



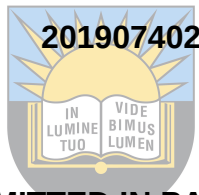
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**EXPLORING SOCIO-ECONOMIC FACTORS INFLUENCING INCIDENCES AND
OUTCOME OF MULTIDRUG RESISTANCE TUBERCULOSIS AMONG PATIENTS
AND FACILITY STAFFS IN MAKANA SUB-DISTRICT, EASTERN CAPE.**

BY

DR LESLEY-ANN CANNON (MBCHB)



**A MINI-DISSERTATION SUBMITTED IN PARTIAL FULFILMENT OF THE
REQUIREMENTS FOR THE DEGREE OF MASTER OF PUBLIC HEALTH**

FACULTY OF HEALTH SCIENCES

SUPERVISOR: DR KE OLADIMEJI; MPH, PHD (PUBLIC HEALTH)

FEBRUARY 2022

DECLARATION

I, Lesley-Ann Lynnath Cannon, hereby declare that the study “***Exploring socio-economic factors influencing incidences and outcome of multidrug resistance tuberculosis among patients and facility staffs in Makana Sub-District, Eastern Cape.***” in submission for the degree of Master of Public Health at the Fort Hare University is my own work and all external sources used or quoted in this study have been recognized by a complete reference list.

This mini dissertation has not been submitted in part or full to any other University.

Name: Lesley-Ann Lynnath Cannon

Signature



Date 17th May 2022



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DECLARATION ON PLAGIARISM

I, Lesley-Ann Lynnath Cannon, student number 201907402, confirm that the content contained in this document is my own work and is not copied from any other author's work. In cases where other people's work has been used in this document, appropriate citations and references have been provided.

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CERTIFICATION

This thesis entitled “Exploring socio-economic factors influencing incidences and outcome of multidrug resistance tuberculosis among patients and facility staffs in Makana Sub-District, Eastern Cape.” meets the guidelines outlining the award of the post graduate degree MASTERS OF PUBLIC HEALTH of the University of Fort Hare and is accepted for its contribution to scientific knowledge and literary presentation.

Supervisor: Dr Kelechi Elizabeth Oladimeji

Signature:  **Date:** 17th May 2022



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DEDICATION

This study I dedicate to my Almighty God, my source of strength; the one who guides me, loves me, and empowers me in my weakness. The one who never abandons me in time of need. The Alpha and Omega. Also, to my loving family and friends who were there all the way, supporting me, encouraging me, and giving a helping hand. Never giving up on me.



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ABSTRACT

Background

Drug-resistant Tuberculosis (DR-TB) is one of the main causes of global public health crisis, due to the morbidity and mortality rates associated with the disease. This DR-TB is a complex illness having direct and indirect impact on finances, social functioning, and quality of life of infected individuals. Major research advances have been made in the diagnosis and treatment of DR-TB. However, minimal information exists on the socio-economic factors influencing the incidence and outcomes. This study aims to fill the gap by exploring the socio-economic factors from both the health care professional and patient perspective in particular settings to gain insights into developing context-specific strategies against the burden of DR-TB.

Methodology

The study applied a qualitative method to explore the socio-economic factors influencing MDR-TB through key-in-depth interviews (KIIs) and focus group discussions (FGDs). The study enrolled a total of thirty-two (32) consenting participants. The KIIs was conducted for ten (10) healthcare workers and nine (9) MDR-TB patients. Two focus group discussions were done involving seven (7) MDR-TB patients and six (6) MDR-TB patients, respectively. The study targeted healthcare workers working in the MDR-TB field and TB patients with the following: GeneXpert Rifampicin resistance and patient confirmed as MDR TB. Eligible participants were selected using a purposive sampling technique from the hospitals' routine data electronic records (EDR-WEB database) and hardcopy registers (drug-resistant TB register) on MDR-TB patients enrolled in care at the study site. Informed consent was obtained from all study participants after thoroughly explaining the purpose. No personal information of participants was used. All responses from respondents were coded during analysis for autonomy and the respondents were not identifiable in any published or unpublished work following this research.

The interviews were transcribed, some translated into English, where necessary, and analysed until saturation was reached. Data was coded and analysed using both thematic and content analysis technique.

Results

There were 3 main themes identified in the study: social factors, economic factors, and other contributing factors. 7 sub- themes were recorded under social factors and 2 subthemes under economic factors. Two independent factors that were also considered to impact MDR-TB were the attitude of healthcare workers, as well as the current COVID-19 pandemic.

Conclusion

MDR-TB is a major public health concern in the Makana Sub-district of the Eastern Cape. The findings of this study highlight the impact of socio- economic factors on the incidence, spread, defaulter rate and outcomes of MDR-TB. The social areas highlighted by the study participants as affecting the incidence and outcomes of MDR TB were housing and relocation, decreased immunity, stigma, patients' attitude and lack of support, alcohol and other substance usage and prison/ incarceration. The economic factors identified by the participants were unemployment and job loss and health related expenses. Other factors are those factors contributing to the increased incidence and possible poor outcomes of MDR TB. Healthcare workers impact and attitude and the effects of the covid-19 pandemic were highlighted as additional factors influencing the incidence and outcomes of MDR TB. The management of MDR-TB requires rigorous efforts that should be directed at addressing the socio-economic factors. Therefore, future quantitative studies and important programmatic strategies should be considered to tackle the socio-economic challenges that contribute to the burden of MDR-TB infection in the Makana community.

KEY WORDS

Drug resistant TB, MDR- TB, socioeconomic factors

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CHAPTER: 1 INTRODUCTION

1.1 Introduction and background

Tuberculosis (TB) is a global public health concern and a primary cause of morbidity and mortality in South Africa (Cramm, Finkenflügel, Møller & Nieboer, 2010; WHO, 2018; McNally, de Wildt, Meza, & Wiskin, 2019). It is an extremely contagious infection that, if untreated or poorly treated, can be fatal (Stout, 2008; Cramm et al., 2010). The *Mycobacterium tuberculosis* bacilli microorganism, which causes TB, attacks the lungs and other organs of individuals infected (Kaur, Garg, & Narang, 2016). Due to a high TB defaulter rate, drug-resistant TB has evolved, leading to complications with TB diagnosis and case management (Khan, 2013; CDC, 2012; Migliori & D'Arcy, 2009). Tuberculosis is transmitted through droplets in the air (CDC, 2017). Close contact and extended periods of exposure increase the chance of transmission (Department of Health National TB Guidelines, 2014). Once infected, an individual can either have latent TB infection or active TB disease (CDC, 2017). Latent infection means the infectious agent is present in the body without causing symptoms or signs. Conversely, TB is referred to as active disease when there are symptoms (Khan, 2013).



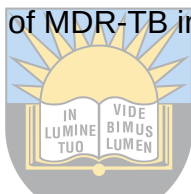
Drug-resistant TB is a TB type, wherein the infectious agent is resistant to the first-line drugs that are used in the treatment of susceptible TB. There are several types of drug-resistant TB, depending on the regimens on which resistance is conferred. Mono-resistance TB is a drug-resistant TB type, where there is resistance to only one first-line anti-TB drug (Department of Health Interim DRTB Guidelines, 2018). Poly-resistance occurs when an individual is resistant to more than one anti-TB drug, except both rifampicin and isoniazid (Department of Health Interim Drug-Resistant TB Guidelines, 2018; CDC, 2017). Multidrug-resistant TB (MDR-TB) is a type of TB that is resilient to the two most effective drugs (Rifampicin and Isoniazid) for susceptible TB (CDC, 2017; Khan, 2013; Migliori & D'Arcy, 2009). According to Asgedom, Teweldemedhin and Gebreyesus (2018), this form of resistance poses a challenge in TB control globally. Extensive drug-resistant TB (XDR-TB) is another resistant TB type, where the microorganism is resistant to two of the first-line drugs, Isoniazid, Rifampicin, any of the fluoroquinolones and one of the second-line injection drugs (Kanamycin, Amikacin or Capreomycin) (CDC, 2017; Khan, 2013; Migliori & D'Arcy, 2009).

As described in the World Health Organization (WHO) global TB report for 2018, 558 000 people (ranging from 483 000 to 639 000) developed rifampicin-resistant TB (RR-TB), and 82% of these had multidrug-resistant TB (MDR-TB). Furthermore, treatment success globally remains low, at 55% (WHO, 2018). According to the World Health Organization's (WHO) worldwide TB report for 2019, around 500 000 people (ranging from 417 000 to 556 000) developed or acquired rifampicin-resistant tuberculosis (RR-TB), with 78% having multidrug-resistant tuberculosis (MDR-TB) (MDR-TB). An estimated 3.4% of newly reported TB cases had RR-/MDR-TB, while 18 percent of formerly treated patients had RR-/MDR-TB. The exact burden of drug-resistant tuberculosis in the African countries is not well described; only 51% of countries having done official reviews (Ntoumi et al., 2016). This can lead to difficulty in estimating the degree of the problem in the African Region. According to available statistics, the AFRO Region reported between 36 000 and 44 000 MDR-TB cases in 2016 (Migliori, Richardson, Sotgiu & Lange, 2009).

South Africa, however, is one of the highest MDR burden nations. Sixteen districts had a TB Rifampicin resistance confirmed client rate above the national average (6.9%), ten of these districts were in KwaZulu-Natal, three were in Mpumalanga, two in the Eastern Cape and one in Northwest (District health barometer 2017/18). Eastern Cape, Western Cape and KwaZulu- Natal has the highest TB incidence rate in the country. Therefore, the National Department of Health has defined TB as one of the quadruple burdens of diseases that need attention. Multiple factors are reported to influence the increased incidence and poor outcomes of MDR TB (WHO, 2018). Socio-economic status, unemployment, overcrowding, poor hygiene, immunocompromising illnesses and malnutrition are risk factors for contracting TB; hence, TB has been previously defined as the disease of the poor (Rocha & Montoya, 2011). Recent analyses by the WHO indicated that TB rate variations are influenced by changes in socioeconomic factors, more than by TB control efforts, strengthening a consensus that TB control should be reinforced by socio-economic interferences (WHO, 2018). The Eastern Cape Province is among the leading provinces with the highest unemployment rate, high HIV burden and poverty. The extent to which the socio-economic conditions have contributed to the high incidences of MDR-TB is not known. In the Makana district of the Eastern Cape, an influx of newly diagnoses MDR-TB and retreatment cases has been observed. With poorer outcomes in this population, i.e., Treatment failure or Loss to follow ups. To combat drug-resistant TB, it is crucial to investigate socio-economic factors from both the health care professional and patient perspective in particular settings to gain insights into developing context-specific strategies against the burden of TB.

1.2 Problem statement

Multidrug-resistant TB (MDR-TB) is a multifaceted illness with expensive treatment regimens, toxic medications and long duration of treatment, creating a substantial financial burden on the patients and health system (Manjelievskaia, Erck, Piracha & Schrager, 2016; Thiruvalluvan, Thomas, Suresh, Sellappan, Muniyandi & Watson, 2017). In the Makana sub-district of the Eastern Cape, MDR-TB is poorly managed, as evident by the amount of new MDR-TB cases, re-treatment cases and poor outcomes. In 2016, there were 42 new DR TB cases at Marjorie Parrish TB hospital (MPTBH). The breakdown of this number was 11 Pre XDR, 17 MDR and 14 Rifampicin resistant TB (RR) patients. Of these newly DR TB patients, 42% died, 5% was lost to follow up and 5% failed DR TB treatment (EDRweb). In 2019, MPTBH recorded 55 new DR TB cases (7 Pre XDR, 12 MDR and 36 RR) (EDRweb). The extent of socio-economic factors affecting MDR control in this area has not been determined. It is, therefore, crucial to examine socio-economic factors and their influence on MDR control. This study aims to fill the gap by exploring the socio- economic factors influencing the spread and treatment outcomes of MDR-TB in the Makana sub-district, Eastern Cape.



1.3 Purpose/Aim of the Study

This study aims to explore the socio-economic factors influencing the spread and treatment outcomes of MDR-TB in the Makana sub-district, Eastern Cape.

