. Are you getting advice and/or treatment from anyone else besides the nurses and doctors that treat you in the clinic?
9. Have you been asked by the nurses whether you would like to have an HIV test? Would you mind telling me if you agreed to have the test?

Appendix 7: Focus Group Discussion

Single Focus Group: 1 CHW

3 Health Care Practitioner (nurse and lab technician and records person)

2 TB Health Workers in the Clinic at Maragua Health Centre.

Facilitator is the Principal Investigator and Research assistance co-facilitator

- Duration 120 minutes

The discussion was tape recorded (with consent) and transcribed and for ethical purposes, the information was kept under key and lock. this will ensure the identity and responses are kept confidential.

This generates qualitative data. This method was used because the healthcare setting is based on team approach hence to allow the team to have a collective view in the theme that will emerge from the in-depth interview of the 15 participants.

Appendix 9: Research Permit

**THIS IS TO CERTIFY THAT:
MR. CHARLES MUTHUI GITONGA
of KENYATTA UNIVERSITY, 0-1002
THIKA, has been permitted to conduct
research in Muranga County**

**Permit No : NACOSTI/P/18/27958/21231
Date Of Issue : 20th February,2018
Fee Received :Ksh 1000**

**on the topic: INDICES INFLUENCING
NON ADHERENCE TO PULMONARY
TUBERCULOSIS (MYCOBACTERIUM
TUBERCULOSIS)TREATMENT IN
MURANGA COUNTY KENYA**



**for the period ending:
20th February,2019**

[Handwritten Signature]
.....
**Applicant's
Signature**

[Handwritten Signature]
.....
**Director General
National Commission for Science,
Technology & Innovation**

CONDITIONS

1. The License is valid for the proposed research, research site specified period.
2. Both the Licence and any rights thereunder are non-transferable.
3. Upon request of the Commission, the Licensee shall submit a progress report.
4. The Licensee shall report to the County Director of Education and County Governor in the area of research before commencement of the research.
5. Excavation, filming and collection of specimens are subject to further permissions from relevant Government agencies.
6. This Licence does not give authority to transfer research materials.
7. The Licensee shall submit two (2) hard copies and upload a soft copy of their final report.
8. The Commission reserves the right to modify the conditions of this Licence including its cancellation without prior notice.



REPUBLIC OF KENYA



**National Commission for Science,
Technology and Innovation**

**RESEARCH CLEARANCE
PERMIT**

Serial No.A 17503

CONDITIONS: see back page

Appendix 10: Research Authorization Letter



NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY AND INNOVATION

Telephone: 020 400 7000,
0713 788787,0735404245
Fax: +254-20-318245,318249
Email: dg@nacosti.go.ke
Website: www.nacosti.go.ke
When replying please quote

NACOSTI, Upper Kabete
Off Waiyaki Way
P.O. Box 30623-00100
NAIROBI-KENYA

Ref. No. **NACOSTI/P/18/27958/21231**

Date: **20th February, 2018**

Charles Muthui Gitonga
Kenyatta University
P.O. Box 43844-00100
NAIROBI.

RE: RESEARCH AUTHORIZATION

Following your application for authority to carry out research on “*Indices influencing non adherence to Pulmonary Tuberculosis (Mycobacterium Tuberculosis) treatment in Muranga County Kenya*” I am pleased to inform you that you have been authorized to undertake research in **Muranga County** for the period ending **20th February, 2019**.

You are advised to report to, **the County Commissioner, the County Director of Education and the County Director of Health Services, Muranga County** before embarking on the research project.

Kindly note that, as an applicant who has been licensed under the Science, Technology and Innovation Act, 2013 to conduct research in Kenya, you shall deposit a **copy** of the final research report to the Commission within **one year** of completion. The soft copy of the same should be submitted through the Online Research Information System.

G.P. Kalerwa

**GODFREY P. KALERWA MSc., MBA, MKIM
FOR: DIRECTOR-GENERAL/CEO**

Copy to:

The County Commissioner
Muranga County.

The County Commissioner
Muranga County.

Appendix 11: Permission Letter to Conduct Research in Maragua Division**THE PRESIDENCY**

MINISTRY OF INTERIOR AND COORDINATION OF NATIONAL GOVERNMENT



Telephone: 067-72472
 Fax: 72200
 e-mail: dcmrgsouth@yahoo.com

ASSISTANT COUNTY COMMISSIONER
 MARAGUA DIVISION
 P O BOX 8 - 01020
KENOL

Ref: MAR/PH.10/1/VOL.II/103

DATE: 9TH FEBRUARY, 2018

CHARLES MUTHUI GITONGA (Bsc.),
 Environment & occupational health department,
 Kenyatta University.

