SCHOOL OF MEDICINE AND HEALTH SCIENCES

DEPARTMENT OF PUBLIC HEALTH

ASSOCIATED FACTORS OF DRUG RESISTANCE AMONG TUBERCULOSIS PATIENTS AT THE KAFUE DISTRICT HOSPITAL

BY

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A research dissertation submitted to the University of Lusaka in partial fulfillment of

the requirements of a Degree in Bachelor of Science in Public Health
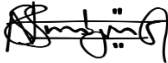
@2023

DEDICATION

I would like to dedicate this work to myself as a celebration of my personal growth, perseverance, and hard work that has led to the successful completion of this dissertation. It is a testament to my dedication and determination in pursuing my academic goals. Through countless hours of research, analysis, and writing, I have overcome challenges and pushed myself to achieve this milestone.

This dedication serves as a reminder of the strength, resilience, and capabilities that reside within me. I am proud of the knowledge and skills I have acquired throughout this journey, and I look forward to applying them in future endeavors. This achievement is a reflection of my passion, commitment, and unwavering belief in my abilities. As I dedicate this work to myself, I acknowledge the importance of self-belief, hard work, and personal growth. It is a reminder to continue striving for excellence and embracing new challenges with confidence and determination.

DICLARATION

Name of student and ID: Nathan Sabao BSPH1411424

I declare that this dissertation is my creative work and to the best of my acquaintance has not been presented for a degree in any other institution.

Signature: **Date:** 2nd June 2023

Supervisor Name: Ms. Kawamya Francisca Nkandu

This dissertation has been submitted with my approval as a University of Lusaka (UNILUS) supervisor.

School of Medicine and Health Sciences, Department of Public Health

Signature: **Date:** 2nd June 2023

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LIST OF ACRONYMS

- AFB: Acid Fast Bacilli

- AIDS: Acquired Immune Deficiency Syndrome

- ART: Antiretroviral therapy

- DR-TB: Drug Resistant Tuberculosis

- ESP: European Society of Mycobacteriology

- HD: Methadone.

- HIV: Human Immunodeficiency Virus

- HIV/TB: Human Immunodeficiency Virus/Tuberculosis

- IDU: Injecting Drug User

- IS: Isoniazid

- INH: Isoniazid

- MDR-TB: Multidrug-resistant tuberculosis

- MOH: Ministry of Health

- RAD: Chest Radiographs

- RMP: Rifampicin

- TB: Tuberculosis

- TA: Thematic Analysis

- UK: United Kingdom

- USA: United States of America

- WHO: World Health Organization

- XDR: extensively drug-resistant

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ABSTRACT

Drug resistance in tuberculosis (TB) poses a significant public health challenge worldwide. This dissertation investigates the associated factors contributing to drug resistance among TB patients, shedding light on critical aspects of TB management and control. The study employed a mixed-methods approach, including retrospective patient record analysis and qualitative interviews.

The analysis of patient records revealed a concerning rise in drug resistance rates, particularly at Kafue District Hospital. Factors associated with drug resistance included inadequate treatment adherence, previous TB treatment history, and comorbidities such as HIV infection.

Qualitative interviews with TB patients and healthcare providers provided valuable insights into the social and healthcare-related determinants of drug resistance. Stigmatization, economic constraints, and limited access to quality healthcare services emerged as significant challenges faced by TB patients.

This dissertation underscores the multifaceted nature of drug resistance among TB patients. It highlights the urgent need for tailored interventions, improved treatment adherence support, and enhanced access to comprehensive healthcare services. Addressing these factors is crucial to mitigating the growing threat of drug-resistant TB and advancing global efforts toward TB control and elimination.

<div align="center">**CHAPTER ONE**</div>

1.0 INTRODUCTION

1.0 Background

With an anticipated 10 million infections and 1.4 million fatalities reported in 2019, tuberculosis (TB) continues to be a serious worldwide health issue (World Health Organization [WHO], 2020). Despite the existence of efficient therapies, drug-resistant tuberculosis (DR-TB) has emerged as a significant obstacle in the global fight against TB. With an expected 484,000 cases of rifampicin-resistant TB and 78,000 cases of multidrug-resistant TB (MDR-TB) recorded in 2019, DR-TB is an increasingly serious issue around the world (WHO, 2020).

Several factors, including those relating to the patient, such as non-adherence to treatment, prior treatment history, and comorbidities like HIV, as well as those relating to the healthcare system, such as inadequate treatment regimens, poor quality of care, and inadequate infection control measures, all play a role in the development of DR-TB (Falzon et al., 2013; Getahun et al., 2015).

The prevalence of DR-TB is especially high in settings with few resources and little access to diagnostic and therapeutic options. For instance, a study carried out in Ethiopia discovered that inadequate healthcare infrastructure, poor infection control, and poor treatment adherence were the key factors for the establishment of DR-TB (Asefa et al., 2019). Another study conducted in South Africa discovered that MDR-TB was substantially related with low socioeconomic level, a history of prior treatment, and poor treatment adherence (Modongo et al., 2014).

It's critical to recognize the contributing elements and create efficient preventative and management methods for DR-TB in order to solve the issue. For patients with DR-TB, studies in the past have demonstrated that the use of modern medications like bedaquiline and delamanid can dramatically enhance treatment outcomes (Nunn et al., 2014; Skripconoka et al., 2013). However, these medications are pricey and scarce in many areas with limited resources.

1.1 Justification of Study

The findings of the study aim to explore the associated factors of drug resistance among tuberculosis patients at the Kafue District Hospital and provide insights into the reasons behind the high prevalence of TB drug resistance in Kafue. The study also seeks to examine potential associations between various qualitative factors and low TB notification rates and treatment success. Justifications for the study include:

• Age distribution of MDR-TB patients: Exploring how different age groups experience and cope with multidrug-resistant tuberculosis (MDR-TB) and understanding their unique perspectives and challenges.

• Gender differences in MDR-TB: Investigating the experiences, attitudes, and social contexts surrounding MDR-TB among individuals of different genders to uncover any gender-specific factors.

• Geographical distribution of MDR-TB: Examining the contextual factors and community dynamics that contribute to the occurrence and spread of MDR-TB in different locations within the Kafue District.

• HIV and MDR-TB association: Understanding the lived experiences, social factors, and psychosocial aspects related to the co-occurrence of HIV infection and MDR-TB, exploring their interconnectedness qualitatively.

• Previous TB treatment and MDR-TB: Exploring the narratives and experiences of individuals who have undergone previous tuberculosis treatment to gain insights into how it may influence the development of drug resistance.

• Compliance and MDR-TB risk: Investigating the perspectives, beliefs, and experiences of patients regarding treatment adherence and its potential impact on the risk of developing drug-resistant tuberculosis.

By digging into these qualitative factors, the study aims to deepen our understanding of drug resistance in tuberculosis and provide valuable insights for developing patient-centered interventions and strategies to address the challenges associated with MDR-TB.

1.2 Statement of The Problem

TB continues to be one of the top 10 causes of morbidity and mortality in Zambia and is a major public health concern. Only a small portion of the diagnosed MDR-TB cases actually fall under the purview of the problem. Latent infections are carried by unknown individuals (and likely unknowable at present). Furthermore, official statistics undoubtedly understate the true prevalence of MDR-TB. It should be stressed that drug resistance can usually be identified immediately if Acid Fast Bacilli (AFB) is still positive after more than two months of rigorous therapy for TB with first-line drugs. MDR-type M strains are found. Only the organism can be cultured and tested for susceptibility to tuberculosis.

Because treatment, diagnosis, and management are time- and money-consuming operations, susceptibility testing should be carried out often. MDR-TB is contagious and has a high fatality rate. If safety precautions are not taken, a multidrug-resistant breakout and an increase in tuberculosis mortality could occur in the nation. In Kafue, collaborative TB control initiatives with international partners have been launched. Additionally, research funding has been increased, a consolidated national electronic database of TB patients has been established, and new policies and diagnostic procedures have been put into place. However, the progress has been far from satisfactory, as, despite the decrease in total TB incidence, the prevalence of MDR/RR-TB is continuing to rise (MOH, 2016) The national drug resistance survey conducted in Zambia in 1999 found that 0.9% of new cases had MDR to INH + RMP. MDR to INH +RMP in the previously treated subjects was 2.3%. (National TB Strategic Plan 2006-2011). The practically incurable disease would jeopardize the economic, social, and health security of nations, communities, and families with a high frequency of MDR-TB through travel to medical facilities and time missed at work as it affects people during their prime years of productivity (King K. Holmes, 2017).

1.3 General Objective

To determine the associated factors of drug resistance among tuberculosis patients at the Kafue district hospital

1.3.1 Specific Objective

1. To describe the demographic characteristics such as age, gender, and geographical distribution of patients presenting with MDR-TB.
2. To investigate the relationship between prior TB treatment, treatment compliance, and the occurrence of MDR-TB.

3. To explore the relationship between HIV status and the occurrence of MDR-TB.

1.3.2 Research Question

1. How are the demographic characteristics such as age, gender, and geographical distribution of patients presenting with MDR-TB?

2. What are the factors influencing treatment compliance among individuals who have received prior tuberculosis treatment, and how do these factors relate to the occurrence of MDR-TB?