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1.4 Specific objectives

The specific objectives are:

1. To explore social factors influencing incidences and outcome of multidrug resistance tuberculosis among patients and facility staffs in Makana Sub-District, Eastern Cape.
2. To describe economic factors influencing incidences and outcome of multidrug resistance tuberculosis among patients and facility staffs in Makana Sub-District, Eastern Cape.
3. To explore any other health related factors influencing incidences and outcome of multidrug resistance tuberculosis among patients and facility staffs in Makana Sub-District, Eastern Cape.

1.5 Research questions

The research questions are:

1. What are the social factors influencing incidences and outcome of multidrug resistance tuberculosis among patients and facility staffs in Makana Sub-District, Eastern Cape?
2. What are the economic factors influencing incidences and outcome of multidrug resistance tuberculosis among patients and facility staffs in Makana Sub-District, Eastern Cape?
3. Which other health related factors influencing incidences and outcome of multidrug resistance tuberculosis among patients and facility staffs in Makana Sub-District, Eastern Cape?

1.6 Significance of the study

Despite significant research advances made in the diagnosis and treatment aspects of MDR-TB (Lönnroth, 2009), research focussed on socio-economic factors associated with MDR-TB in South Africa are limited. This study will explore the impacts of socio-economic factors on MDR-TB patients from the Makana sub-district in the Eastern Cape. This study is essential as the outcomes can influence policy changes in the control of MDR-TB in the Makana sub-district, and the Eastern Cape Province to assist in prevention strategies. Findings from this study could also be used to conduct more extensive studies that could inform policy adjustment at the national level.



1.7 Conceptual framework

The conceptual framework, as presented in Figure 1 below, was designed based on prior experience as well as literature reviewed on the topic. The framework shows that MDR-incidence and treatment outcomes are influenced by social, economic and health system factors as primary drivers. Then each of these three factors has secondary drivers that are linked back to the MDR-TB incidences and outcomes.

The concepts that are used in this framework are as follows (Figure 1):

TB loss to follow up rate – Number of patients that interrupt treatment for two successive months or more (Department of Health National Tuberculosis Management Guidelines, 2014).

Factors – In this study, it is defined as any situation that leads to an increase of MDR TB cases or poor MDR TB treatment outcomes.

Socio-economic factors – In this study, the social-economic factors are categorized by social and economic experiences and realities that transform the lifestyle and attitude of

the individual. Social factors refer to any variable which arises from the environment, culture, language, and religion, which affects the thinking and decision-making processes of an individual. This study will focus primarily on housing, family support, substance use and abuse and stigma. The economic factors are defined as variables associated with the financial status, i.e., employment, poverty, and income.

Health System Factors – In this study, it will be any factors related to the spread of TB in hospitals and any factor affecting the diagnosis and management of MDR TB.

Treatment outcomes – Are defined as the result of an action or event. In this study, the outcome of treatment can either be:

- **Not evaluated yet** - Meaning the participant is still on medication and not due for results yet.
- **Cured** - A participant that had an initial positive culture, but that has three consecutive negative cultures during continuation phase and no signs of clinical worsening
- **Treatment complete** – The participant does not have three successive negative cultures during the continuation phase.
- **The loss to follow up** - When treatment is interrupted for more than two successive months, for non- medical reasons.
- **Died** – Participants who passed away for any reason during treatment.

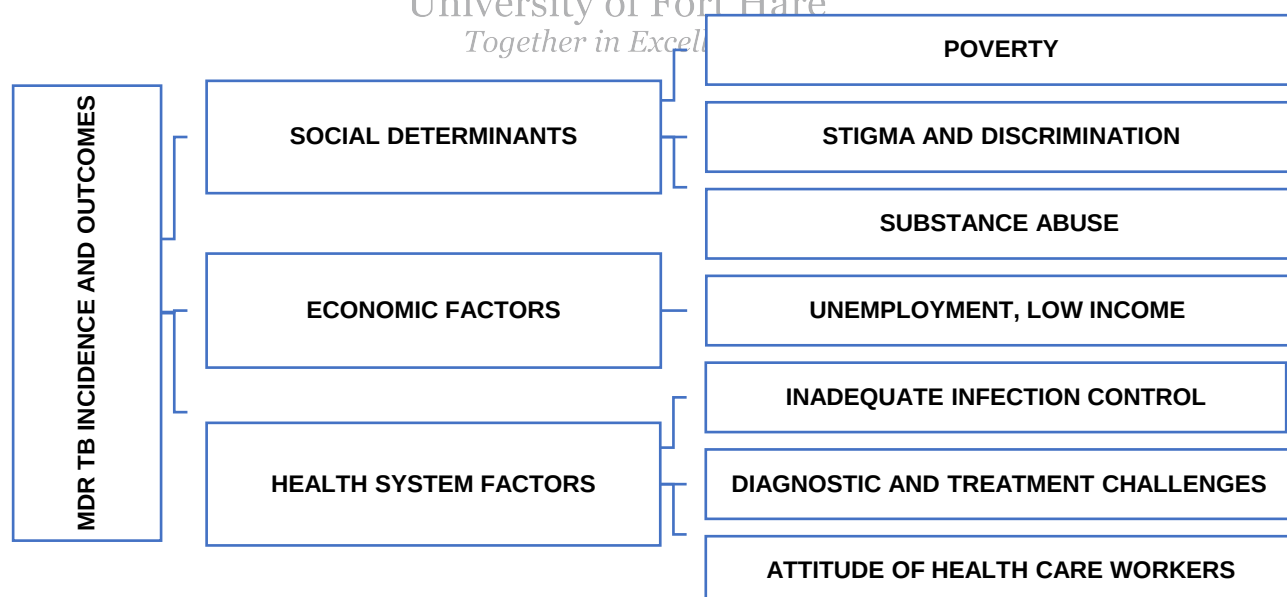


Figure 1: Conceptual framework showing interrelating factors affecting MDR- TB.

1.8 Operational definitions of key concepts

Tuberculosis - Tuberculosis (TB) is an airborne disease caused by *Mycobacterium tuberculosis* (Kaur et al., 2016; WHO, 2018; CDC, 2017). In this study, a patient with tuberculosis will be defined as any person diagnosed either by Gene Expert or Smear or culture to have Mycobacterium Tuberculosis.

Mono-resistant TB - Resistance to a single anti-TB drug (Department of Health Interim DRTB Guidelines, 2018).

Rifampicin resistant TB - Resistance to Rifampicin, with or without resistance to another anti- TB drugs (Department of Health Interim DRTB Guidelines, 2018).

MDR TB - Resistance to Isoniazid and Rifampicin (Department of Health Interim DRTB Guidelines, 2018). In this study, MDR TB will include those confirmed as MDR as well as Rifampicin mono resistant TB cases.

Pre-XDR - MDR with added resistance to either a second-line injectable or a fluoroquinolone (Department of Health Interim DRTB Guidelines, 2018). In this specific study, all PRE XDR and XDR patients will be excluded.

XDR TB - MDR plus additional resistance to both a second-line injectable and fluoroquinolone. (Department of Health Interim DRTB Guidelines, 2018).



1.9 Outline of the Dissertation

Chapter 1: outlines the introduction and background of the study, the problem statement, significance of the study, aim of the study, objectives of the study, research questions, definition of concepts and outline of the dissertation.

Chapter 2: deals with literature around the concepts related socio- economic factors involved in the incidence and outcomes of MDR-TB.

Chapter 3: Focusses on the research design, study settings, population, sampling of the study, participants, data collection, data analysis, trustworthiness, and ethical considerations.

Chapter 4: Discusses findings from the study's data presentation and findings.

Chapter 5: is the summary, conclusions and recommendations based on the study findings.

CHAPTER 2: LITERATURE REVIEW

2.1 What is TB?

Tuberculosis (TB) is an airborne disease caused by *Mycobacterium tuberculosis* (Kaur et al., 2016; WHO, 2018; CDC, 2017). Tuberculosis (TB) affects the lungs typically but can infect other organs of the body; when the infection is in the lungs, it is called pulmonary TB, and when the disease is in any other organ outside the lungs, it is regarded as extra pulmonary TB (CDC, 2017; Khan, 2013). Tuberculosis is spread through droplets in the air (CDC, 2017). Close contact and extended periods of exposure increase the chance of transmission (Department of Health National TB Guidelines, 2014).

Once infected, an individual can either have latent TB infection or active TB disease (CDC, 2017). Latent infection means the infectious agent is present in the body without causing symptoms or signs. While having latent TB, a person is not contagious and cannot spread the disease (Khan, 2013). About 23% of the global population, are projected to have latent TB, thus, at risk of acquiring active TB disease throughout their lifespan (WHO, 2018). The infectious agent could become active at any stage, causing active disease or remain latent in the body without causing illness. Conversely, TB is referred to as active disease when there are symptoms (Khan, 2013).

2.2 Susceptible TB

Drug susceptible or sensitive TB is an active TB disease characterized by sensitivity to the two core TB drugs, INH, and RIF. Drug susceptible TB is treated for 6-9 months with four main drugs, including Rifampicin (Rif), Isoniazid (INH), Pyrazinamide (PZA) and Ethambutol (EMB). The first two months are called the intensive phase and patients take a cocktail of all four of these drugs, while the following 4 to 6 months is the continuation phase of treatment (Warner & Mizrahi, 2014; Department of Health National TB Guidelines, 2014; WHO, 2018; CDC, 2017).

2.3 Drug resistance TB

The section below will discuss Drug-resistant TB, but the majority of drug resistance TB is MDR TB. Drug-resistant TB is a TB type, wherein the infectious agent is resistant to the first-line drugs that are used in the treatment of susceptible TB. There are several types of drug-resistant TB, depending on the regimens on which resistance is conferred:

Multidrug resistance TB (MDR TB) is a type of drug resistance TB whereby the *Mycobacteria* is resistant to isoniazid and rifampicin, the two main drugs in the drug treatment regimen (Department of Health Interim DRTB Guidelines, 2018).

Extensive drug-resistant TB (XDR TB) is resistant to rifampicin and isoniazid, as well as any fluoroquinolone and, as a minimum, one of three second-line injectable drugs (Department of Health Interim DRTB Guidelines, 2018).

Mono-resistance TB is a drug-resistant TB type, where there is resistance to only one first-line anti-TB drug (Department of Health Interim DRTB Guidelines, 2018).

Poly-resistance occurs where resistance is to more than one anti-TB drug, except both rifampicin and isoniazid (Department of Health Interim Drug-Resistant TB Guidelines, 2018; CDC, 2017).

In 2016, the WHO permitted the use of a short regimen treatment for MDR-TB patients who do not have resistance to second-line anti-TB drugs. Furthermore, this schedule takes 9–12 months and is more cost-effective. Also, patients with XDR-TB or resistance to second-line anti-TB drugs cannot use this short regimen, lengthy regimens will be initiated (Department of Health Interim DRTB Guidelines, 2018; WHO, 2018).

2.3.1 Global burden of drug resistance TB

The World Health Organization global TB surveillance report estimates that in 2016, 600 000 people developed MDR TB, while 240 000 of those died (WHO, 2018). In the same year, 8000 cases of XDR TB were reported worldwide (WHO, 2018). Multi-Drug resistant-TB kills an estimation of 110,000 people per year and nearly half a million new MDR-TB cases emerge every year, with the most significant problem in low- and middle-income countries (WHO, 2018). Currently, only 54% of MDR-TB patients and 30% of XDR-TB have been successfully treated globally (Karekar, 2018).

2.3.2 The burden of drug-resistant TB in Africa

The exact strain of drug-resistant tuberculosis in the African countries is not well described; with only 51% of countries having done official surveys (Ntoumi et al., 2016). This has led to difficulty in quantifying the burden of MDR TB in the African continent (Ismail, Ismail, Omar, Blows, Gardee, Koornhof & Onyebujoh, 2018). It is projected that three million people with TB remain undiagnosed and untreated in this region. Only South Africa has reported a high occurrence of MDR-TB among the African nations; all Sub-Saharan Africa likely has an unreported high load of drug-resistant TB. Strengthening of the monitoring systems is needed in the continent to monitor the burden of DR-TB (Ntoumi et al., 2016).

In one study, modelling was used to estimate the burden of MDR TB; it estimated 92 629 drug-resistant tuberculosis cases, with 42% of these happening in only two countries: Nigeria and South Africa (Ismail et al., 2018). Of the 92 629 cases projected, many cases were missed, as 70% of cases were not notified (Ismail et al., 2018). Mortality among

patients with MDR-TB was 21% and was 43% among those with XDR-TB (Ismail et al., 2018). Drug-resistant TB is commonly missed in Africa, and this threatens the prospects of attaining the year 2035 targets of the end TB strategy (WHO, 2015). Urgent efforts of tools are needed to confirm the exact problem of drug-resistant TB in the African Continent.