RE: PERMISSION TO CONDUCT RESEARCH IN MARAGUA DIVISION

Your letter ref: Q23/CE/25328/2014 dated 2/2/2018 and Director General, National Commission for Science, Technology & Innovation refers:-

Permission is hereby granted to carry out the said study. Ensure you keep in touch with the area chiefs as you proceed with the study. In the event you need help from this office, contact me any time of the day during working hours.

On completion of the study, organize a brief of your findings.

Good luck.

**ASSISTANT
 COUNTY COMMISSIONER
 MARAGUA DIVISION**

ALEX K. MUKINDIA
 ASSISTANT COUNTY COMMISSIONER
MARAGUA DIVISION

CC

- DCC- MURANG'A SOUTH

Appendix 12: Research Authorization Letter**MURANG'A COUNTY GOVERNMENT**

Telephone: (060) 30244,
 Fax: (060) 30244,
 When replying please quote,

DEPARTMENT OF HEALTH

COUNTY DIRECTOR,
 MURANG'A COUNTY,
 P. O. BOX 69,
 MURANG'A

REF: MOH/GEN/MUR/Vol. IV/68

DATE: 5TH FEBRUARY 2018

Charles Muthui Gitonga
Q23/CE/25328/2014
Environmental & Occupational Health Department
Kenyatta University

Dear Sir,

**RE: PERMISSION TO CONDUCT A STUDY TITLED 'INDICES INFLUENCING
 NON-ADHERENCE TO PULMONARY TUBERCULOSIS (mycobacterium
 Tuberculosis) TREATMENT IN MARAGUA SUB COUNTY, MURANG'A
 COUNTY**

The above matter refers.

Permission to conduct the above mentioned study is hereby granted. Be informed that further arrangements should be made with the targeted institution, services in the said institution should not be disrupted by the study and a copy of the completed study should be submitted to the department to serve as a resource.

Your cooperation will be highly appreciated.

DR. KANYI W.W.
COUNTY DIRECTOR OF HEALTH
MURANG'A COUNTY



c.c. – Sub County Medical Officer
Maragua Sub County

Appendix 13: Application for Research Authorization Letter



**KENYATTA UNIVERSITY
ETHICS REVIEW COMMITTEE**

Fax: 8711242/8711575
Email: chairman.kuerc@ku.ac.ke
secretary.kuerc@ku.ac.ke

P. O. Box 43844-00100
Nairobi.

Tel: 8710901/12

Website: www.ku.ac.ke

Our Ref: KU/ERC/ Re- Review Appr./VOL.1 (59)

Date: 30th January, 2018.

Charles Muthui Gitonga
Kenya University
P.O. Box 43844-00100
NAIROBI.

Dear Charles,

APPLICATION NUMBER- PKU/755/I823 'INDICES INFLUENCING NON-ADHERENCE TO PULMONARY TUBERCULOSIS (MYCOBACTERIUM TUBERCULOSIS) TREATMENT IN MURANG'A, COUNTY KENYA.'

1. IDENTIFICATION OF PROTOCOL

The application before the Committee is with a research topic PKU/755/I823 'Indices Influencing Non-Adherence to Pulmonary Tuberculosis (Mycobacterium tuberculosis) Treatment in Murang'a County, Kenya" received on 30th October, 2017 and deliberated on the 16th of January, 2018 and received on 22nd January 2018 for re- review.

APPLICANT

Charles Muthui Gitonga

2. SITE

Muranga County. Kenya

3. DECISION

The Committee has considered the research protocol in accordance with the Kenyatta University Research Policy (Section 7.2.1.3) and the Kenyatta University Review Committee Guidelines **AND APPROVED that the research may proceed for a period of ONE year from 26th January 2018.**

ADVICE/CONDITIONS

You must include a Clinician in the Study and include an elaboration of Community benefits.

- i. Progress reports are submitted to the KU-ERC every six months and a full report is submitted at the end of the study.
- ii. Serious and unexpected adverse events related to the conduct of the study are reported to this committee immediately they occur.
- iii. Notify the Kenyatta University Ethics Committee of any amendments to the protocol.
- iv. Submit an electronic copy of the protocol to KUERC.

When replying, kindly quote the application number above.

If you accept the decision reached and advice and conditions given please sign in the space Provided below and return to KU-ERC a copy of the letter.



**DR. TITUS KAHIGA
CHAIRMAN ETHICS REVIEW COMMITTEE**

I CHARLES MUTAI GITHA accept the advice given and will fulfill the conditions therein.

Signature: [Signature] Dated this day of 12 FEB 2018.

C.c. DVC Research Innovation and Outreach