3. How does HIV status influence the occurrence of multidrug-resistant tuberculosis (MDR-TB) among individuals?

Figure 1: Conceptual Framework
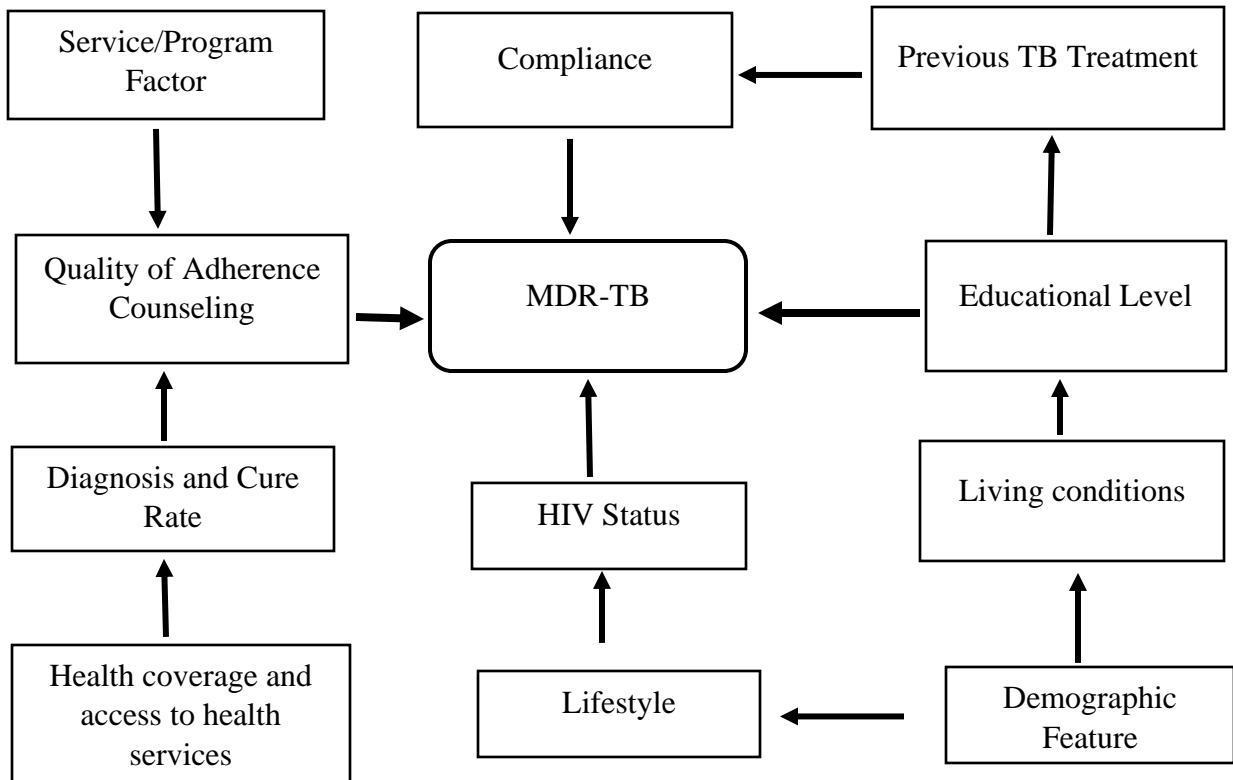
CHAPTER TWO

2.0 LITERATURE REVIEW

2.0 Introductions

This chapter presents a review of the MDR-TB literature that has already been published. This review's objective is to give the reader a thorough overview of the research that has been done on this topic in various nations. The review aims to provide a comparative analysis of the study findings and highlight the significant scholarly works on MDR-TB.

2.1 Global Perspective

Drug-resistant tuberculosis (DR-TB) is a significant public health concern worldwide, particularly in low- and middle-income countries. DR-TB is caused by strains of the bacteria Mycobacterium tuberculosis that are resistant to one or more of the standards first-line anti-TB drugs. Multidrug-resistant tuberculosis (MDR-TB) is a form of DR-TB that is resistant to at least two of the most effective first-line anti-TB drugs, isoniazid and rifampicin. Extensively drug-resistant tuberculosis (XDR-TB) is a rare but particularly dangerous form of DR-TB that is resistant to a broader range of anti-TB drugs, including second-line drugs that are used to treat MDR-TB.

The factors associated with drug resistance in TB patients are complex and multifaceted, including patient-related, healthcare-related, and program-related factors. Patient-related factors include a history of previous TB treatment, poor treatment adherence, and low body mass index (BMI). Healthcare-related factors include inadequate drug regimens, poor treatment supervision, and inadequate diagnostic facilities. Program-related factors include inadequate funding, poor infrastructure, and lack of political will.

In Russia, a study found that a history of previous TB treatment, male sex, and alcohol abuse were significant risk factors for DR-TB among TB patients. The study also found that the prevalence of DR-TB was higher in urban areas than in rural areas (Balabanova et al., 2006).

In China, a study of MDR-TB patients found that a history of previous TB treatment, poor treatment adherence, and a low BMI were significant risk factors for treatment failure. The study also found that MDR-TB patients had a higher risk of adverse effects from treatment, including hearing loss, compared to non-MDR-TB patients (Li et al., 2017).

In Brazil, a study of MDR-TB patients found that a history of previous TB treatment, a longer duration of illness, and treatment interruption were significant risk factors for treatment failure. The study also found that the use of second-line anti-TB drugs was associated with a higher risk of adverse effects, such as liver toxicity (Fregona et al., 2017).

In the United States, a study of MDR-TB patients found that a history of previous TB treatment, homelessness, and HIV coinfection were significant risk factors for poor treatment outcomes. The study also found that the use of second-line anti-TB drugs was associated with a higher risk of adverse effects, such as renal toxicity (Marks et al., 2000).

In Europe, a study of MDR-TB patients found that a history of previous TB treatment, HIV coinfection, and the use of second-line anti-TB drugs were significant risk factors for treatment failure. The study also found that the prevalence of MDR-TB was higher in Eastern Europe than in Western Europe, highlighting the importance of socioeconomic factors in the development of drug resistance (Drobniewski et al., 2005).

Other factors that have been associated with DR-TB include poverty, malnutrition, smoking, and exposure to TB patients who are already infected with drug-resistant strains. In addition, the global rise in HIV/AIDS has contributed to the increase in drug resistance, as TB is a leading opportunistic infection in people living with HIV/AIDS.

2.2 Regional Perspective

Tuberculosis (TB) is a major public health challenge in Africa, with the highest incidence and mortality rates reported in the world. According to the World Health Organization (WHO) Global Tuberculosis Report 2021, Africa accounts for approximately 25% of the global TB burden, with an estimated 2.9 million cases reported in 2020. Drug resistance is a growing concern in Africa, with increasing rates of multidrug-resistant TB (MDR-TB) and extensively drug-resistant TB (XDR-TB) reported in several countries.

Several factors have been linked by numerous studies to medication resistance in African TB patients. In a study carried out in Nigeria, elements like poor treatment results, prior history of TB therapy, and non-adherence to treatment were recognized as risk elements for MDR-TB (Lawson

et al., 2018). Another study conducted in Ethiopia discovered that age, sex, past TB treatment history, and HIV status were all significant predictors of medication resistance (Kibret et al., 2016).

Poor treatment outcomes have been reported as a major risk factor for drug resistance in several African countries. In a study conducted in South Africa, patients with poor treatment outcomes were more likely to have drug-resistant TB (Shean et al., 2013). The study also found that patients with drug-resistant TB were more likely to have a history of previous TB treatment and to be HIV positive.

HIV co-infection is another factor that has been associated with drug resistance among TB patients in Africa. A study conducted in Mozambique found that HIV-positive TB patients were more likely to have drug-resistant TB compared to HIV-negative patients (Cox et al., 2015). The study also found that patients who were not on antiretroviral therapy (ART) were more likely to have drug-resistant TB.

Poor infection control measures have also been identified as a factor contributing to drug resistance in Africa. A study conducted in Ghana found that inadequate infection control measures in health facilities were associated with increased risk of MDR-TB (Kwara et al., 2013). The study recommended the need for improved infection control measures to prevent the transmission of TB in health facilities.

Inadequate laboratory facilities and diagnostic tools have also been identified as a factor contributing to drug resistance in Africa. A study conducted in Uganda found that delayed diagnosis due to inadequate laboratory facilities and diagnostic tools contributed to the development of drug-resistant TB (Lubwama et al., 2013). The study recommended the need for improved laboratory services to facilitate early and accurate diagnosis of TB.

Social and economic factors have also been identified as contributors to drug resistance in Africa. Poverty, malnutrition, and overcrowding have been associated with increased risk of TB transmission and development of drug resistance (Mukherjee et al., 2016). In addition, stigma and discrimination towards TB patients have been identified as barriers to effective treatment and control of TB in several African countries (Mfinanga et al., 2014).

2.3 Local Context

Zambia faces a significant public health burden from multi-drug resistance tuberculosis (MDR-TB), where an estimated 4,000 people contract the disease each year (Ministry of Health, 2017). Mycobacterium tuberculosis germs that produce MDR-TB are resistant to at least two of the most potent anti-TB medications, isoniazid, and rifampicin (WHO, 2021).

According to research by Kapata et al. (2017) in Zambia, 2.7% and 14.1%, respectively, of newly diagnosed and previously treated TB cases had MDR-TB. The research also showed that prior TB treatment, co-infection with HIV, and poor TB treatment adherence were all risk factors for MDR-TB (Kapata et al., 2017).

Another study by Sinyangwe et al. (2018) revealed that MDR-TB was more common in men than in women, and that patients with MDR-TB were more likely to have received prior TB treatment, be HIV positive, and reside in urban areas. The study also noted difficulties in the diagnosis and management of MDR-TB, such as the lack of diagnostic tools for MDR-TB, poor treatment adherence, and insufficient funding for MDR-TB care (Sinyangwe et al., 2018).

Moreover, Mbulo et al 2019.'s study found patient-related characteristics that support the growth and spread of MDR-TB in Zambia. They included a lack of understanding of TB transmission and prevention, the stigma around TB and MDR-TB, and poor treatment compliance. Inadequate training of healthcare professionals, lax infection control procedures, and a lack of access to MDR-TB therapy, according to the study, were other health system-related variables that significantly contributed to the emergence and spread of MDR-TB in Zambia (Mbulo et al., 2019).