2.3.3 The burden of drug-resistant TB in South Africa

The Lancet reports that South Africa has one of the highest MDR and XDR TB prevalence worldwide; therefore, SA was one of the first high-burden countries to initiate second-line treatment for MDR-TB nationally in 2001 (Cox, Ramma, Wilkinson, Azevedo & Sinanovic, 2015). South Africa has the highest projected TB incidences and prevalence. Furthermore, South Africa had the second-highest amount of diagnosed multidrug-resistant TB cases and has the most considerable amount of HIV/TB coinfections (Churchyard, Mametja, Mvusi, Ndjek, Hesselning, Reid & Babatunde, 2014).

There was an increase in the reported cases of TB and laboratory-confirmed cases of MDR-TB during the period 1990-2015. This increase was consistent with the increasing prevalence rate of HIV/AIDS. Furthermore, drug-resistance TB was responsible for over 90% of the TB related mortalities among the HIV-positive population during those years. Although Gauteng is the most crowded of the nine South African provinces, it has the second-lowest TB incidence rate, but the highest amount of TB/HIV co-infection, with 68% of TB patients projected to have HIV. (Berry, Rodriguez, Berhanu, Ismail, Mvusi, Long & Evans, 2019)

The mortality rate of 71% has been registered in HIV-co-infected MDR-TB patients in KwaZulu-Natal (KZN) (Mahwire, 2019). Sixteen districts had a TB Rifampicin resistance confirmed client rate above the national average (6.9%), ten of these districts were in KwaZulu-Natal, three were in Mpumalanga, two in the Eastern Cape and one in Northwest (District health barometer, 2017/18).

2.3.4 Treatment of drug-resistance TB in South Africa

As of July 2018, new injection-free regimens have been implemented for Drug-resistant TB in South Africa. Short and long regimes were developed based on WHO guidelines. The short regimen is given for 9 to 11 months and is comprised of seven drugs, namely, Bedaquilline (BDQ), Clofazimine (CFZ), Linezolid (LZD), high dose Isoniazid (INH), Levofloxacin (LFX), Ethambutol (E) and Pyrazinamide (PZA). Linezolid is only given for two months and BDQ for six months. The intensive phase is for four months but may be increased to six months, dependent on response. The continuation phase is for five months. The long regimen is given for 18 to 20 months. The long regimen includes the core drugs-

BDQ, LZD, CFZ, LFX and Terizidone (Teri). The intensive phase is for 6 to 8 months and 12 months continuation phase (Department of Health Interim DRTB Guidelines, 2018). According to Van Rensburg, Berhanu, Hirasen, Evans, Rosen and Long (2019), longer duration in treatment and more visits result in a bigger financial impact.

The treatment duration and regimen for MDR and XDR TB have significantly improved in the last five years, and in SA, the benefits of these changes need to be monitored closely. Recently, in South Africa, the toxic kanamycin injectable used for the treatment of MDR TB has been replaced by a less toxic, shorter-term bedaquiline based regimen. However, multi-drug resistant TB is still among public health concerns in South Africa.

2.3.5 Factors influencing drug-Resistant Tuberculosis

Multidrug-resistant TB is caused by inconsistent, incomplete, improper, or incorrect use of treatment of susceptible TB (Dean, Cox & Zignol, 2017). In the subsequent section, the numerous factors influencing DR-TB are discussed.

2.3.5.1 Social determinants of drug-resistant Tuberculosis

The social causes of TB are attributed to the mode of spread of TB, as well as the risk factors for acquiring the disease. As mentioned, TB is an airborne disease that is spread through air droplets by inhaling the droplets from coughing and sneezing (Department of Health National TB Guidelines, 2014; WHO, 2018). The risk factors for TB are HIV infection and other diseases that compromise the immune systems, also congested environments, poor infection control in healthcare facilities, inadequate airing such as working underground (WHO, 2018; Horter et al., 2014; Rocha et al., 2011).

Poverty

The highest rates of TB are discovered in the disadvantaged settings of the community. Tuberculosis arises more often among low-income people occupying congested areas and persons with little schooling (Thomas et al., 2016). Poverty may result in poor nutrition, which may be related with alterations in the immune system, causing increased vulnerability. Poverty, on the other hand, results in congestion, poor ventilation, and unhygienic environments, increasing the risk of TB transmission (Thomas et al., 2016; Horter et al., 2014; Rocha et al., 2011). People living in poverty in overpopulated areas, alcohol and drug users, imprisoned persons, and other vulnerable groups are more likely to contract the infection. South Africa is characterised by a high unemployment rate and high-income gap; it is recorded that over half of the South African population is living under extreme poverty (Budlender, Leibbrandt, & Woolard, 2015). According to Biru and Woldesemayat (2019), living in a one-roomed house is an independent risk associated with DR-TB.

Social issues: Stigma and discrimination

Stigma and discrimination in the setting of MDR-TB negatively affect patient access to healthcare services in any given society. Also, the effects of stigma and discrimination include rejection from family, friends or health workers, financial uncertainty, and feelings of humiliation (Thiruvalluvan et al., 2017). Multi- Drug-Resistant Tuberculosis (MDR-TB) patients would readily isolate themselves to avoid infecting other members of the family. This can often lead to separation and problematic family relationships (Thomas et al., 2016). In places like South Africa where TB and HIV are still regarded as a “*killer disease*,” TB clients could suffer detrimental effects of being isolated, negatively impacting on their treatment adherence status, thus, creating a risk for developing DR-TB.

Substance Abuse

Substance use is frequently observed among patients with poor adherence (Thomas et al., 2016). Alcohol has an impact on MDR-TB management. Alcohol use disorders are associated with non-adherence to anti-TB medication (Tesfaye, 2019). Alcohol usage is a general predictor of poor outcome (Mulisa, Workneh, Hordofa, Suaudi, Abebe & Jarso, 2015). Substance addiction and misuse have been identified as risk factors for MDR-TB acquisition or development, whereas alcohol intake has been linked to treatment failure and treatment default among new DR-TB cases (Mulu, Mekkonen, Yimer, Admassu & Abera, 2015). Patients who smoke tobacco, alcohol usage, and abusing other substances had higher odds of developing MDR-TB (Sharma, Lalwani, Pandey & Thakur, 2019). Smoking is one of the core determinants for TB, and it is suggested that smoking might even contribute to the development of drug resistance (Sharma et al., 2019). In South Africa, there is a reported increase in illicit drug manufacturing, utilization, and distribution in the past few years, especially among the youth and young adults (Mokwena & Huma, 2014; Patel et al., 2016). Substance abuse is also associated with extreme poverty and unemployment levels. In the population with an increased drug and alcohol utilization, it is empirical to study the impact of this increase in substance abuse in the Makana sub-district.

2.3.5.2 Health systems Factors

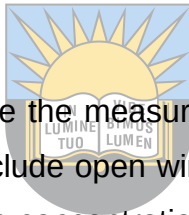
Abubakar et al. (2013) outline that health system failures contributed to the rise in incidences of drug-resistance TB in South Africa, including Makana District in the Eastern Cape Province. Poor diagnostic services, inadequate guidelines on medication usage, poor application of the directly observed program, and the absence of tuberculosis drugs lead to monotherapy and unpredictable treatment outcomes. In Russia, there is an increased rate of TB in prisons with disadvantaged conditions, which added to the rise of MDR-TB

transmission and resulted in its spread into the community (Abubakar et al., 2013). Adequately resourced and planned health systems worldwide are less likely to encounter MDR-TB, as indicated by the small numbers of MDR tuberculosis in patients in Western Europe and North America, where health systems are improved compared to the African region. Furthermore, on a public level, the most effective plan is early diagnosis and management with appropriate treatment.

South Africa is thriving to strengthen the health systems, using the WHO health systems building blocks. Various elements remain a threat to obtaining an optimised health system.

Inadequate infection control

Infection control practices can be divided into administrative, environmental and personal protective equipment. Administrative control measures include the systems and strategies in place by management, this includes registers, policies and treatment guidelines (Menzies, Joshi & Pai, 2007). The administrative measure is aligned with the clinical control practices which ensure prompt identification of TB symptoms, diagnosis and treatment initiation (Malangu & Mngomezulu, 2015).



Environmental control measures are the measures implemented to prevent the infectious agent/ droplets in the air. These include open windows, adequate ventilation systems and the designs of buildings to decrease concentrations of TB bacilli (Malangu & Mngomezulu, 2015). The last domain is personal protective equipment, e.g., the use of N95 masks. Often most of the focus is placed on this area whereby healthcare workers need to protect themselves (Engelbrecht, Janse Van Rensburg, Kigozi & van Rensburg, 2016).

These 3 infection control areas are fundamental in the reduction of TB spread, if there is a lack in one of these areas more focus is placed on the other (WHO, 2009). Infection prevention and control contribute to the spread of drug-resistant tuberculosis. An attempt to control MDR-TB in the world and proper infection regulation measures in all health-care settings needs to be implemented through control of droplet infection (Abubakar et al., 2013). Improving infection control practices depend on altering healthcare worker behaviour (Engelbrecht, Janse Van Rensburg, Kigozi & van Rensburg, 2016).

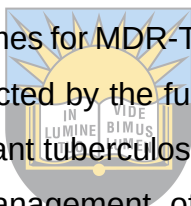
In South Africa, infection control prevention and control are still a challenge. Although the health systems factors are complex to tackle, drug-resistance TB burden can be reduced by the effective implementation of tuberculosis infection control interventions.

Diagnostic and treatment challenges

Abubakar et al. (2013) state that the occurrence of MDR-TB and the magnitude of the recent rise are likely to be an underestimate due to inadequate laboratory services for drug sensitivity testing in high TB burden nations. Unfortunately, many laboratories in poorly resourced settings are ineffectively equipped to detect and diagnose MDR-TB, which is a major obstruction for continuous scrutiny of drug-resistant tuberculosis. In South Africa, the introduction of Gene Expert for simultaneous diagnosis of TB and rifampicin resistance was a significant landmark in scaling-up identification of drug resistance TB. However, the detection of rifampicin resistance was found to be linked with false-positive results (Feliciano, Menon, Anselmo, Dippenaar, Warren, Silva & Bollela, 2019).

Another problem is the initiation of treatment once the diagnosis has been confirmed. In high burden settings, treatment programmes for drug-resistant tuberculosis are deficient (De Vries et al., 2017). In SA, the decentralization of MDR TB has been implemented to ease the burden faced by the centralized facility.

Xavier and Peixoto (2015) indicated that numerous countries had constructed strategies for the upscaling of treatment programmes for MDR-TB. These strategies relied on international donor funding and have been impacted by the funding shortage from international donors. Control of the spread of drug-resistant tuberculosis would need a constant supply of drugs, enough resources, prevention, management of adverse events, and stopping spread globally (Abubakar et al., 2013).



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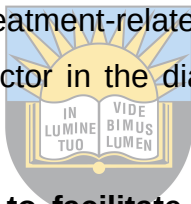
The knowledge and attitude of the health care worker

Lack of knowledge and negative attitude by healthcare workers toward MDR TB have a damaging impact on the management and control of MDR TB. Studies globally have found that health care workers do not always have adequate knowledge for the control and management of MDR-TB (Malango & Adebajo, 2015). Medical doctors showed a better level of understanding about MDR-TB than nurses and counsellors, but the difference was not noteworthy when equated with pharmacists (Malango & Adebajo, 2015). Lack of knowledge of TB among HCWs may lead to subpar treatment, ineffective service delivery, inefficient resource usage, influence on health outcomes, and increased risk of TB transmission and resistance development (Alotaibi, Yassin, Mushi, Maashi, Thomas, Mohamed, Hassan & Yezli, 2019). Personal and religious beliefs also influence the attitude towards TB and MDR TB. A lack of knowledge and negative attitude results in incorrect information passed to patient which result in misconceptions (Alotaibi, Yassin, Mushi, Maashi, Thomas, Mohamed, Hassan & Yezli, 2019).. The risk is therefore more for the spread of disease and higher rates of defaulting due to mistaken beliefs.