In Zambia, efforts to combat the problem of MDR-TB have been concentrated on enhancing TB control programs and enhancing MDR-TB diagnosis and treatment. The Zambian government has created and implemented a national strategic plan for TB control that calls for the improvement of infection control procedures, the expansion of diagnostic services, and the introduction of new anti-TB medications (Ministry of Health, 2017). Unfortunately, there are still a lot of obstacles to overcome in order to address the intricate and multiple causes of the emergence and spread of MDR-TB in Zambia.

In conclusion, MDR-TB poses a substantial public health risk in Zambia. Previous TB treatment, HIV co-infection, poor adherence to TB therapy, and a lack of resources for MDR-TB management

are all factors that contribute to its prevalence and spread. Strengthening TB control programs and enhancing MDR-TB diagnosis and care in Zambia are both necessary for addressing these issues.

CHAPTER THREE

3.0 METHODOLOGY

3.0 Introduction

The study's methodology is explained in this chapter. The following sections make up its structure. Data collection methods, inclusion and exclusion criteria, validity and reliability, ethical considerations, and a pilot research.

3.1 Research Design

This study, which examined the related determinants of medication resistance among tuberculosis patients at the Kafue District Hospital, used a mixed-methods approach. The combination of quantitative and qualitative research methodologies enabled the acquisition of rich and extensive data as well as numerical proportions and statistical connections, enabling a thorough examination of the complex and multiple processes causing medication resistance. While the quantitative component supplied numerical data for a more in-depth knowledge of the problem, the qualitative component concentrated on understanding subjective experiences, views, and contextual elements. The conclusions are intended to offer insightful information for the creation of focused interventions to address the problem of medication resistance.

3.2 Study Site

The study was conducted in Kafue District, Lusaka, Zambia, where the population is estimated to be approximately 220,000 people as of 2021.

3.2.1 Inclusion

- "Adults aged 15 years and above."
- "Culture-positive TB" patient.

3.2.2 Exclusion Criteria

- "Individuals below 15 years old"
- Culture-negative TB patient

3.3 Sample Size

In this study, the sample size will be determined using the data saturation method. The point of saturation will refer to the point at which no new insights or themes emerge from the data collected. To ensure that the sample size is comprehensive, and representative of the population being studied, data collection will continue until no new information is gained from additional interviews.

3.4 Sampling Methods

The sampling method to be used will be convenience sampling. The most popular non-probability sampling technique is convenience sampling, which focuses on collecting data from individuals (the sample) who are 'convenient' for the researcher to reach. This sampling technique allows researchers to choose subjects at random who are open to being approached and participating in the study, as opposed to selecting participants at random based on any set of criteria (such as demographic variables).

3.5 Data Analysis

The data will be analyzed using the thematic analysis (TA) approach after being collected using an interview guide, with themes being created from the goals we established in chapter one. By focusing on meaning across a data set, TA allows the researcher to see and make sense not only of practical evidence but also of collecting connected (related) or shared meanings and experiences.

3.6 Ethical Consideration

Approval will be "sought from the Research Ethics Committee of the" University of Lusaka. Permission will also be obtained from Kafue District Hospital "management. Confidentiality" will be "maintained by use of codes and no names indicated in the data collection sheet. Since it" will be "a record based retrospective study and" will "not involve human subjects, a waiver for consent" will be requested

4.0 RESULTS

Tuberculosis (TB) is a major global health challenge, with multidrug-resistant tuberculosis (MDR-TB) posing a significant threat to public health. MDR-TB is a form of TB caused by bacteria that are resistant to two of the most effective first-line drugs, isoniazid and rifampicin. MDR-TB is associated with high morbidity and mortality rates and poses a significant challenge to healthcare systems worldwide.

In this study, we investigated the associated factors of MDR-TB in Kafue District hospital setting. Sixteen patients (12 males and 4 females) who were culture positive for MDR-TB were included in the study. The patients were evaluated for various factors, including age, sex, duration of TB symptoms, history of TB treatment, and HIV status. In addition to the sixteen MDR-TB patients, two hospital workers at the TB department were also interviewed, providing valuable insights into the management of MDR-TB in the hospital setting. Their participation of the health workers helped to highlight potential areas for improvement in infection control practices and staff training, which could enhance patient care and reduce the risk of transmission.

The findings of our study reveal that most of the patients were male and had a history of TB treatment. Additionally, a significant proportion of the patients had a duration of TB symptoms for more than 2 months before seeking medical attention.

it is important to acknowledge that the lack of information on the HIV status of most participants limits the generalizability of the study findings. It is possible that the prevalence of HIV among MDR-TB patients in the hospital is underestimated due to the lack of data.

However, the fact that one female participant was willing to disclose her HIV status is significant. It highlights the importance of addressing stigma and discrimination surrounding HIV status, which may prevent individuals from disclosing their status and seeking appropriate care. It also suggests that further efforts are needed to encourage patients to disclose their HIV status, as this information is crucial for effective management of both TB and HIV.

Despite the limitations of the study, the findings still provide valuable insights into the associated factors of MDR-TB in the hospital setting. The high proportion of patients with a history of TB

treatment and delayed presentation to healthcare facilities underscores the need for more effective TB control measures, including earlier diagnosis and treatment. Additionally, the predominance of male patients raises questions about potential gender-specific risk factors for MDR-TB that warrant further investigation.

4.0.1 Table 1: Emerging Themes

Specific Objectives	Generated Themes
1. How are the demographic characteristics such as age, gender, and geographical distribution of patients presenting with MDR-TB?	• Age distribution of MDR-TB patients • Gender differences in MDR-TB • Geographical distribution of MDR-TB
2. What are the factors influencing treatment compliance among individuals who have received prior tuberculosis treatment, and how do these factors relate to the occurrence of MDR-TB?	• Patient Perspectives and Experiences • Link between Compliance and MDR-TB
3. How does HIV status influence the occurrence of multidrug-resistant tuberculosis (MDR-TB) among individuals?	• HIV as a Risk Factor • Disease Interactions and Transmission • Impact on Treatment Outcomes

4.0.2 Table 2: Key Informant Information

Key Informants	Experience	Code
Lab Technician	3 Years	HStuff 1
Counsellor	7 Years	HStuff 2

4.0.3 TABLE 3: Participant's Information

ID	AGE	SEX	LOCATION	Tested for HIV?	HIV STATUS	Previous DIAGNOSIS	MDR-TB Diagnosis
1	32	Male	Kalundu View	YES	Negative		Dec-22
2	29	Male	Kalundu View	NO	No Response		Nov-22
3	19	Female	Shikoswe	NO	NO Response		Oct-22
4	30	Male	Kafue ZC	YES	Negative	MDR-TB 2017	Jun-22
5	32	Female	Shimabala	YES	No Response		Dec-22
6	46	Male	Kafue ZC	YES	No Response	2019	Aug-22
7	29	Male	Kafue ZC	NO	No Response		Dec-22
8	30	Female	kafue East	YES	No Response		Nov-22
9	53	Male	Kafue town center	YES	Negative	2014	Nov-22
10	41	Male	Kafue ZC	NO	No Response		Jan-23
11	33	Male	Kalundu View	YES	Negative		Aug-22
12	32	Female	Kalundu View	YES	Positive		Sep-22
13	57	Male	Shikoswe	YES	Negative		May-22
14	38	male	Kalundu View	YES	negative		Mar-22
15	28	male	Kafue ZC	YES	Negative		Aug-22
16	31	male	Kafue ZC	YES	No Response		Sep-22

The study conducted individual interviews with 16 patients who had multidrug-resistant tuberculosis (MDR-TB) and two clinical staff members. The patients ranged in age from 19 to 57 years old, with 12 males (75%) and 4 females (25%). Of the male patients, 8 (66.66%) were confirmed to be HIV negative, while 4 (33.33%) chose not to disclose their status. Among the female patients, only 1 (25%) was confirmed to be HIV positive, while 3(75%) chose not to disclose their status.

When asked if any of the patients had TB or MDR-TB in the past, out of the 16 respondents, 81.3% (13) responded with a NO while 18.8% (3) responded with a YES. Out of the 16 Respondents, 2 (12.5%) who are only male reported to have had TB in the past and 1 (6.25%) also being male reported to have had MDR-TB in the past.

With regards to geographical locations, of all the 16 patients. 6 (37.5%) all being male reported to have come from Kafue Zambian Compound (Kafue ZC), 5 (31.25%) 4 being male at 80% and 1 female at 20% reported to have come from Kalundu View, 2 (12.5%) 1 male at 50% and 1 female at 50% reported to have lived in Shikoswe, and the remaining three at 6.25% each reported to have lived in different areas being Kafue Town Center (male), Shimabala (female) and Kafue East (female).

The demographic information provides valuable insights for understanding the affected population. It's important to note the significant gender disparity among the patients, with males being the overwhelming majority. It's also worth mentioning that a significant number of patients chose not to disclose their HIV status, which could have implications for the study's findings. Overall, this study could contribute to a better understanding of MDR-TB and the social factors that contribute to its spread. By examining the patients' demographics and HIV status, researchers may be able to identify factors that increase the risk of MDR-TB transmission and develop more effective strategies for prevention and treatment.

Additionally, the study's focus on individual interviews with patients and clinical staff members could provide valuable insights into the patient experience and the challenges that healthcare providers face in treating MDR-TB. Understanding the unique needs and perspectives of patients with MDR-TB is essential for developing patient-centered interventions and improving treatment outcomes.

Moreover, the study's findings on the prevalence of HIV among MDR-TB patients could have broader implications for public health interventions. The co-infection of HIV and TB is well-established, and the high proportion of patients who did not disclose their status suggests that there may be significant barriers to HIV testing and treatment among this population. Addressing these barriers could not only improve MDR-TB outcomes but also contribute to efforts to control the HIV epidemic.

In summary, the study's demographic findings and focus on individual experiences could provide valuable insights into the social and clinical factors that contribute to MDR-TB and its transmission. By understanding these factors, researchers and healthcare providers may be better equipped to develop targeted interventions and improve patient outcomes.

4.1 Results Presented in Narrations, Pie Charts and Histograms

4.1.1 Compliance and MDR-TB

This theme discusses how poor compliance with drugs can cause multi-drug resistance in TB patients. A patient who had TB in the past explained to say,

"I had MDR-TB before, and it was really tough. But now, I have it again, and I'm scared. The first time, I had to take strong antibiotics every day for two years. I finished the treatment, but I didn't take the medication correctly. Now, the drugs won't work, and I have to take even stronger ones that have more side effects." (ID: 4)

Another patient who experienced a similar situation explained to say,

"I know how important it is to take all of the prescribed medication for tuberculosis. A few years ago, I was diagnosed with TB and was given a six-month course of antibiotics. At first, I was serious about taking my medication every day, but as I started to feel better, I became unworried and started to skip doses. I thought that since I was feeling better, I didn't need to take the medication anymore.

However, my decision to stop taking the medication was a big mistake. After a few weeks of not taking the medication regularly, I started to feel sick again. When I went back to the doctor, I was told that I had developed multi-drug resistance due to my poor compliance with the treatment. This meant that the medication that had worked for me before was no longer effective, and I had to be put on a different, more expensive because sometimes I had to pay for certain medication, and treatment plans got longer.

My experience taught me the importance of taking TB medication as prescribed and not to stop taking it until the treatment is complete. Poor compliance with medication not only puts the individual at risk of developing multi-drug resistance but also increases the risk of spreading the disease to others. It is essential to educate patients about the importance of completing the full course of treatment to prevent multi-drug resistance and improve treatment outcomes for tuberculosis." (ID: 11)

4.1.2 HIV and MDR-TB association

This theme discusses how HIV association with TB can cause multi drug resistance in TB patients.

Out of the 16 interviewed respondents, 12 (75%) reported to have been tested for HIV and 4 (25%) reported not to have been tested for HIV as seen below in Figure 2 and out those (12) who reported to have tested for HIV. 7 (58.3%) are negative, 4 (33.3%) from those that accepted to have tested for HIV where non respondents meaning they were uncomfortable to reveal their HIV status, and only 1 Individual at (8.3%) reported to have HIV as seen in figure 3 below.

Figure 2: Have you been tested for HIV?

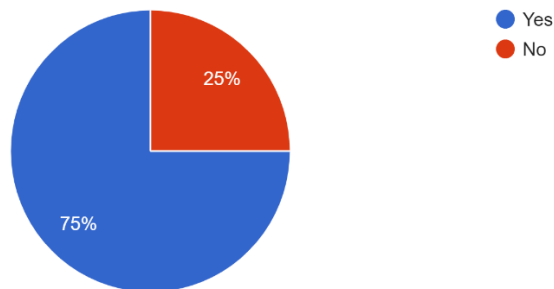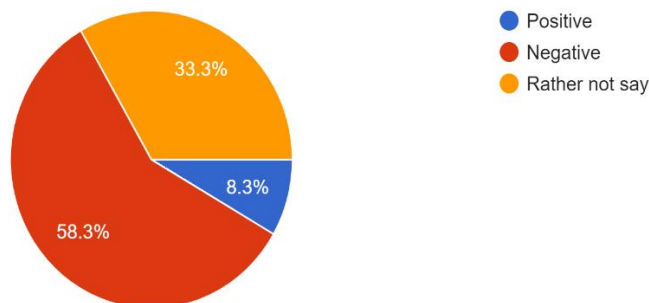**Have you been tested for HIV ?**
16 responses

- Yes
- No

25%

75%

Figure 3: If yes you have tested for HIV. What where your results?

If yes, what was the result ?
12 responses

- Positive
- Negative
- Rather not say

33.3%

8.3%

58.3%

A patient who has HIV explained to say

"I was diagnosed with HIV and months later TB symptoms started to show. Treatment with antibiotics didn't work, and a drug test showed I had multi-drug resistant TB. My weakened immune system due to HIV made it harder to fight off TB, and HIV and TB drugs can interact, complicating treatment. I was devastated but my doctor reassured me of other treatment options. Following my treatment and monitoring my progress are crucial. I'm determined to fight MDR-TB and keep my immune system strong. My healthcare team and loved ones provide comfort during this challenging time, and I remain hopeful." (ID: 12)

With only 1 HIV positive patient able to disclose their HIV status it is difficult to work out the relations of HIV and MDR-TB association, though a counselor working at the TB department for over 6 years provided some insights on most patients without giving out personal or devastating information, she said

"With only one HIV positive patient able to disclose their status to you, it's difficult to determine the relationship between HIV and MDR-TB. However, based on my experience, I can tell you that we actually have a higher number of MDR-TB patients with HIV because they are required to test for HIV, even though most patients choose not to disclose their status." (HStuff: 1)

The counselor's insights shed light on the need for a multidisciplinary approach to TB and HIV management, involving both medical and non-medical staff. Additionally, she further went on to say

"We've come a long way in TB and HIV treatment, we've seen significant improvements in overall health and MDR-TB symptoms in patients who are on HIV treatment but there's still much to be done. By working together, healthcare providers can provide better care for patients with TB and HIV" (HStuff: 1)

4.1.3 Gender differences in MDR-TB

The study interviewed 16 patients with MDR-TB, revealing that 75% of the patients were male, whereas only 25% were female. This suggests that males are more susceptible to MDR-TB than females. This can be attributed to factors such as higher rates of smoking, alcohol consumption, and occupational exposure, which are known risk factors for TB and MDR-TB and are more common among males.

Figure 4: Representing Gender differences
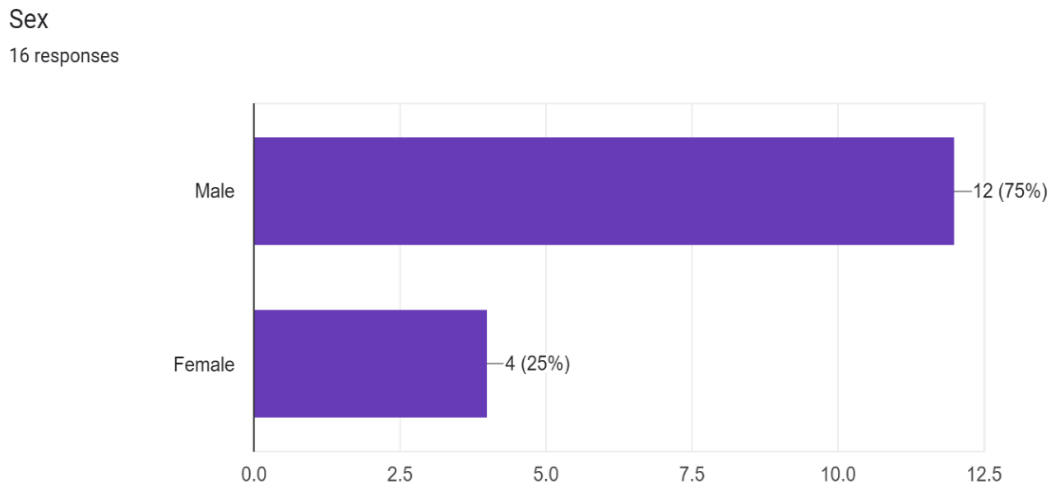
4.1.4 Previous TB treatment and MDR-TB

Previous treatment for TB is a well-established risk factor for MDR-TB. In this context, understanding the relationship between previous TB treatment and MDR-TB is crucial for effective disease management. As 2 of the 3 patients who reported to have TB in the past explained

"I was diagnosed with TB nine years ago, and I completed the standard treatment routine without any complications, however, in the years following my treatment, I developed a persistent cough, fatigue, and weight loss, and my mucus tests came back positive for TB. I was devastated to learn that I had MDR-TB, and my doctors explained to me that my previous TB treatment likely contributed to its development. The doctor said Incomplete treatment or non-

adherence to the medication routine can cause the bacteria to mutate and become resistant to the drugs."

"*The treatment for MDR-TB is a long and difficult process for me. Now I take six different drugs which I was told can go on for about two years, and the side effects are severe,*"

he added on to say. "*I had to quit my job because of the treatment, and it is a struggle for my family to make ends meet.*" (ID: 9)

The other patient who reported to have had TB in the past explained his situation as

"I was diagnosed with tuberculosis back in 2019. At the time, I received the standard treatment recommended by my doctor, which involved taking a combination of four different drugs for six months, but I had to take the drugs for over six months because I wasn't getting better. I was a heavy smoker and drinker at the time, which my doctor warned could make it more difficult for me to fight off the infection.

During my treatment, I continued to smoke and drink heavily, even though I knew it was risky.

A long while after finishing the treatment, I started experiencing symptoms again, like coughing, fever, and night sweats. I went back to my doctor, and after some tests, I was diagnosed with multi-drug-resistant tuberculosis.

My doctor explained to me that my smoking and heavy drinking could have played a significant role in my developing MDR-TB. He told me the damage to my lungs from smoking made it harder for the drugs to reach the bacteria and kill them and that the alcohol also interfered with the effectiveness of the drugs and weakened my immune system.