Healthcare workers attitude and good levels of knowledge regarding TB infection control were the key elements related with good infection control practices (Engelbrecht, Janse Van Rensburg, Kigozi & van Rensburg, 2016) which limit the spread of TB.

2.3.5.3 The economic barriers contributing to Multi- Drug-Resistant Tuberculosis

MDR-TB has a huge economic outcome on patients due to the long duration and intricate nature of treatment regimens (De Vries et al., 2017). Socio-economic barriers include treatment inaccessibility, remoteness, transport expenses and hospitalization related fees, these all affected patient care (Horter, 2014; Kaliakbarova, 2013; WHO, 2015; Zhang, 2015). Kaliakbarova (2013) reported that monetary restraints were associated with 23% of MDR-TB patients defaulting treatment. Thomas et al. (2016) and Khanal (2017) found that patients had not returned to work after one year of being on treatment, and, on occasion, caregivers had to stop working. There was also a decrease in income due to work absenteeism and some income had to be spent on treatment-related costs. The inability to pay management related cost, was also a limiting factor in the diagnosing and treatment of DR-TB (Oga-Omenka et al., 2020).



2.3.6 Socio-economic measures to facilitate effective management and control of drug-resistant TB

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Eradicating extreme poverty and providing social protection could significantly reduce TB incidences (Carter et al., 2018). Recent analyses by the WHO indicated that TB rate variations are influenced by changes in socioeconomic factors, more than by TB control efforts, thereby strengthening a consensus that TB control should be reinforced by socio-economic interferences (WHO, 2018).

There is, however, little evidence to notify policymakers and control officers on how socioeconomic interferences should be used to improve TB control and reduce TB-related health disparities. The Eastern Cape Province is among the leading provinces with the highest unemployment rate, high HIV burden and poverty; it is not known the extent to which the socio-economic conditions have contributed to the high incidences of MDR-TB.

A massive scale-up of swift diagnosis and treatment is necessary to control the DR-TB epidemic. This will not be possible without concerted and collaborative efforts toward the implementation of integrated model care, considering the health systems, socio-economic factors, as well as medical factors. Increasing political will and resources could assist in

strengthening the health systems. Instead of focusing on diagnosed cases only, it is imperative to recognize that transmission is primarily driven by undiagnosed, untreated cases, both in the healthcare setting and in the community.



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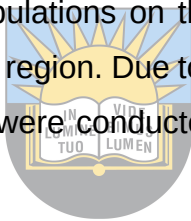
CHAPTER 3: RESEARCH METHODOLOGY AND DESIGN

3.1 Introduction

This chapter gives an overview of the research technique and design. It includes information about the study's setting, population and sampling, participants, instrument utilized, data collection, data analysis, reliability and ethical ramifications.

3.2 Research design

A research design is the approach followed to collect and present data (Teddlie and Tashakkori, 2006). In this study, the research design involved the use of a qualitative research approach. In this approach, participants enrolment was through purposive sampling and data collection with semi-structured, open-ended interviews (Dudwick, Kuehnast, Jones and Woolcock, 2006). This qualitative study design approach was explorative, descriptive and contextual. A qualitative research method was chosen because this would delve into the study topic and achieve the study's set out objectives of getting in-depth details from the affected populations on the socio-economic conditions driving the MDR-TB epidemic in the mentioned region. Due to the exploratory and descriptive nature of the research questions, interviews were conducted, to understand the in-depth views and opinions of participants.



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3.3 Research setting

This study was conducted in Marjorie Parrish TB Hospital situated in Port Alfred, Eastern Cape. This hospital is a government hospital of the department of health that serves as one of the decentralised sites for the management of drug-resistant TB. Marjorie Parrish is one of two specialised TB hospitals that manage susceptible and drug-resistant TB patients in the Makana and Ndlambe municipal districts. This study site is a referral centre for ten local clinics in the Ndlambe area and nine local clinics in the Makana area. All drug-resistant patients are referred to Marjorie Parrish TB hospital.

3.4 Population

The study targeted healthcare workers working in the MDR-TB field and TB patients with the following: GeneXpert Rifampicin resistance and patient confirmed as MDR TB.

3.4.1 Eligibility criteria

Inclusion

This study included confirmed and unconfirmed MDR TB patients aged 18 years and older, new as well as retreatment patients in the same aforementioned age category, as well as healthcare worker with more than two years' experience in MDR TB. MDR TB patients with history of being in prison was also included in this study.

Exclusion

This study did not include critically ill patients and those not willing to participate in the study.

3.5 Sample and Sampling procedure

Purposive sampling was used where the researcher decided what information is needed and recruited participants based on that (Etikan, Musa & Alkassim, 2016). Eligible participants were selected using a purposive sampling technique from the hospitals' routine data electronic records (EDR-WEB database) and hardcopy registers (drug-resistant TB register) on MDR-TB patients enrolled in care at the study site. These two documents have the list of all patients currently and previously on Drug-resistant TB treatment at the institution. It also contains in-patients as well as outpatients. The selected participants were assessed for eligibility to participate in the study and interviewed and join focus group discussions. The hospitals' database was also reviewed to gain additional information about the study participants who gave consent to be enrolled in the study. Health-care-workers, who are involved with the management of MDR-TB, were also selected from the study site as well as referral clinics.

3.6 Participants

A total of thirty (30) consenting participants were targeted for enrolment into this qualitative study, which involved key in-depth interviews (KIIs) and focus group discussions (FGDs.). The KIIs was conducted for ten (10) healthcare workers and nine (9) MDR-TB patients. Two focus group discussion were done involving seven (7) MDR-TB patients and six (6) MDR-TB patients respectively.

3.7 Data collection procedure

Data collection is an organized manner of acquiring and measuring information from various sources. This enables researchers to answer research questions (Moser & Krostjens, 2017). For this study, data was collected through face-to-face interviews using interview guides and tape recorders. Both Key In-depth interviews and Focus group discussions were conducted

at MPTBH and during outreach visits at the local clinics. Interviews were done in a secured environment to ensure privacy i.e., patients' tearoom, out- patients consulting room or nurse's station. Interviews were conducted after fully explaining the procedure and obtaining informed consent from participants. A trained translator was engaged to assist with participants who only speak Xhosa or did not fully comprehend questions. The interviews took about 20 – 40 minutes. During data collection, memos and notes were written by the principal investigator in English. After the interviews, the recordings were transferred onto a designated laptop under an alias. The interviews were then transcribed verbatim in an MS Word document for analysis.

3.8 Data analysis

Data collected was analysed using both content and thematic analysis approach. Thematic analysis is associated with identifying themes and developing codes (Harris, 2015). Data analysis was carried out simultaneously with data collection until the saturation point was achieved. Data was transcribed using the Otter application into Microsoft word as transcripts. Microsoft excel was used to summarize the socio- demographic characteristics of the participants. Transcripts was uploaded on NVivo software for further analysis. In this study, the researcher developed categories according to Tesch' s eight-step method, which is:

- A careful reading of data and writing down ideas coming to mind.
- Picking the most interesting/ shortest interview to sense its underlying meaning.
- Topics can be coded next to appropriate segments of the text.
- Grouping the topics, turning them into categories that relate to each other.
- A final decision is made on the abbreviation of these codes for each category.
- Data material belonging to each category is assembled in one place.
- A preliminary assessment is done.
- Lastly, the recording of existing data (Creswell, 2014)

3.9 The trustworthiness of the study

For qualitative research, the trustworthiness of the data is the primary concern because it implies the study's validity. Confirmability, dependability, transferability, and credibility are the four factors used to ensure the trustworthiness of the data (Moser & Krostjens, 2017).

3.9.1 Confirmability

The direct responses of participants were quoted in the research report to ensure confirmability. The researcher verified that the study was free of bias by excluding her personal opinions on the subject. The findings and conclusion were confirmed by ensuring that there was sufficient evidence to back them up.

3.9.2 Dependability

The study methodology was intensive to enable future investigators to repeat the study for dependability. Comments on the procedure used to gather and analyse data, as well as raw data recordings and transcriptions were provided. An expert in this subject vetted the interview guide.

3.9.3 Transferability

Transferability is achieved by systematically recording the methodology for the research to be transferred to other settings. Transferability was achieved in this work by maintaining a large data base that other researchers could access, follow, and use.

3.9.4 Credibility

Longer involvement with participants, the peer review process, an investigation of researcher bias, and constant monitoring and triangulation were all used to ensure the study's credibility. Open-ended interviews conducted on both clinical staff and patients were used to achieve triangulation. In addition, assurances bolstered participants' trust that the study's findings would be made available to them after the study's data analysis and completion.

3.10 Ethical considerations

Ethical approval was obtained from the Faculty of Health Science ethics committee, University of Fort Hare (Appendix 5). Ethical clearance REC- 100118- 054, certificate reference number Ref # 2020=10=07=Cannon LL. Permission was attained from the Eastern Cape Department of Health (Appendix 7) and Marjorie Parrish TB Hospital (Appendix 6).

3.10.1 Ensuring informed consent was given

Informed consent was obtained from all study participants after thoroughly explaining the purpose. Participation was completely voluntarily, and respondents were given an option to opt-out of the study at any time.



3.10.2 Ensuring no harm to the participants

The risk associated with participating in this study are no greater than the risk of daily living. The researcher ensured that participating in the study would not compromise their treatment rights at the hospital and that information was only collected by official persons.

3.10.3 Ensuring confidentiality and anonymity

No personal information of participants was used. All responses from respondents were coded during analysis for autonomy and the respondents were not identifiable in any published or unpublished work following this research. The information collected in this study was strictly confidential and interview records were locked in a safe environment and encrypted folder only accessible to the principal investigator. Thus, ensuring anonymity and confidentiality of participants.

3.11 Chapter summary

This chapter highlights the methodology and study design. This qualitative study design approach was explorative, descriptive and contextual. The study targeted healthcare workers working in the MDR-TB field and TB patients with the following: GeneXpert Rifampicin resistance and patient confirmed as MDR TB. Eligible participants were selected using a purposive sampling technique from the hospitals' routine data electronic records (EDR-WEB database) and hardcopy registers (drug-resistant TB register) on MDR-TB patients enrolled in care at the study site. Targeted sample size for this study was thirty (30). Informed consent was obtained from all study participants after thoroughly explaining the purpose. No personal information of participants was used. All responses from respondents were coded during analysis for autonomy and the respondents were not. Data was then thematically analysed.

CHAPTER 4: RESULTS AND INTERPRETATION OF FINDINGS

4.1 INTRODUCTION

This chapter presents the findings from the focus group discussions and the individual interviews. The demographics of the study participants and the emerging themes will be detailed in this chapter and the findings will be discussed.

4.2 Description of the study participants

Table 1 describes the characteristics of the study participants. There were thirty-two (32) participants enrolled into the study, among whom there were 19 individual interviews and two (2) focussed group discussions based on saturation. Of the individual interviews, ten (10) were conducted on healthcare workers and nine (9) on MDR-TB patients. The two focussed group discussions only included MDR-TB patients. The first focus group had 7 participants and the second one had 6 participants. Saturation was defined when no new themes emerged.

The MDR-TB patients included in the interviews included both male (15) and female (7) patients, the ages ranged from 18 to 75 years (Table 1). 15 of the MDR TB patients were previously treated for drug sensitive TB, while 7 were having TB for the first time. None of the current participants had DRTB prior to this exposure. The current statistics indicate that prior DSTB is a risk factor for MDR-TB, therefore patients who were previously treated were more likely to get MDR-TB than those who never had TB before. This could be due to previous defaulting resultant in resistance to first-line anti-TB drugs.

Majority (11) of the MDR-B infected participants were from Grahamstown (Makanda). 5 of the participants were from Port Alfred, 3 from Alexandria and 1 each from Bathurst, Kenton-on-sea and Salem. The reason for the distribution could be due to the large area covered by Makanda and the high alcohol intake in this area.

Of the 10 healthcare workers interviewed, there was 1 doctor, 1 pharmacist, 6 professional nurses, 1 enrolled nurse and 1 enrolled nursing assistant participated. There was an equal distribution of 5 females and 5 males, respectively. 3 of the 10 participants had been working with MDR-TB for more than 10 years, 7 participants had been working with MDR-TB for 5 to 10 years. All the participants had experience in a primary health care setting, as well as working in a TB hospital, and were directly involved in the management of MDR-TB patients. None of the healthcare workers were ever infected with TB.