Now, I'm undergoing a much more intense and prolonged treatment routine for MDR-TB, which involves taking several different drugs for up to two years. I regret not taking better care of my health by quitting smoking and reducing my alcohol intake earlier. (ID: 6)

Figure 5: Representing Past TB treatments

Have you had TB in the past ?
16 responses

- Yes
- No

81.3%

18.8%
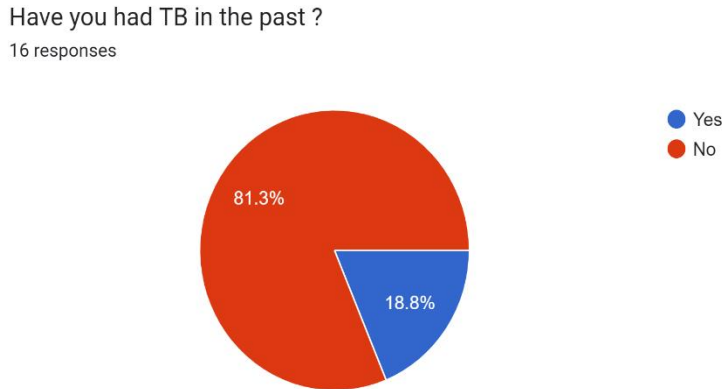
4.1.5 Age distribution of MDR-TB patients

When examining the incidence and prevalence of the disease, one crucial demographic factor to take into account is the age distribution of MDR-TB patients. MDR-TB patients make up a larger percentage of the population between the ages of 28 and 34 (Vertical Histogram below), according to recent studies. This age group may be more prone to contracting TB infection as a result of things like poor adherence to TB therapy, contact with drug-resistant TB strains, and postponed diagnosis. Additionally, persons in this age range may practice activities like smoking or living in crowded situations that raise their chance of acquiring TB.

Figure 6: On Age responses

Age
16 responses
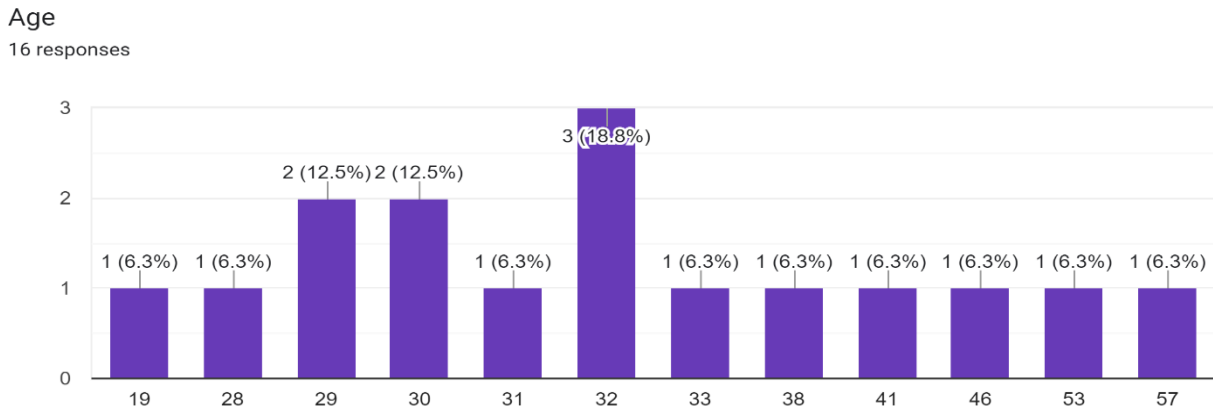
4.1.6 Geographical distribution of MDR-TB

It is obvious that the disease is prevalent in a variety of settings based on the geographic data of MDR-TB patients in the research. Kafue ZC, a slum with substandard living circumstances, had the greatest percentage of MDR-TB patients (37.5%). Due to established TB risk factors such inadequate access to healthcare, overcrowding, and poor nutrition, this region has a high prevalence of MDR-TB.

In Kalundu View, which likewise has subpar living circumstances, such as insufficient housing and a high population of people living in small dwellings, the second highest percentage of MDR-TB patients (31.3%) was discovered. This shows that poor living conditions, which create an environment that is favorable for the transmission of the disease, may play a significant role in the incidence of MDR-TB.

Interestingly, a significant proportion of MDR-TB patients (12.5%) were found in a middle-class setting (Shikoswe), which suggests that TB is not solely a disease of poverty. The remaining MDR-TB patients were distributed across a rural area (Shimabala) and two areas in Kafue (Kafue East and Kafue Town Center) with similar proportions.

Figure 7: Representing Geographical Information
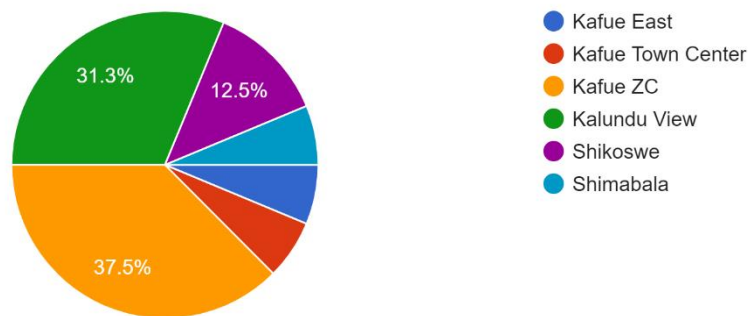
With regards to location one individual from Kafue ZC explained his situation as

MDR-TB is a serious problem in our community of Kafue ZC. It is an area known for its slum-like conditions where people live in close proximity to each other, which makes the spread of the disease more likely. Unfortunately, many of us do not have access to proper healthcare (ID: 16)

According to another community member from Kafue ZC explained, "*since our area is a ghetto, people are always in crowds exchanging beers, cigarettes, and other items. The housing is overcrowded, and people share living spaces, making it difficult to maintain hygiene and avoid contact with TB patients."* He additional said "*We have seen a rise in cases of MDR-TB in our area, and it is challenging to provide adequate care and treatment due to limited resources and poor living conditions. We need to increase awareness of TB and MDR-TB in this community to prevent spreading of the disease.* (ID: 10)

5.0 DISCUSSION

5.0 Introduction

The knowledge offered in the preceding section is expanded upon in this chapter. With a focus on individual, social, and health system determinants, we examine the variables that lead to medication resistance among tuberculosis patients. Multidrug-resistant tuberculosis (MDR-TB), which is regarded as a major public health concern globally, is the subject of our examination.

We adopt a comprehensive strategy to comprehend the complex interaction of variables that fuels the emergence and spread of drug-resistant TB strains. We aim to identify key drivers of MDR-TB and possible solutions to address this global threat by looking at individual factors, such as patient characteristics and behaviors, social factors, such as community and cultural context, and health system factors, including access to diagnostic and treatment services.

5.1 Discussion of key findings with supporting literature

5.1.0 Individual Factors

Individual factors that contribute to the development and spread of MDR-TB are complex and multifaceted. These factors include demographic characteristics, such as age and gender, as well as behaviors related to TB diagnosis, treatment adherence, and drug use.

❖ Smoking and Alcohol Consumption

In this study one of the males confessed to have been a heavy smoker and drinker. In numerous researches, smoking has been identified as a substantial risk factor for TB (Lin et al., 2019; Akgün et al., 2018). The immune system may become more vulnerable to TB infection as a result of the toxins in tobacco smoke. Smoking can harm the lungs, which makes it simpler for the TB germs to enter the body and spread there.

Similarly, heavy alcohol consumption has also been linked to an increased risk of TB. A systematic review of studies found that alcohol use was associated with a two-fold increase in the risk of developing TB (Rehm et al., 2009). The reasons for this association are not fully understood, but it's believed that alcohol can suppress the immune system and make it more difficult for the body to fight off TB infection. Overall, the connection between excessive drinking, smoking, and MDR-

TB emphasizes how crucial it is to encourage healthy lifestyles and lessen TB exposure in high-risk populations.

   ❖ Compliance with treatment

Compliance with treatment is crucial for the successful treatment of MDR-TB. Skipping doses or not completing the full course of medication can lead to treatment failure, relapse, and the development of further drug resistance. In the case of the interviewee who admitted to skipping doses, their behavior could have serious implications not only for their own health but also for public health.

Several studies have highlighted the negative impact of poor medication compliance on the development of MDR-TB. For example, a study by Isaakidis et al. (2011) found that among patients with previously treated TB, poor medication adherence was a significant risk factor for the development of MDR-TB. Similar findings were made by Breen et al. (2006) who discovered that people with HIV were more likely to develop drug-resistant TB if they had poor medication adherence.

According to a study by Zhang et al. (2012), people with pulmonary TB in China were more likely to develop MDR-TB if they didn't take their medications as prescribed. According to the study, patients who did not adhere to their prescribed drug regiment had a noticeably higher risk of getting MDR-TB than those who did. The study also discovered that a patient's probability of developing MDR-TB increased with the length of time they did not take their medicine as prescribed.

Another study by Kuaban et al. (2015) discovered that MDR-TB patients in Cameroon were more likely to experience treatment failure when they had poor drug adherence. Additionally, a study by Reves et al. (2001) discovered that among patients with MDR-TB in the United States, non-adherence to medication was a risk factor for treatment failure and recurrence.

Compliance with prescribed medications is essential for the effective management of MDR-TB, as well as for halting the progression of the disease and the emergence of drug resistance. To obtain positive treatment outcomes, effective techniques to increase compliance are crucial and should be put into practice.

❖ HIV and MDR-TB As an Individual Factor

In this study it is evident that most patients with MDR-TB preferred not to disclose their HIV information making it difficult to determine how much HIV contributes to MDR-TB. HIV and MDR-TB are two diseases that often occur together, with HIV-positive patients being more susceptible to developing MDR-TB. The interaction between these two diseases can complicate treatment and lead to poorer outcomes if not managed properly.

According to the World Health Organization (WHO), people living with HIV have a 20 to 30 times higher risk of developing TB compared to those without HIV. Additionally, HIV weakens the immune system, making it harder for the body to fight off TB, which can result in more severe forms of TB, such as MDR-TB. In fact, studies have shown that HIV-positive patients with TB are more likely to develop MDR-TB than those who are HIV-negative.

5.1.1 Social Factors

Social factors are also critical contributors to the development and spread of MDR-TB. These factors include community and cultural context, socioeconomic status, and social networks.

❖ Poverty

Poverty and overcrowding have been shown to increase the risk of TB and MDR-TB, as individuals living in these conditions may have limited access to healthcare and may be more likely to be exposed to TB in their community.

In this study it is evident that majority of the affected patients come from overcrowded and impoverished communities such as Kalundu view and Kafue Zambian Compound. Other studies have also shown that poverty is a major factor to MDR-TB for example, according to a study done in Mumbai, India, patients with MDR-TB were more likely to come from low-income families and had less education (Udwadia et al., 2010). Patients with MDR-TB were more likely to reside in unofficial settlements and had insufficient access to healthcare, according to a different South African study (Brust et al., 2011).

So-to-say the prevalence of MDR-TB can be decreased in underdeveloped communities by expanding access to healthcare and improving living conditions. This includes expanding access

to TB and MDR-TB diagnosis and treatment, as well as providing sufficient housing, education, and sanitation.

❖ HIV and MDR-TB as a Social Factor

Although the WHO advises that all TB patients should be checked for HIV and all HIV-positive patients should be screened for TB, this is only to help guarantee that both infections are discovered and treated as early as possible (WHO, 2013). In this study, it was observed that four out of the sixteen patients who were interviewed responded negatively when asked if they had undergone HIV testing. Conversely, the health counselor at the facility reported that TB and MDR-TB patients are required to tested for HIV.

Patients may fabricate the fact that they did not receive an HIV test for a variety of reasons. One factor might be a lack of awareness of the significance of HIV testing for TB patients. Patients may worry about discrimination if their status is revealed because there may be a stigma attached to having HIV in some communities. Finally, some patients might just not want to share their HIV status for personal reasons or privacy worries.

There are several studies that support the idea that stigma and fear of discrimination are significant barriers to HIV testing among TB patients. A study by Datiko et al. (2015) found that TB patients in Ethiopia had low levels of knowledge about HIV, and stigma was a significant barrier to HIV testing. Another study by Daftary et al. (2016) found that stigma associated with HIV was a significant barrier to HIV testing among TB patients in India.

In addition, a study by Karim et al. (2011) found that privacy concerns were a common reason for patients to decline HIV testing in a TB clinic in South Africa. The study also found that patients who were concerned about privacy were more likely to refuse testing.

These findings suggest that there are several complex social and cultural factors that can impact a patient's willingness to disclose their HIV status or to get tested for HIV. Addressing these barriers and increasing awareness and education about the importance of HIV testing for TB patients can help improve HIV detection and care for patients with both TB and HIV.

5.1.2 Health system determinants

❖ Education and Awareness on HIV and MDR-TB

Programs that promote education and awareness are crucial elements of health systems that can influence the prevalence and treatment of MDR-TB and HIV. Lack of knowledge and awareness about TB and HIV are prevalent in many nations, which can cause delayed diagnosis and treatment.

This study found that a considerable proportion of patients were unable to offer vital details that could help with patient MDR-TB. One such piece of information is the patient's HIV status, which is essential for comprehending how HIV affects MDR-TB and creating effective therapies. Programs for education and awareness about the value of providing such information, among other interventions, can be created by evaluating patient data.

For example, A study by Gashu et al. (2018) in Ethiopia found that an educational intervention for healthcare workers led to improved knowledge and attitudes towards TB and HIV, as well as increased confidence in diagnosing and managing these diseases.

Another study by Kigozi et al. (2018) in Uganda found that a community-based intervention that included education and awareness programs led to improved TB case detection and treatment outcomes.

Education and awareness programs can help improve the detection and management of MDR-TB and HIV by increasing knowledge about these diseases among healthcare providers and the general population. These programs can also help reduce the stigma associated with TB and HIV, which can be a significant barrier to diagnosis and treatment.

5.2 Study Limitations

The language barrier surfaced as a significant impediment when doing a qualitative case study with the goal of gathering in-depth information from a region where the majority of the people speaks Tonga and Nyanja. The interviewer had to make sure that the participants understood the questions and gave suitable answers because the questionnaire was written in English. The responses also needed to be translated, but it was impossible to guarantee the accuracy of the translation because it might have changed the original content's meaning.

CHAPTER SIX

6.0 INTRODUCTION

This chapter provides a conclusion and recommendations for the study, focusing on addressing factors related to multidrug-resistant tuberculosis (MDR-TB) at the community and healthcare facility levels. It explores the individual, social, and health system determinants, highlighting the necessary actions to be taken.

6.1 CONCLUSION

In conclusion, this chapter has examined the individual, social, and health system factors contributing to multidrug-resistant tuberculosis (MDR-TB). The findings highlight the significance of these factors in the development, spread, and management of MDR-TB, as well as the complexities surrounding HIV and MDR-TB coexistence.

Individual factors such as smoking, alcohol consumption, and treatment compliance have been identified as critical determinants of MDR-TB. Promoting healthy lifestyles, reducing TB exposure in high-risk populations, and improving medication adherence are essential strategies to address these individual factors.

Social factors, particularly poverty and overcrowding, have been found to increase the risk of MDR-TB. Enhancing living conditions, providing access to healthcare, and addressing socio-economic disparities are key interventions needed to tackle these social determinants.

Health system determinants, particularly education and awareness programs, are vital in improving the prevention, detection, and management of MDR-TB. Targeted interventions that enhance healthcare provider knowledge, increase awareness among the general population, and reduce stigma associated with TB and HIV are essential components of effective health systems.

6.2 RECOMMENDATIONS

Based on the findings and conclusions regarding individual, social and health system factors contributing to multidrug-resistant tuberculosis (MDR-TB), the following recommendations are suitable:

6.2.1   Public health education:

Develop targeted public health education campaigns that focus on raising awareness about the individual behaviors associated with MDR-TB, such as smoking and alcohol consumption. These campaigns should emphasize the link between these behaviors and the risk of developing drug-resistant TB, as well as promote healthier alternatives and provide resources for cessation programs.

6.2.2   Behavior changes interventions:

Implement interventions that aim to reduce risky behaviors such as smoking and excessive alcohol consumption. These interventions could include counseling services, support groups, and community-based programs that help individuals overcome addiction and adopt healthier lifestyle choices. Additionally, initiatives to improve treatment adherence should be implemented to minimize the development of drug resistance.

6.2.3   Socio-economic empowerment:

Address the social determinants of MDR-TB, particularly poverty and overcrowding. Implement poverty alleviation programs, provide economic opportunities, and improve living conditions in vulnerable communities. This could involve initiatives such as income-generating projects, vocational training, and affordable housing programs, which can help reduce the risk of TB transmission.

6.2.4   Community engagement and support:

Foster community engagement through participatory approaches to address stigma, discrimination, and misconceptions associated with MDR-TB and HIV. Empower local communities to take ownership of their health by establishing support networks, peer education programs, and community outreach initiatives. Engaging community leaders and influencers can

help disseminate accurate information, reduce stigma, and encourage early detection and treatment.

6.2.5   Collaboration with local organizations:

Collaborate with local non-governmental organizations, community-based groups, and civil society organizations to strengthen efforts in combating MDR-TB. These partnerships can facilitate community mobilization, ensure culturally appropriate interventions, and provide support services to individuals affected by MDR-TB.

6.2.6   Health literacy and awareness:

Improve health literacy among the general population through targeted educational programs. Promote knowledge about TB, including their transmission, prevention, and treatment options. Emphasize the importance of early diagnosis and prompt treatment-seeking behavior to reduce the impact of drug resistance and improve health outcomes.

6.2.7   Monitoring and evaluation:

Establish robust monitoring and evaluation systems to assess the effectiveness of interventions targeting individual and social factors. Regularly collect and analyze data on behaviors, attitudes, and health outcomes related to MDR-TB. This will enable evidence-based decision-making and facilitate the refinement of strategies over time.

By focusing on individual, social and health system factors, Kafue General Hospital can work in collaboration with the community to address the root causes of MDR-TB. These recommendations, when implemented, can contribute to the prevention, early detection, and effective management of MDR-TB, leading to improved health outcomes and reduced transmission within the community.

REFERENCES

Adeiza, M. A., Agbaji, O. O., Muhammad, A. S., Okonkwo, P., Ishaleku, D., Isa, M. A., & Muktar, H. M. (2018). Drug Resistance Pattern among Tuberculosis Patients Attending a Tertiary Hospital in Northern Nigeria. Journal of Medical Sciences, 18(2), 68-71.

Akgün, M., Öztürk, C., Özdemir, M., & Uysal, O. (2018). Evaluation of the relationship between tuberculosis and smoking. Journal of the Chinese Medical Association, 81(7), 639-642.

Alene, K. A., Yi, H., Viney, K., McBryde, E. S., Yang, K., Bai, L., & Gray, D. J. (2021). Treatment outcomes and associated factors among multidrug-resistant tuberculosis patients in Ethiopia: a systematic review and meta-analysis. Infectious Diseases of Poverty, 10(1), 1-11.