Table 1: Demographic characteristics of participants

Characteristics	N
Participants	32
Healthcare workers	10
DRTB Patients	22
Age ranges of MDR patients	
18- 30	5
31- 40	7
41- 50	4
Above 50	6
Age ranges of healthcare workers	
18- 30	3
31- 40	5
41- 50	1
Above 50	1
Sex of MDR patients	
Male	15
Female	7
Sex of healthcare workers	
Male	5
Female	5
Employment status of MDRTB patients	
Employed	3
Unemployed	17
Part- time/ Piece- jobs	2
Previous TB Infection	



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None	7
Previous DSTB	15
Previous DRTB	0

4.3 Summary of themes and sub-themes

The results of the focus group discussions and individual interviews were analysed using both content and thematic analysis, using Microsoft word, Microsoft excel and NVivo software. Emerging themes were categorised, and these include social factors, economic factors, and other factors, respectively. The themes were further divided into sub-themes as presented in the below table 2.

Table 2: Major emerging Themes and Sub- themes.

	Themes	Sub-themes
1	Social factors	1.1 Housing and relocation 1.2 Decreased immunity 1.3 Stigma 1.4 Patients attitude and lack of support 1.5 Alcohol and other substance usage 1.6 Prisoners
2	Economic factors	2.1 Unemployment 2.2 Health related expenses
3	Other factors	3.1 Healthcare workers impact and attitude 3.2 Covid- 19 pandemic

4.3.1 THEME 1: SOCIAL FACTORS INFLUENCING MDR- TB

Social problems are common problems affecting the majority in a society. The areas highlighted by the study participants were housing and relocation, decreased immunity, stigma, patients' attitude and lack of support, alcohol and other substance usage and prison/ incarceration.

Sub- Theme: 1.1 Housing and relocation

Poverty was identified as one of the main risk factors for acquiring MDR-TB. This was mentioned by all the participants, patients, including health care workers. It was explained that poverty results in poor housing and citizens staying in informal settlements, which are

overcrowded. Many of the participants were from this type of areas - especially living in houses with no or minimal ventilation, small houses with multiple occupants.

As one participant stated: *“...the other thing they stay in shacks, and it is cold there.”* Many informal settlements do not have flooring, is made from scrap metal, and has no windows, during winter and cold, rainy days these residents are exposed to damp and wet environments. When asking participant 13, what are some of the reasons people get MDR-TB? The answer came loud and clearly: *“Overcrowding, defaulting and poorly ventilated areas.”*

Participant 10 stated: *“Most people live in RDP houses or like turtles who would live like 10 people in one room shack or squatter camps.”*

Participant 11: *“I’d definitely say your location, where you live and your amenities, water and sanitation, windows, circulation you know. I’d say where you live or who you live with affects the incidence of MDR- TB. We have a lot of patients in the “location.” Living with other family members, living with children... overcrowding! We have a few patients on farms, with MDR-TB... contact transmissions.”*



Participant 12: *“Now you have a person living with four other people in one shack or one bedroom... so those type of factors also influence...”*

As described by the participants' comments, there is a high likelihood for MDR-TB patients to come from settlements or houses that are not adequate and mostly in a poor condition for infection control. This is due to in-proper ventilation as well as overcrowding of small houses/ buildings. Many of the participants interviewed lived with their extended family, as the traditional nuclear family is not a practice in this particular area. Your cousins, nieces and nephews are siblings in these areas of Makana. Therefore, houses are filled with multiple occupants.

The hygiene, especially related to water and sanitation in these areas, are not up to standard. This increases the likelihood of spreading disease. When delving into the reasons why defaulting is prevalent and poor outcomes are still experienced, the health care workers interviewed all believed that living in an informal settlement is a contributing factor. As explained, many of the informal settlements in the Makana area do not have house numbers.

Therefore, if the tracing of patients' needs to be done, at times, it is nearly impossible to find the person as areas are wide and scattered, complicated by the lack of house numbers.

As participant 7 stated: *"Another thing is demographics. Yeah, in our country, you know, we don't have a good like, how can I say this? Areas of accommodation where people stay- maybe some others, they don't even have, like house numbers, you see. So, you don't know exactly where a person stays or if the person goes to follow up, where can you trace that person?"*

Another factor is relocation of patients to different areas without informing the necessary health institution. Relocation is often necessary due to no job opportunities in the smaller town of the Makana area. People are often forced to move to bigger cities, like Port Elizabeth and East London, in search of more job prospects. This nomadic behaviour increases defaulting and, subsequently, the infectious rate, thereby negatively impacting cure rates and resulting in treatment failures.

Participant 1, when asked why the MDR-TB defaulter rate was high: *"I think most of them were relocated, then we can't follow up."*

Poverty is also linked to increased risks of substance abuse, high unemployment rates and a lack of education. These factors all then ultimately impact infectious rates and the possible outcomes expected.

Sub-theme: 1.2 Decreased immunity

Persons with a decreased immunity were associated with MDR-TB development. Environmental factors that lead to decreased immunity in the study population, as alluded to by the participants, are poor nutrition, HIV infection and defaulting of sensitive TB treatment. These were the results of poverty and lack of education experienced in this area.

Participant 6: *"Ventilation, the diet, if your immune system is not strong or adequate to fight infections, then obviously, your chances of contracting MDR-TB all the time is likely."*

Participant 7: *"But mostly, I think it's immunosuppression/ HIV, it plays a role, you know, like in people getting HIV, and we can talk about socio- economic status of most of the people*

that we see in the facility. People who are coming from one social backgrounds with poor housing facilities. So yeah, I think that these people are more predisposed people.”

Participant 12: *“As I’ve said before, most of our patients are unemployed. Most of them are living with parents or grandparents receiving a grant. So, food equality is very limited.”*

Sub-theme: 1.3 Stigma

Stigma was one of the core factors mentioned by both the patients and healthcare workers interviewed.

Participant 4: *“I did not tell any of my other family members, because at the time I was the only one who had TB. I thought they would blame me if they got TB.”*

Participant 10: *“Because once more some maybe they're fearing that once they disclose people isolate themselves to them so they will end up alone.”*

Participant 11: *“Stigma. Don't want people to avoid them or talk about them.”*

Participant 13: *“I think some people don't want to disclose because I think they're shy or not shy. They are afraid of stigmatization and others are afraid of say for instance, you have this group of friends, if I disclose to my friends now, I will lose some of them. Because some of them, some of them are not well educated.”*

In the small towns, which our participants are from, the communities are under the misconception that all patients who are infected with TB, and especially MDR-TB are HIV infected as well. Many participants feared that other people would be under this impression and talk about them. Rejection from family and friends could then follow, this resulted in delayed presentations and diagnosis and defaulting. Due to the multiple misconceptions in our communities, patients fail to disclose, as they are afraid of ending up alone due to the diagnosis. This leads to suspects not presenting for testing as well as defaulting.

Participant 6: *“Because of the stigmatization- because TB is, is it is an opportunistic infection of HIV. People stigmatize it and think if you have TB, you are most definitely HIV positive, which is not the case in all, in all cases. In most cases, yes, but that is because of stigma.”*

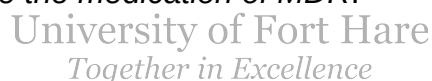
Another factor that was considered to contribute to the increase in stigma was the fact that, in the small towns of the Makana area, some of the clinic staff are related to persons infected. Fear then exists that these family members or friends would know about their diseases. This also contributes to avoiding clinics and increased defaulter rates.

Participant 13: *"Say for instance, I'm the nurse and I stay in this community in my community, and then my neighbor wants to go for testing. And then my neighbor will be afraid that I will talk about her status or if she if she has TB, or whatever. So, she just doesn't go for testing."*

Sub-theme: 1.4 Patients' attitude and lack of support

Patients' attitudes vary significantly. Some accepted the disease, while others were initially in denial. Fear caused delays in help-seeking behaviour. Some were under the impression that they were bewitched and consulted with traditional healers prior to getting medical attention. Even after diagnosis, many participants did not fully understand what MDR-TB was, due to a lack of education. Treatment side effect, especially nausea and vomiting, result in a negative attitude toward treatment.

Participant 1: *"Number one, I think they don't accept their status. They don't accept that they have MDR, or they don't like the medication of MDR."*



Participant 11: *"It's scary still, is not so much education. So, STB might be more acceptable, but MDR scary and worse because it is still an unknown disease out there."*

Focus group 1, no1: *"I did not understand I had TB, I thought of witchcraft."*

Family and treatment support are considered necessities by those interviewed to adhere to treatment. The participant with support is considered less likely default and more likely to have favourable outcomes.

Participant 5: *"Other people are not taking medication because they don't get that support from their families."*

Participant 6: *"So, if there's emotional support, if a family is able to assist you with dietary needs, and all of that, it will have a positive impact on your treatment. However, if you do*

not have support, if people do not know about your health status, how will they ask you questions. So therefore, disclosure do have an impact.”

Participant 13:” Some have families that, like I said, they cope, they cooperate very well, because they have family members that support them.”

Participant 19: “Those, as I said, those that disclose, they will think of their dignity. reason I'm saying that they will think that the care, by their family, their homes won't be the same as it used to be while there was still 100% percent healthier.”

Sub-theme: 1.5 Alcohol and substances

All participants identified substance use as a risk factor for acquiring MDR-TB and a predictor of negative outcome. As explained, when a person is intoxicated, one forgets to take medication, resulting in defaulting. Most persons drink so much that the next morning they are experiencing a hang-over and are too sick to take medication, therefore they skip it again. Drinking happens in taverns, groups and mostly in overcrowded areas.

In these places, no masks are worn; at the same time, cigarettes and glasses are shared. This results in spread of MDR-TB in groups of people. One participant had the following example:

“We buy two beers but only have one glass. Then that glass is shared. And people will not tell you they have TB, even if they know”

Participant 1: “Because they drink more than supposed to, then you can't follow through treatment. And alcohol affects the liver.” Alcohol affects the body organs and immunity of persons.

Participant 12: “Alcohol is a huge problem. Especially with our TB patients, because they will be defaulting their medication. And they'll end up being MDR to XDR eventually...”

Participant 18: “Because now you drink alcohol over the limit, and you don't drink your treatment. So, you are a risk for those you are drinking with.”

In conclusion, substances and especially alcohol, is a risk factor for acquiring MDR-TB and a factor associated with defaulting and negative treatment outcomes.

Sub-theme: 1.6 Prisoners

When talking about incarceration and prison inmates, there were two minds whether there is an increased risk or not. Those participants who have been in holding cells and prison before though said there is an increased risk of getting MDR-TB due to overcrowding and small cells (Table 3). Another factor mentioned was that there is a high prevalence of HIV in prisons, therefore, opportunistic infections like TB and MDR-TB will be prominent. It is said that many inmates do not disclose their illnesses and medication, this is, therefore, a medium for spread of MDR- TB.

Participant 12: *“Personally, I think they are more at risk. Because the standard of care in prisons compared to hospital settings are two different things. Prisoners are overpopulated prisoners doesn't receive at times the most proper care which you will receive outside. So, I believe they are more at risk.”*

Participant 13: *“Okay, the prison is obviously poorly ventilated, because the windows are high. They never go out. They're always indoors. They're always overcrowded. Okay. And they sleep close to each other.”*



Participant 18: *“Because if the patient is in prison, it is like the patient is in hospital patient taking his treatment. So, there's no risk for the others to get it.”*

Many of those participants who were not inmates before, believed due to screening processes, that those with symptoms would be separated and not in contact with the rest of the inmates. Therefore, they were less likely to get MDR-TB and less likely to default due to supervision. Therefore, there was not consensus reached.

4.3.2 THEME 2: ECONOMIC FACTORS INFLUENCING MDR-TB

Economic factors are factors that can influence a person's financial state and monetary availability. The economic factors identified by the participants were unemployment and job loss and health related expenses.

Sub-theme 2.1: Unemployment and job loss

Most patients are unemployed or become unemployed as the duration of illness and admission is long. Unemployment is identified by many participants as a risk factor - it is said when one is unemployed, they have a lot of time on hand. Therefore, they spend time

at taverns and overcrowded places. The unemployed also do not have money, therefore, there is always a lack of food and necessities, resulting in individuals going to multiple other people and homes to ask for assistance. Therefore, the unemployed are more exposed to communicable diseases like MDR-TB due to possible contact.