Asefa, A., Teshome, W., & Hamza, E. (2019). Drug-resistant tuberculosis in Ethiopia: a systematic review and meta-analysis. International Journal of Infectious Diseases, 80, 30-35. https://doi.org/10.1016/j.ijid.2018.12.004

Balabanova, Y., Radiulyte, B., Davidaviciene, E., Hooper, R., Ignatyeva, O., Nikolayevskyy, V., ... & Drobniewski, F. (2006). Drug-resistant tuberculosis in Russia: patients' perspectives on social support, treatment and diagnosis. The International Journal of Tuberculosis and Lung Disease, 10(5), 1163-1168.

Belay, M., Bjune, G., & Ameni, G. (2019). Diagnostic and treatment delay among tuberculosis patients in Afar Region, Ethiopia: a cross-sectional study. BMC Public Health, 19(1), 1-8.

Birukila, G., Charles, E., John, K., & Samuel, Y. (2019). Treatment outcomes of multidrug-resistant tuberculosis (MDR-TB) patients in Ethiopia: a systematic review and meta-analysis. Infection and Drug Resistance, 12, 3113-3121.

Breen, R. A., Miller, R. F., Gorsuch, T., Smith, C. J., Schwenk, A., Holmes, W., & Johnson, M. A. (2006). Adherence to highly active antiretroviral therapy and incidence of HIV-1 drug resistance in an urban cohort. Journal of acquired immune deficiency syndromes (1999), 41(3), 315-322.

Brust, J.C., Gandhi, N.R., Carrara, H., Osburn, G., Padayatchi, N., & Highstein, G.R. (2011). High treatment failure and default rates for patients with multidrug-resistant tuberculosis in rural South Africa. PLoS One, 6(1), e20542. doi: 10.1371/journal.pone.0020542

Daftary, A., Padayatchi, N., & Padilla, M. (2016). HIV testing and disclosure: a qualitative analysis of TB patients in South Africa. AIDS Care, 28(7), 904-908. doi: 10.1080/09540121.2016.1151208

Damtie, D., Yimer, S. A., & Gedefaw, M. (2019). An overview of drug-resistant tuberculosis in Ethiopia: systematic review and meta-analysis. BMC Pharmacology and Toxicology, 20(1), 1-10.

Datiko, D. G., & Jerene, D. (2017). Experience of stigma and discrimination and the implications for healthcare seeking behavior among people living with HIV/AIDS in resource-limited setting. SAHARA-J: Journal of Social Aspects of HIV/AIDS, 14(1), 65-72.

Datiko, D. G., Lindtjørn, B., & Tulloch, O. (2015). Health extension workers improve tuberculosis case detection and treatment success in southern Ethiopia: a community randomized trial. PloS One, 10(2), e0114052. doi: 10.1371/journal.pone.0114052

Drobniewski, F., Eltringham, I., Graham, C., Magee, J. G., & Smith, E. G. (2005). Global and local epidemiology of multidrug-resistant tuberculosis. International Journal of Infectious Diseases, 9(6), 596-605.

Falzon, D., Gandhi, N., Migliori, G. B., Sotgiu, G., Cox, H. S., Holtz, T. H., ... & Keshavjee, S. (2013). Resistance to fluoroquinolones and second-line injectable drugs: impact on MDR-TB outcomes. European Respiratory Journal, 42(1), 156-168. https://doi.org/10.1183/09031936.00134712

Fregona, G., Cosme, L. B., Moreira, C. M., Bussular, J. L., Dettoni, V., Dalcolmo, M. P., ... & Kritski, A. L. (2017). Multidrug-resistant tuberculosis in São Paulo State, Brazil: magnitude of the problem and predictive factors. Tropical Medicine & International Health, 22(1), 48-56.

Gandhi, N. R., Shah, N. S., Andrews, J. R., Vella, V., Moll, A. P., Scott, M., ... & Friedland, G. (2010). HIV coinfection in multidrug- and extensively drug-resistant tuberculosis results in high early mortality. American journal of respiratory and critical care medicine, 181(1), 80-86. https://www.atsjournals.org/doi/full/10.1164/rccm.200907-0989OC

Gashu, Z., Jerene, D., Ensermu, M., Habte, D., Melese, M., Hiruy, N., . . . Ayele, G. (2018). Ability of health-care providers to diagnose and manage tuberculosis and HIV in Ethiopia: A cross-sectional survey. Ethiopian Journal of Health Sciences, 28(6), 697-706.

Getahun, H., Matteelli, A., Abubakar, I., Aziz, M. A., Baddeley, A., Barreira, D., ... & Zignol, M. (2015). Management of latent Mycobacterium tuberculosis infection: WHO guidelines for low tuberculosis burden countries. European Respiratory Journal, 46(6), 1563-1576. https://doi.org/10.1183/13993003.01245-2015

Getnet, F., Demissie, M., & Worku, A. (2019). Delay in diagnosis of pulmonary tuberculosis in low-and middle-income settings: systematic review and meta-analysis. BMC Pulmonary Medicine, 19(1), 1-13.

Isaakidis, P., Casas, E. C., Das, M., Tseretopoulou, X., Ntzani, E. E., Ford, N., & Cox, H. S. (2011). Treatment outcomes for HIV and MDR-TB co-infected adults and children: systematic review and meta-analysis. The international journal of tuberculosis and lung disease, 15(7), 917-927.

Kapata, N., Chanda-Kapata, P., O'Grady, J., Bates, M., Mwaba, P., & Janssen, S. (2017). Trends in tuberculosis case notification and treatment outcomes in Zambia from 2000 to 2015. PloS one, 12(9), e0184563.

Karim, Q. A., Kharsany, A. B., Leask, K., Ntombela, F., Humphries, H., Frohlich, J. A.,... & Abdool Karim, S. S. (2011). Impact of HIV status and gender on HIV testing preferences among tuberculosis patients in Durban, South Africa. Tropical Medicine & International Health, 16(8), 1108-1115. doi: 10.1111/j.1365-3156.2011.02788.x

Kigozi, G., Heunis, C., Engelbrecht, M., Janse van Rensburg, A., van Rensburg, D., & Mehtar, S. (2018). Impact of a health education intervention on public knowledge, attitudes, and behaviour towards tuberculosis in a high-risk community in South Africa. International Journal of Environmental Research and Public Health, 15(8), 1662. doi:10.3390/ijerph15081662

Kuaban, C., Bercion, R., Noeske, J., Cunin, P., Nkamsseu, J., Atangana, P., & Mouangue, A. (2015). Treatment outcomes of multidrug-resistant tuberculosis in Cameroon: a prospective observational cohort study. The international journal of tuberculosis and lung disease, 19(1), 87-94.

Li, Y., Pang, Y., Chen, M., Liu, L., Ou, X., & Chen, S. (2017). Risk factors associated with multidrug-resistant tuberculosis among tuberculosis patients in northeastern China. Tuberculosis research and treatment, 2017.

Lin, H. H., Ezzati, M., & Murray, M. (2019). Tobacco smoke, indoor air pollution and tuberculosis: a systematic review and meta-analysis. PLoS Medicine, 16(4), e1002771.

Marks, S. M., Taylor, Z., Qualls, N. L., Shrestha-Kuwahara, R. J., & Wilce, M. A. (2000). Outcomes of contact investigations of infectious tuberculosis patients. American journal of respiratory and critical care medicine, 162(6), 2033-2038.

Mbulo, L., Kasese-Chanda, G., Kondowe, K., Banda, P., Kaonga, P., Chiluba, C., & Munthali, C. (2019). Factors contributing to the development and transmission of multidrug-resistant tuberculosis in Zambia: a qualitative study. The Pan African Medical Journal, **33,**

Mekonnen, D., Derbie, A., Desalegn, E., & Girmay, G. (2019). Drug-resistant tuberculosis in Ethiopia: a systematic review and meta-analysis. BMC Infectious Diseases, 19(1), 1-9.

Modongo, C., Sobota, R. S., Kesenogile, B., Ncube, R., ... & Bisson, G. P. (2014). Successful MDR-TB treatment regimens including amikacin are associated with high rates of hearing loss. BMC Infectious Diseases, 14(1), 542. https://doi.org/10.1186/1471-2334-14-542

Nunn, A. J., Phillips, P. P., Meredith, S. K., Chiang, C. Y., Conradie, F., Dalai, D., ... & Weyer, K. (2014). A trial of a shorter regimen for rifampin-resistant tuberculosis. New England Journal of Medicine, 371(17), 1577-1587. https://doi.org/10.1056/NEJMoa1407643

Odone, A., Calderon, R., Becerra, M. C., & Pape, J. W. (2016). HIV-associated tuberculosis in the Americas: current status in the context of the HIV epidemic. Current epidemiology reports, 3(2), 190-200. https://link.springer.com/article/10.1007/s40471-016-0076-1

Rehm, J., Samokhvalov, A. V., Neuman, M. G., Room, R., Parry, C., Lönnroth, K., & Patra, J. (2009). The association between alcohol use, alcohol use disorders and tuberculosis (TB). A systematic review. BMC Public Health, 9(1), 1-11.

Reves, R. R., Cavanaugh, J. S., MacKenzie, W. R., & Menzies, D. (2001). Treatment of tuberculosis and tuberculosis infection in adults and children. American journal of respiratory and critical care medicine, 163(7_supplement), S29-S63.

Skripconoka, V., Danilovits, M., Pehme, L., Tomson, T., & Skenders, G. (2013). Delamanid improves outcomes and reduces mortality in multidrug-resistant tuberculosis. European Respiratory Journal, 41(6), 1393-1400. https://doi.org/10.1183/09031936.00125812

Temesgen, C., Demissie, M., & Yimer, G. (2019). A meta-analysis of the prevalence of tuberculosis treatment non-adherence among pulmonary tuberculosis patients in Ethiopia. BMC Infectious Diseases, 19(1), 1-8.