Participant 1: *“Most of them are unemployed, and those who are employed, become unemployed. Because they will be in the hospital for approximately four months. So then after the diagnosis, most of them do not have jobs.”*

Some participants, although unemployed, work piece jobs to support their families. This is their source of income. Once diagnosed, this source is lost, and their families struggle to maintain daily living requirements.

Participant 5: *“You know since I'm a person working at home, they are struggling for now. When I am not working the money stops.”*

For those who are employed, many employers are only worried about sick leaves and do not care about the physical wellness of the persons infected. Poor support from work colleagues is also part of the statements made by participants. Therefore, there is always a fear of being fired (Table 3): firstly, due to poor knowledge and stigma associated with MDR-TB in the workplaces and, secondly, because of the duration of the illness and infectiousness. This is attributable to a lack of knowledge and misconceptions associated with MDR-TB. Some persons are not infectious or have completed their treatment, but still, on return to work, they are ill-treated. This results in unhappy employees who resign and end up unemployed. And the financial burden increases.

Participant 5: *“My manager, she was only phoning me asking about a doctor's certificate. Not asking how I was.”*

When asking participants if there are any specific types of jobs that place a person more at risk of acquiring MDR TB multiple sectors were mentioned as being at increased risk. Healthcare professionals and those people working in facilities like clinics and hospitals were seen as having increased risk due to daily exposure. Another section was the construction area, painters and those working in freezers, who are seen to be affected due to the fumes and exposures to cold. Persons who work in factories and overcrowded areas were seen as

more at risk of exposure and infecting colleagues. One participant also thought that working hours, e.g., working night shifts would disrupt schedules and increase risk of missing medications; therefore, there is a higher risk of defaulting.

Participant 2: *"You know, because I default before. I can't speak for other people; I speak for myself okay. Wait before- maybe sometimes I'm working nighttime anywhere."*

Participant 7: *"Being a healthcare worker, working in a crowded place- like mines or like taxi drivers, like, so there are many occupations, which predispose you or put you in the front line of contracting TB."*

Participant 12: *"I'm going to talk about the nursing profession. Okay. Obviously, before COVID-19 We were not wearing masks in the primary care setting. So, you, you were diagnosing people with clients who have TB, so in that manner, I will say that health care workers are more at risk of contracting TB than in the general population."*

Sub-theme 2.2: Health related expenses

The main financial factor identified as hindering presentation, diagnosis and continuation of care is the distance from local clinics for participants (Table 3). Money is required for transport or taxis to these facilities. This is mentioned by most of the participant as a reason for the delay in diagnosis and, subsequently, a risk factor for defaulting. Health facility distance and associated transport constraints and the lack of fund increase the number of poor outcomes for MDR-TB. There is also a lack of community healthcare workers in remote areas and mobile clinics usually only visit an area once a month, transport is, therefore, a necessity to access healthcare facilities.

Participant 11: *"...distance to and from getting to hospitals to collect the medication results in defaulting"*.

Participant 13: *"Okay, say for instance, they must pay for transport or whatever. Like we said in the first one. Some don't always have money for taxis, and some don't have transport to go."*

Many of the medications are taken with food, and as mentioned by the healthcare workers who were interviewed, a specific diet is needed. Therefore, patients must have money available to maintain their dietary needs.

All medication is supplied, free of charge for the duration of treatment. While admitted at the TB hospital, all food and basic needs is supplied. Once discharged, most participants were receiving disability grants that assisted in activities of daily living. However, this money is misused at times; more often than not, unfortunately, recipients do not use it for transport or food, but buy alcohol, cigarettes, and other substances.

4.3.3 THEME 3: OTHER FACTORS INFLUENCING MDR-TB

Other factors are those factors contributing to the increased incidence and possible poor outcomes of MDR TB. Healthcare workers impact and attitude and the effects of the covid-19 pandemic were highlighted as additional factors influencing the incidence and outcomes of MDR TB.



Sub-theme:3.1 Healthcare workers impact and attitude

The attitude of healthcare workers is mentioned numerously as a contributing factor to why patients avoid health institutions and, eventually, end up defaulting (Table 3). The main factor is the lack of empathy and support seen at primary care level and the long waiting times. There is also a notion that there is only one nurse working with TB and, when that specific person is not there, all the information and care is not adequate.

Participant 4: *"Sometimes it appears as if they (healthcare workers) do not care about you. That is how my shoes were lost also. I came here bare feet. It is not easy. You wait forever there."*

Participant 5: *"And another thing people don't want to test, if nurses can... If nurses can be professional and don't disclose. And if one nurse is not at work, they will close their office with all the information in there."*

Participant 19: *"People do want to go to the clinic doc. But the thing is, in our clinics, you get gossipers. You will go there and produce a sputum just get the results-results will come. The person who works there will go out and talk about your name. So that dignity thing. (Okay,*

so yes, yes. *Stigma related.*). So that is, that's some of the reasons why people don't want to go to the clinic."

Participant 7: *"There's a lack of, or no community health care workers, which actively go to educate people for TB and screen people for TB. That is another challenge. You see, because we end up now having to, to wait or someone must get sick to go to the clinic. If we could have continuous screening of people in the community, I think we can find more cases."*

Focus group 1, no4: *"There is discrimination at the clinics"*

In the specific clinics and hospitals, where the attending healthcare workers were understanding, supportive and informative, the patients felt at ease and care. In these institutions patients were not afraid to present and to return when they were not doing well. Therefore, this indicates that the attitude of the healthcare workers has an enormous effect on the presentation and compliance of patients.

Sub-theme: 3.2 Covid-19 pandemic

The Covid- 19 pandemic has influenced MDR-TB in numerous ways. Firstly, due to some of the restrictions, specifically the wearing of masks, social distancing practices and alcohol bans have also resulted in decreased diagnosis of MDR-TB. Whether this is a true reflection of what was happening, and that the infection control practices that were applied for Covid-19 had a positive impact, is not yet established. There is also the belief that due to fear of acquiring Covid-19 at health institutions, patients avoided going for testing. Therefore, this could also be why the incidence decreased during the intense lockdown (level 4 and 5). Another problem during this pandemic, was the restriction on outreach activities, meaning outpatients on MDR-TB treatment was reviewed less often, and this has resulted in a higher defaulter rate.

Participant 6: *"No, especially with COVID. Now, people are scared, people do not want to come to the clinic. So, people will stay with their symptoms for a long time. Until they are, they are extremely sick, when it is too late, and then only leave to the clinic or they will go to the hospital, where they will be tested."*

Participant 11: *"I know obviously with COVID now... there's a lot of attention being put on testing for that, forgetting about TB. Especially because our Primary Health Care clinics are doing a lot of the testing and a lot of the first contact with the patient. There's a lot of delays, education, they don't know so much, or don't put too much focus on it. And so, they miss it."*

4.4 Chapter summary

The result highlight multiple contributory factors influencing the rate and outcomes of MDR-TB. Social problems are common problems affecting the majority in a society. The social areas highlighted by the study participants as affecting the incidence and outcomes of MDR TB were housing and relocation, decreased immunity, stigma, patients' attitude and lack of support, alcohol and other substance usage and prison/ incarceration. The economic factors identified by the participants were unemployment and job loss and health related expenses. The healthcare workers impact and attitude, and the effects of the covid-19 pandemic were highlighted as additional factors influencing the incidence and outcomes of MDR TB



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CONCLUSION, LIMITATIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter presents the summary, conclusion, and recommendations from the research.

5.2 Discussion

This study explored the socio-economic factors that impacted the incidence and outcome of MDR-TB in the Makana Sub- district of the Eastern Cape. It is important to identify these contributing factors in this setting to develop strategies and interventions to curb the spread and halt the defaulting rate.

Risk factors for MDR-TB infection include the previously treated for TB; male gender was also seen as an independent risk factor. The reasons for males being at higher risk for MDR-TB was not clear and, as such, require further investigation. Some of the reasons could be due to cultural activities, more males than females using alcohol and visiting overcrowded places like taverns. The South African National HIV, Incidence, Behaviour and Communication (SABSSM) 2008 survey showed that alcohol use was reported by 41.5% of the men and only 17.1% of women (Peltzer, Davids & Njuho, 2011). Overall, males smoke between 27% and 36% more than females (Boachie & Ross, 2020). Smoking is a huge contributor to preventable diseases (Groenewald et al., 2007). The differences in the traditional type of working environments based on gender also need to be taken into account, as, for example, males are more likely to work in the construction industry, therefore, would be more exposed to dusty, cold conditions and environments with fumes and toxins (Budlender, 2011).

Most of the MDR-TB infected participants were from the Grahamstown (Makanda) area. This could be seen as the area serving a huge amount of the population in the Makana area and, therefore, more infected individuals are detected. This is, however, based on speculations; further in-depth research into the reasons would need to be done.

The study had three major themes that were identified, including social factors, economic factors, and other factors. The major contributing factors identified were stigma, housing, substance abuse, poverty, and unemployment. These factors were all linked to the increased risk of acquiring MDR-TB, as well as associated with defaulting and poor treatment outcomes.

South Africa is characterised by a high unemployment rate and high-income gap; it is recorded that over half of the South African population is living under extreme poverty (Budlender, Leibbrandt, & Woolard, 2015). Poverty is one of the major contributing factors associated with increased incidence and poor outcomes of MDR infected individuals. Most of the other factors are somehow linked to poverty. Unemployment and lack of formal education lead to poverty. This, in turn, results in bad housing, staying in informal settlement that have poor water and sanitation facilities, if at all, poor ventilation and are overcrowded. Therefore, individuals of lower social economic class are more at risk of acquiring MDR-TB due to the daily living conditions. According to Thomas et al. (2016), tuberculosis arises more often among low-income people occupying congested areas and persons with little schooling. Poverty goes hand in hand with a lack of proper nutrition, as there is no money available; hence an increase in substance abuse by these individuals to forget or ignore the problems they face. This results in decreased immunity, as well as higher likelihood of defaulting MDR-TB medication. Poverty is, therefore, the main contributing or risk factor then, leading to a spiral of events that increase the likelihood of individuals getting infected and leading to a higher risk of potentially defaulting.

Furthermore, this study highlighted the importance of social support and the lack thereof resulted in treatment interruption and defaulting. The lack of social support was due to the stigma associated with MDR-TB and the linkage of TB with HIV. Since TB is one of the opportunistic infections, it is automatically assumed that all patients who are infected are also HIV infected (Daftary et al., 2021). This was not only associated with family and friends, but was also seen in the manner the patients experience care by healthcare workers and how they were treated. Stigma, therefore, resulted in delayed presentations, patients isolating themselves due to fear of rejection or of being blamed for other individuals who also acquire MDR-TB. Multi- Drug-Resistant Tuberculosis (MDR-TB) patients would readily isolate themselves to avoid infecting other members of the family (Thomas et al., 2016). This could have a detrimental outcome for the infected individual but also for the surrounding family and community exposed to that individual. It is, therefore, of utmost importance to counsel infected individuals, their families, as well as the local clinics, to avoid these problems.

A lack of knowledge about the disease and the severity and infectiousness was also a principal factor. This was due to most infected individuals not having much formal schooling. Even in cases of those individuals who were employed, the work colleagues and employers

were misinformed and displayed a lack of knowledge about MDR-TB. Consequently, it led to the spread of the infection, non-adherence to medication and, at times, loss of employment. Job loss again leads to poverty, which spirals the events. For the MDR programme to succeed, it requires empathetic and supportive family as well as community awareness and education about the disease (Daftary et al., 2021).

Most of the infected individuals in the present study are unemployed, if we delve deeper into the why, this could be attributed to many factors. Firstly, South Africa has a high unemployment rate (Budlender, 2011), specifically in the smaller towns which have a lack of opportunities. These individuals might feel like failures and misuse and abuse substances like alcohol. Sitting in overcrowded places, taverns and living promiscuous lives increases the risk for HIV, MDR-TB is an opportunistic infection associated with stage 4 HIV. This means that it especially occurs in individuals that have a high viral load and decreased CD4 count (Holmes et al., 2006). These are the individuals who default.