Udwadia, Z.F., Pinto, L.M., & Uplekar, M.W. (2010). Tuberculosis management by private practitioners in Mumbai, India: has anything changed in two decades? PLoS One, 5(8), e12023. doi: 10.1371/journal.pone.0012023

World Health Organization. (2013). Global tuberculosis report 2013. World Health Organization.

World Health Organization. (2019). Guidelines for treatment of drug-susceptible tuberculosis and patient care, 2017 update. World Health Organization.

WHO. (2020). Global Tuberculosis Report 2020. World Health Organization.

World Health Organization. (2018). Tuberculosis and HIV. https://www.who.int/news-room/fact-sheets/detail/tuberculosis-and-hiv

Zhang, Q., Liu, Q., Liu, G., Zheng, R., Xie, Y., Li, X., ... & Dong, H. (2012). Factors associated with the prevalence of pulmonary tuberculosis among health care workers in designated hospitals in China. BMC infectious diseases, 12(1), 1-7.

WORK PLAN

GANT CHART FOR THE WORK PLAN (2023)

ACTIVITY	SEP - OCT	NOVEMBER	APRIL	MAY	JUNE
Proposal writing and editing	■				
Proposal presentation		■			
Data collection			■		
Analysis comparison and compilation				■	
Report writing				■	
Final project submission					■

BUDGET

SN	ITEM	DESCRIPTION	AMOUNT ZMW
1.	**Airtime**	All Network	**K100**
2.	**Stationary**	• **5 Pens**	**K12.50**
		• **1 Notebook**	**K15**
		• printing and binding 3copies of the proposal	**K150**
		• Printing and Binding Final Copy	**K400**
		• Printing 30 copies of questionnaire (k5 per page)	**K150**
3.	**Transport**	• From Kalingalinga to kafue for 5 days	**K700**
4.	**Food**	• Lunch K30 FOR 5 days	**K150**
5.	**Miscellaneous**		**K250**
Total			**K1,927.50**

SCHOOL OF MEDICINE AND HEALTH SCIENCES

DEPARTMENT OF PUBLIC HEALTH

CONSENT FORM

Name of researcher: Nathan Sabao [BSPH1411424]

Program of study: Bs Public Health

Institution: University of Lusaka

Title of the Research Study: **ASSOCIATED FACTORS OF DRUG RESISTANCE AMONG TUBERCULOSIS PATIENTS AT THE KAFUE DISTRICT HOSPITAL**

You are invited to take part in a study being done by Nathan Sabao at Kafue District Hospital. This study's goal is to investigate the factors that contribute to drug resistance in patients with tuberculosis (TB) at the Kafue District Hospital. You have the freedom to refuse or withdraw from this study at any time without incurring any penalties or losing any advantages, and your participation is completely voluntary.

Study Procedures: If you agree to participate, you will be asked to:

1. Provide demographic information such as age, gender, occupation, and medical history.

2. Undergo interviews or answer questionnaires related to your tuberculosis diagnosis, treatment history, and lifestyle factors.

3. Allow access to your medical records and laboratory results for research purposes.

4. Potentially undergo sputum or other relevant sample collection for further laboratory analysis related to drug resistance.

Benefits of Participation: By taking part in this study, you will be able to contribute important data that may be used to determine what causes treatment resistance in tuberculosis patients. The results of this study could aid in the improvement of diagnostic techniques, therapeutic plans, and public health regulations to battle drug-resistant tuberculosis.

Risks and discomforts: The study entails only minor risks related to the gathering of medical data and the potential discomfort of providing personal information about your health and way of life. However, we guarantee that all information gathered will be handled discreetly, saved safely, and results will be provided in aggregate to safeguard your anonymity.

Data protection and confidentiality: Your participation in this survey will be handled with the highest discretion. Your identity and any other identifying information, including your name, will be kept completely private. The study's data will be safely preserved and only the approved researchers working on it will have access to it. Instead of utilizing personal identifiers in any reports or publications, your identity will be secured by giving your data a special identification code.

Voluntary Participation and Right to Withdraw: The decision to take part in this study is entirely voluntary. You have the right to decline participation or revoke your consent whenever you want, without having to give a justification. Your medical care, your connection with the healthcare providers, or any other benefits to which you are entitled won't be affected by your choice to join or withdraw.

Contact Information: If you have any questions or concerns about the study, you can contact Nathan Sabao at sabaojr.nathan@gmail.com / +260 970 949 468 . If you have any questions regarding your rights as a participant in this study or concerns about the study's conduct, you can contact the University of Lusaka Research Ethics Committee at: unilus@zamnet.zm / +260976075850, 961917862

Consent: I have read and understood the details given above regarding the investigation into "Associated Factors of Drug Resistance Among Tuberculosis Patients at the Kafue District Hospital." I got the chance to inquire, and all my inquiries received satisfactory responses. I knowingly choose to take part in this study, and I give my approval for my data to be collected, used, and stored to further research.

Participant's Name: _____

Participant's Signature: _____Date: _____

Researcher's Name: _____

Researcher's Signature: _____ Date: _____

QUESTIONNAIRE

For Patients:

Section 1: Demographic Information

1. Age: _____

2. Gender: Male / Female

3. Geographical Location: _____

Section 2: Tuberculosis Information

1. When were you first diagnosed with tuberculosis? _____

2. Have you received treatment for tuberculosis in the past?

- Yes / No

3. If yes, how many times have you received treatment for tuberculosis? _____

4. Were you compliant with your tuberculosis treatment regimen?

- Yes / No

5. Have you completed your tuberculosis treatment?

- Yes / No

6. Were you diagnosed with multi-drug resistant tuberculosis (MDR-TB)?

- Yes / No

Section 3: HIV Information

1. Have you been tested for HIV?

- Yes / No

2. If yes, what was the result of your HIV test?

- Positive / Negative

3. If positive, have you received treatment for HIV?

- Yes / No

QUESTIONNAIRE

For Stuff:

Section 1: Demographic Information

1. How would you describe the average age of your tuberculosis patients? _____

2. What is the gender distribution of your tuberculosis patients?

- Mostly male / Mostly female / Equal distribution of male and female

3. Which geographical locations do most of your tuberculosis patients come from? _____

Section 2: Tuberculosis Information

1. How many of your patients have been diagnosed with multi-drug resistant tuberculosis (MDR-TB)? _____

2. In your experience, what proportion of your culture-positive tuberculosis patients have been diagnosed with MDR-TB? _____

3. Have you observed any association between HIV status, previous tuberculosis treatment, and compliance with the treatment regimen and the development of MDR-TB in your patients?

- Yes / No

Section 3: Treatment Information

1. How do you assess the compliance of your tuberculosis patients with their treatment regimen?

- Self-reported / Pill counts / Other

2. Have you encountered any challenges in ensuring that your tuberculosis patients complete their treatment regimen?

- Yes / No

3. If yes, what are some of the common reasons for non-compliance among your tuberculosis patients?

- Financial constraints / Side effects of treatment / Difficulty accessing health services / Other

NATIONAL HEALTH RESEARCH AUTHORITY

Lot No. 18961/M, off Kasama Road, Chalala, P.O. Box 30075, LUSAKA
Tell: +260211 250309 | Email: znhrasec@nhra.org.zm | www.nhra.org.zm

Ref No: NHRA00010/26/01/2023   Date:26ᵗʰ January 2023

The Principal Investigator,
Nathan Sabao,
UNILUS,
Lusaka, Zambia.

Dear Mr Sabao,

Re: Request for Authority to Conduct Research

The National Health Research Authority is in receipt of your request for ethical clearance and authority to conduct research titled **"Associated Factors of Drug Resistance Among Tuberculosis Patients at The Kafue District Hospital."**

I wish to inform you that following submission of your request to the Authority, our review of the same and in view of the ethical clearance, this study has been **approved** on condition that:

1. The relevant Provincial and District Medical Officers where the study is being conducted are fully appraised;
2. Progress updates are provided to NHRA bi-annually from the date of commencement of the study;
3. The final study report is cleared by the NHRA before any publication or dissemination within or outside the country;
4. After clearance for publication or dissemination by the NHRA, the final study report is shared with all relevant Provincial and District Directors of Health where the study was being conducted, University leadership, and all key respondents.

Yours sincerely,

National Health Research Authority

Ms Sandra Chilengi Sakala,
Acting Director/Chief Executive Office

SCHOOL OF MEDICINE AND HEALTH SCIENCES RESEARCH ETHICS COMMITTEE

Ref no: IORG0010092-2023/045

Date: 15ᵗʰ DECEMBER, 2022

NATHAN SABAO - BSPH1411424

Re: RESEARCH TITLE: ASSOCIATED FACTORS OF DRUG RESISTANCE AMONG TUBERCULOSIS PATIENTS AT THE KAFUE DISTRICT HOSPITAL

The above research was submitted to the research ethics committee for review. The study has no major ethical problems and is approved subject to the following:

1. The study cannot be changed without express permission of the UNILUS Research ethics committee
2. Approval from the Lusaka District health Management or equivalent health authorities should be sought.
3. The study tools should be added.
4. An informed consent form should be attached and filled by all study participants (If dealing with primary data)
5. The risks and benefits should be included in the consent form.
6. Ensure before commencement that approval is sought from ZNHRA Congratulations and the committee wishes you success in your work.

Prof Kasonde Bowa
MSc(Glasgow),M.Med(UNZA),FRCS(Glasgow),FACS,FCS,DPH(LSTMH),MPH(UCL)
Chairman- UNILUS REC
Professor of Urology and Consultant Urologist
Executive Dean
University of Lusaka and University Teaching Hospital School of Medicine and Health Sciences.

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