During the past two years, COVID- 19 has been a prominent discussion point, influencing the livelihood of all individuals. Many individuals had job losses, family losses and increased psycho-social stressors (Lentoor & Maepa, 2021). These could be seen as risk factors for acquiring MDR-TB. However, there has been a slight decrease in the incidence of MDR-TB during the intense lockdown periods (Bentivegna, Luciani, Arcari, Santino, Simmaco & Martelletti, 2021). MDR-TB and Covid-19 are both respiratory tract infections with similar modes of spread. South Africa's experience with large-scale HIV and tuberculosis epidemics, therefore, established the groundwork for the country's swift and early community-based response during the COVID- 19 pandemic (Abdool Karim & Abdool Karim, 2020). The regulations that were implemented for Covid-19 prevention i.e., social distancing, mask wearing, sanitizing and limitation to crowds, would, therefore, also have been effective in preventing MDR-TB transmission. Another factor is the immense fear the local citizens were faced with due to the emergence of this pandemic. Fear to go to health institutions or present with symptoms. Fear of being exposed or being infected with Covid-19. During the lockdown, access to medical care for non-COVID-19 diseases was limited, with health facilities reporting a decrease in the number of TB and HIV patients who received their medication on time (Karim & Karim, 2020). Therefore, there could be a wrong impression of the incidence going down, but it could just be due to people not presenting And, instead, staying at home with their symptoms due to fear. Further investigation is, however, needed

to establish the linkage and effects of these two communicable diseases on each presentation and incidence.

Healthcare workers play such a key role in the diagnosis, care, and management of MDR-TB patients. The attitude of healthcare workers is a principal factor in the identifying and retaining of patients. If a patient receives a bad or unprofessional experience from a clinic or hospital, the patient is less likely to present again or to go for follow up visits. Studies globally have found that health care workers do not always have adequate knowledge for the control and management of MDR-TB (Malango & Adebajo, 2015). However, if patients has a good experience, they are more likely to present and comply. Such patients are also more likely to spread a cheerful outlook about the institution and, in turn, encourage other friends, family, and community members. The attitude of the HCWs can, thereby, make or break the programme and the outcomes thereof.

5.2.1 Comparison of the findings from qualitative data analysed with that of the published review

A scoping review was conducted by Cannon, Oladimeji and Goon (2021), focussing on the socio-economic factors that influenced DR-TB in the African setting. In a comparison of the current finding from the qualitative data collected with the findings of the aforementioned review, many similarities were identified.

Both the scoping review and the current study had overlapping social factors identified in the themes i.e., poverty, substance use and abuse, as well as stigma. Stigma was identified by both the findings as a major factor limiting the case findings, as persons fear the impact their presentation might have on their lives. The overlapping fear was that of rejection by those closest to you. Substance abuse and use was a risk factor in both the Makana community, as well as the study in the African setting. It was also seen as a predictor for poor outcomes in both settings. However, the current findings from the study conducted in the Makana region also include patients' attitude and lack of support, as well as decreased immunity as additional factors that are associated with an increased incidence. These were not identified as main themes in the African setting scoping review.

Regarding the economic factors identified, transport cost that limited case findings and increased defaulter rate was a key finding in both the Scoping review and the current study. Associated job loss was the other factor that was identified as a contributing factor. This

overlapped in both studies. The Scoping review mentioned that, in African countries, there are other associated care related cost that patients face. However, in the findings from the Makana study, it was clear that all medication and basic needs are covered for the patients that are initially admitted and, thereafter, they receive disability grants to assist in needs upon discharge. In conclusion, the findings from this research study, correlate with other findings in the literature.

5.3 Limitations of the study

Results produced from this study may be unique to this study setting and may not be readily generalized to other settings. However, results will be applicable in most developing countries with a high Drug-Resistant burden. Qualitative methods were used, which has its limitations, i.e., high volumes of data that can be time-consuming and the subjectivity of the interviewer. Interviews varied based on availability and resources of participants.

5.4 Conclusion

MDR-TB is a complex disease with multiple contributing factors, a disease that can not only be dealt with on a clinical/ physical manner. MDR-TB has long durations of treatment, multifaceted treatment modalities and multiple socio-economic influences. MDR-TB, therefore, needs a bio-psycho-social approach to the management. The findings of this study highlight the impact of socio-economic factors on the incidence, spread, defaulter rate and outcomes of MDR-TB. The management of MDR-TB requires rigorous efforts that address the socio-economic factors. Therefore, important programmatic changes should be considered to address the socio- economic challenges that contribute to MDR-TB infection in the Makana community.

5.5 Future directions

Stigmatization and its linkage to MDR-TB is a major area to address. To address this, it is recommended that awareness campaigns and health education be done in the surrounding communities. Schools must be targeted for these types of campaigns. This is seen as a cost- effective manner, whereby the children can then teach the parents and grand-parents at home. Secondly, different work sections and big companies must be screened, and educational sessions done on a regular basis. More campaigns, like in HIV management, need to be done and increased radio and television exposure should be employed to increase the coverage.



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Inter-departmental collaborations are needed due to many factors necessitating addressing and a multi-sectoral approach is the only solution. Patients do not only have physical illness, but multiple other factors influence the “healthy human.” Therefore, a bio- psycho-social approach is the only solution in addressing the problems. A memorandum of understanding needs to be drawn up with all relevant departments. This includes the Department of housing, department of water and sanitation, SASSA, social development, home affairs, education department and local municipalities. The Department of Housing and rural development can ensure, even distribution of RDP houses. There must be systems in place to ensure those in dire need are first on the list for housing. SASSA and home affairs are needed to ensure all infected individuals have Identity documents and that disability applications are fast tracked. It is also suggested to give food parcels or vouchers to stores, then disability grant. This could be a control to avoid misuse of grant money.

TB focal nurses have to be appointed at local clinics again, however, information to also be shared with other staff members to avoid delays when one person is sick or on leave. Appointment of more community healthcare worker, especially in remote areas, is quite crucial. For door-to-door screenings, health educations and early identification of those infected and those defaulting is imperative. Also, the DOTS (directly observed therapy) to not be done at the clinic but in the community and at the homes of those infected. This will result in decreased defaulter rate.

Establishing of a treatment support on first presentation is also advised to ensure that there is accountability and a person to assist if there is loss to follow ups. Family support is a key factor in the retaining and successful outcome for patients. A social worker needs to be involved to ensure all psychosocial factors inhibiting adherence for e.g., alcohol and substance abuse can be addressed.

5.6 Chapter summary

This chapter summarises the different factors influencing MDR-TB and the linkage to increased incidence and poor outcomes. Recommendations are also given on programmatic strategies to consider in addressing the socio-economic challenges that contribute to the burden of MDR-TB infection in the Makana community.

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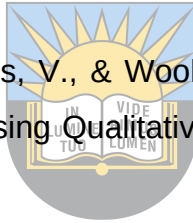
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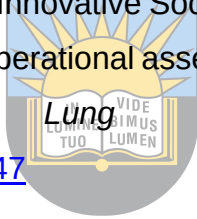
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Appendix 1: Informed consent

Informed Consent

MPH PROGRAMME, UNIVERSITY OF FORT HARE

TITLE OF STUDY: Socio- economic factors influencing Multi- Drug Resistant Tuberculosis, Makana District, Eastern Cape

RESEARCH ETHICS COMMITTEE'S APPROVAL NUMBER:

NAME AND AFFILIATION OF RESEARCHER (S): This study is being conducted by Dr. Lesley- Ann Cannon (Master of Public Health student) of the Public Health Department, University of Forte-Hare, Eastern Cape, South Africa.

PART A: INFORMATION SHEET



Introduction: We are researchers from the Public Health Medicine Department, College of Health Sciences at University of Forte Hare. We are conducting this research to explore the socio-economic factors influencing multi-drug resistant TB. We will be providing you with information on this research and invite you to participate in the research at your own will. You are being selected because you are eligible to take part in the study.

Purpose of study: The study purpose is to explore the socio-economic factors influencing the spread and outcomes of Multidrug-Resistant Tuberculosis (MDR-TB) in Makana District, Eastern Cape.

Participant's Initials: _____

Please read the information provided in this form carefully before you agree to take part in this study. Understanding the purpose of the research and what will be expected of you is an important concept to understand. I will read the information together with you and explain. However, if you have questions later, my contact details are on the last page of this document.

Study procedures: The researcher will conduct one on one interviews and focused group discussions with all consenting participants. During these interviews and discussions, tape recorders as well as a note pad will be used to document all discussions and observations. In the case of language barriers, an interpreter would be asked to assist. The one-on-one Interviews will last between 15 to 45 minutes, while focused-group discussions will take up to an hour. After the collection of information, it will be compiled to ultimately derive a report□□

Risks: This study does not involve any form of invasive procedure, such as needle prick, thus you will not experience pain. The researcher will only ask your health-related and socio-economic questions, either directly or in focused-groups discussions. After interviews, all data will be collected from your medical records; however, measures will be taken to ensure strict confidentiality of information you provided as a participant in this study.

Benefits: There will be no direct benefit to you for your taking part. However, we are hopeful that the information gathered from this study may assist in the improvement of policies and guidelines and the holistic management of patients. We are optimistic that findings will inform the development of new prevention strategies.

Cost and voluntariness of participation in this study: Your participation in this research project is fully voluntary and will not cost you anything.

Participant's Initials: _____

You will be required to sign a consent form, if you decide to participate. After you have signed this form, you are still free to withdraw from participation at any time, without providing a reason. Withdrawal from the study will not impact further

management at the institution or your relationship with the researcher. If you opt out of the study before data collection is completed, your data will not be used in the study.

Compensation: There will be no compensation for participation in this study.

Confidentiality: A locked cabinet will be utilized to keep all medical information; it will be stored in a locked cabinet. Results will NOT be available to people who are not part of the study, such as your friends, boss, and family. Your name will not be used in reports or papers. You will be allocated a study number. Your HIV status will not be disclosed to anyone outside this study. It is also important to note that your information will be kept strictly confidential, except in cases where the researcher is legally compelled to report an incident. These incidents can include, but may not be limited to, incidents of suicidal risk and abuse.

Contact of next of kin: We ask that you give us permission to contact a specific next of kin and the person's phone number, if we are unable to reach you for your incomplete information. The person you are selecting must agree to take phone calls from us only about matters related to this research.

Sharing the results when the research is over: The knowledge gained from this study will be shared with the ministry of health, stakeholders and other relevant health bodies. No confidential information will be disclosed. We also intend to publish the findings to improve management and control of MDR TB.

Participant's Initials: _____

Contact information: You can contact the researcher at any time, if you have any questions related to the study, or are experiencing negative effects because of participating in this study.

PART B: CERTIFICATE OF CONSENT

CONSENT

I have read, and I understand the provided information and have had the opportunity to ask questions. I understand that my participation is voluntary and that I am free to withdraw at any time, without a reason and without cost. I understand that I will be given a copy of this consent form. I voluntarily agree to take part in this study.

I hereby consent to take part in the study components marked “yes” or refuse to consent to participate in the components as indicated in the marked “no.”

Interviews -

Access to hospital records -

Contact next of kin/relative -



YES ☐ NO ☐

YES ☐ NO ☐

YES, ☐ NO ☐

Participant's signature _____ Date _____

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Investigator's signature _____ Date _____

RESEARCH CONTACT DETAILS

Principal Investigator Name: Dr Lesley-Ann Cannon

Institution: University of Fort Hare, Faculty of Health Sciences, East London

Tel : 073 393 6466/ 046 624 5306

Email : lesleycannon@outlook.com

Appendix 2: Interview Questions for MDR Patients

Interview Questions for MDR Patients

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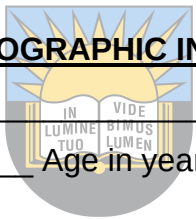
Instruction for interviewer: Please fill in the demographic information section for all participants and probe for responses from the participants in a manner that would encourage them to be at ease and provide rich responses.

Interviewer name (s):

Date:

Venue:

SECTION A : PARTICIPANT DEMOGRAPHIC INFORMATION

- 
1. Name of participant _____
2. Date of Birth _____ Age in years _____
3. Phone number _____
4. Phone number of next of kin/relative _____
5. Study ID _____
6. Sex: Male ☐ Female ☐
7. Hometown _____
8. TB contact: ☐ Yes ☐ No
9. TB history: ☐ Previous Sensitive TB ☐ Previous MDR TB ☐ Previous PRE- XDR TB
☐ Previous XDR TB

SECTION B: QUESTIONS ON SOCIAL FACTORS

1. What do you think are the reasons for getting MDR?
 - a. Probe to encourage the participants to discuss elaborately
2. How were you diagnosed?
 - a. Probe to encourage the participants to discuss elaborately on:
 - i. sign and symptoms experienced

- ii. First point of care visited (if hospital or traditional healer or any other...)
 - iii. If he/she delayed before enrolling in care, probe for reasons.
- 3. Have you disclosed your MDR status to your family and friends?
 - a. If so, since disclosing, how has the attitude been towards you?
 - b. If not, probe for what is hindering his/her disclosure.
- 4. What has been your challenges since MDR diagnosis?
 - a. Probe to encourage the participants to discuss elaborately.
 - b. Probe for support received from family and friends since diagnosis.
 - c. Probe for perceptions of quality of health care in terms of attitude of health care workers, cost of treatment, etc.
- 5. Are you an alcohol user?
 - a. If no to alcohol usage, further probe for why.
 - b. If yes to alcohol usage, ask - are you still drinking, since you have been in care? Further probe for reason why, if response is yes or no.
- 6. What area/ housing do you stay in?
 - a. Probe to get more than a yes or no response.
 - b. Probe for challenges experienced in current housing type.
- 7. Have you been in prison the past year?
 - a. If yes, probe to get more responses on why he/she was arrested and how family and friends have treated him since he/she was released from prison.

SECTION C: QUESTIONS ON ECONOMIC FACTORS

- 1. What economic factors has been challenging since MDR diagnosis?
 - a. Probe to encourage the participant to discuss elaborately, especially if he/she feels this would discourage him for continuing care.
- 2. Are you employed, if so, how has your diagnosis influenced your job?

- a. Probe to encourage the participant to discuss elaborately on how either being employed or unemployed has affected him/her since diagnosis
 - b. For those employed, probe for income/salary range.
- 3. What health related expenses have you incurred since diagnoses?
 - a. Probe to encourage the participants to discuss elaborately.
- 4. Are you able to maintain your food needs?
 - a. Probe to encourage the participants to discuss elaborately on the eating plan, type of meals (balanced diet), if he/she is the breadwinner that feeds the home and how this affects his eating habits etc.
- 5. Thank you for allowing us to interview you, one final question, is what do you think should be done to tackle the issues caused by MDR TB and how can the disease be prevented?



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Appendix 3: IsiXhosa Interview Questions for MDR Patients

Interview Questions for MDR Patients

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Instruction for interviewer: Please fill in the demographic information section for all participants and probe for responses from the participants in a manner that would encourage them to be at ease and provide rich responses.

Interviewer name (s):

Date:

Venue:

CANDELO A : IINKCUKACA ZOMTHATHI NXAXHEBA

- 
10. Amagama apheleleyo _____
11. Umhla wakho wokuzalwa _____ iiminyaka yakho _____
12. Inombolo yomnxeba _____
13. Inombolo _____ yomnxeba _____ yesizalwana _____ sakho/okanye
isalamane _____
14. Inombolo yocwaningo _____
15. ISINI: Male ☐ Female ☐
16. Idolophu ozalelwe kuyo _____
17. Ukhona umntu ohlala naye awakha wane TB? ☐ Yes ☐ No
18. Wakhe wane TB wena? ☐ Previous Sensitive TB ☐ Previous MDR TB ☐ Previous
PRE- XDR TB ☐ Previous XDR TB

CANDELO B: IMIBUZO NGENDLELA OHLALA NGAYO EKHAYA/EBUMELWANENI

8. Ucinga ukuba umguli wosuleleka njani kwi-MDR?
- a. Zama ukuncokola nomguli ukwengeza kulombuzo ungentla.
9. Ufunyaniswe njani ukuba une TB, MDR?
- a. Zama ukuncokola nomguli ukwengeza kulombuzo ungentla.

- i. Zeziphi iimpawu ozibonileyo?
- ii. Uye waya koluphi uziko lonyango (esibhedlele okanye exhelweni noba ekliniki)?
- iii. Ukuba ulibazisile uku ngenela uncwaningo buza izizathu.

10. Ukhona umntu oye wamchazela ukuba ugula nge MDR kwi family /abahlobo?

- a. Uba kujalo babonakalise uvelwano okanye Baku balekile?
- b. Ukuba awukachazeli mntu, woyika ntoni?

11. Zintoni ingxaki oye wahlangabezana nazo oko wathi waphathwa yi MDR?

- a. Zama ukuncokola nomguli ukwengeza kulombuzo ungentla.
- b. Zama ukuncokola nomguli ngokumbuza ngoncedo athe walufumana kwizihlobo nazalamane oko ethe wagula.
- c. Zama ukuncokola nomguli ngendlela aziva ngayo ngokwasempilweni ne ndlela abongikazi abamphatha ngayo xa ese kliniki.

12. Uyabusela utywala?

- a. Ukuba akabuseli utywala qinisekisa isizathu.
- b. Ukuba uyabuselea utywala mbuze ukuba asabusela nangelilixa agulayo. Qinisekisa izizathu zokusela noxa ekunyango.

13. Uhlala phi/endlwini okanye etyotyombeni?

- a. Zama ukuncokola nomguli ukwengeza kulombuzo ungentla.
- b. Zama ukuncokola nomguli, umbuze ngakumbi ngemeko yakhe yasekhaya.

14. Wawukhe wabanjwa wavalelwa entolongweni?

- a. Ukuba kunjalo, wawubanjelwe ntoni, kwaye izihlobo nezalamane zakho zazikuphethe njanil ngelaxesha ubusentolongweni, nangelilixa sele ubuyile?

CANDELO C: IINKCUKACA NGEZOMNOTHO NE NXASO

6. Zeziphi ingxaki oye wakhawulelana nazo okokoko wathi wane-MDR?

- a. Zama ukuncokola nomguli ukwengeza kulombuzo ungentla.

7. Uyaphangela/ukuba kunjalo esisigulo siwuchaphazela njani umsebenzi wakho?
- a. Zama ukuncokola nomguli ukwengeza kulombuzo ungentla.
 - b. Kwabo basebenzayo buza umvuzo/nokuba wanele na.
8. Zeziphi ingxaki ohlangabezana nazo ngokwasempilweni okokoko, wathi wagula?
- a. Zama ukuncokola nomguli ukwengeza kulombuzo ungentla.
 - b. Zama ukuncokola nomguli ukwenzela ukufumana ingcaciso ethe vetshe.
9. Uyakwazi ukuzithengela ukutya nezinye izinto ozifunayo?
- a. Zama ukuncokola nomguli ukwengeza kulombuzo ungentla.
 - b. Zama ukuncokola nomguli ukwenzela ukufumana ingcaciso ecacileyo ngesimo somguli sokuphila.
10. Ndiyabulela ngenxaxheba othe wayithatha ekuphenduleni lemibuzo, nangokuthetha ngesimo sakho. Ndiyabulela nangokundixelela uba ucinga ukuba singongeza phi okukhusela ulosuleleko kwi TB ne MDR-TB, kwaye zeziphi ezinye izinto esinokuzenza ukukhusela ukunwena kwesisifo.



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Appendix 4: Interview Questions for Healthcare Workers

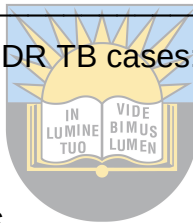
Interview Questions for Healthcare Workers

MPH PROGRAMME, UNIVERSITY OF FORT HARE

Please supply information where necessary and tick where appropriate.

SECTION A: DEMOGRAPHIC INFORMATION

1. Name of participant _____
2. Date of Birth _____ Age in years _____
3. Phone number _____
4. Study ID _____
5. Sex: Male ☐ Female ☐
6. Occupation: _____
7. Number of years working on MDR TB cases: ☐ More than 5 years ☐ More than 10 years.



SECTION B: SOCIAL FACTORS

1. What do you think are the reasons for getting MDR?
2. How does a patient's disclosure of his/her MDR status to their family and friends impact treatment?
3. What are some of the challenges related to MDR diagnosis?
4. What are some of the challenges related to MDR treatment and retention in care? (Also probe for loss to follow up experiences.)
5. Please share with me some of the attitudes of patients and their supporters while in care (also probe for the health care workers perception on why the patients have the attitudes been discussed).
6. How does alcohol use impact outcome and incidence?
7. How does housing impact on your patient's outcome and incidence?
8. Are prisoners more at risk of acquiring MDR-TB?
9. How do you think the social factors associated with MDR TB burden could be addressed?

SECTION C: ECONOMIC FACTORS

1. What economic factors challenge MDR diagnosis?
2. How does MDR diagnosis affect employment and vice versa?
3. What health related expenses do MDR patients face?
4. How does nutrition and food intake/or lack impact on MDR TB diagnosis and treatment outcomes among patients?
5. How do you think the economic factors associated with MDR TB burden can be addressed?



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Appendix 5: Ethical Clearance Certificate



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HEALTH RESEARCH ETHICS COMMITTEE

P.O. Box 1054
East London 5200
Tel: +27 (0) 43 704 7368
E-mail: dgoon@ufh.ac.za

ETHICAL CLEARANCE CERTIFICATE REC-100118-054

Certificate Reference Number: **Ref # 2020=10=07=CannonLL**

Project title: **Socio-economic factors influencing Multi- Drug Resistant Tuberculosis in Makana Sub- District, Eastern Cape**

Nature of Project: **Masters of Public Health**

Principal Researcher: **Cannon LL**

Student Number: **201907402**

Supervisor: **Dr KE Oladimeji**

On behalf of the University of Fort Hare Health Research Ethics Committee (HREC), I hereby give ethical approval in respect of the undertakings contained in the above-mentioned project and research instruments(s). Should any other instruments be used, these require separate authorization. The Researcher may therefore commence with the research as from the date of this certificate, using the reference number indicated above.

Please note that the HREC must be informed immediately of

- Any material change in the conditions or undertakings mentioned in the document
- Any material breaches of ethical undertakings or events that impact upon the ethical conduct of the research

The Principal Researcher must report to the HREC in the prescribed format, where applicable, annually, and at the end of the project, in respect of ethical compliance.



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HEALTH RESEARCH ETHICS COMMITTEE

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The HREC retains the right to

- Withdraw or amend this Ethical Clearance Certificate if
 - Any unethical principles or practices are revealed or suspected
 - relevant information has been withheld or misrepresented
 - regulatory changes of whatsoever nature so require
 - the conditions contained in the Certificate have not been adhered to
- Request access to any information or data at any time during the course or after completion of the project.
- In addition to the need to comply with the highest level of ethical conduct principal investigators must report back annually as an evaluation and monitoring mechanism on the progress being made by the research. Such a report must be sent to HREC monitoring@ufh.ac.za.

The Ethics Committee wishes you well in your research endeavours.

Yours sincerely

Professor DT Goon
Chairperson: HREC
14 October 2020

Appendix 6: Marjorie Parrish TB Hospital permission letter.



Marjorie Parrish TB Hospital, 43 Old Air School, Bathurst Road, Port Alfred,
Private Bag / Ingxowa, Eyodwa X 154, Port Alfred 6170,
Telephone: 046 624 5306 / 7 / 8, Fax: 046 624 5319

November 2020

RE: PERMISSION TO CONDUCT RESEARCH AT MARJORIE PARRISH TB HOSPITAL

I acknowledge that Dr Lesley- Ann Cannon is employed as a Medical Officer by the Eastern Cape Department of Health and is requesting permission to conduct research at Marjorie Parrish TB Hospital for her study titled : " Socio- economic factors influencing Multi- Drug Resistant Tuberculosis In Makana Sub – District Eastern Cape."

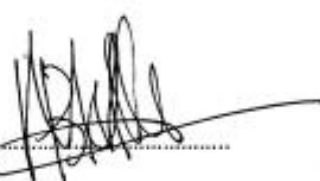
Dr L Cannon has stated that the study will make use of a qualitative study design. Interviews and focus-group discussions will be conducted to allow in- depth views and opinions of participants, in order to describe the socio- economic factors influencing the spread and treatment outcomes of Multi- Drug Resistant TB in this area.

Ethical approval has already been received from The University of Fort Hare. Certificate reference number: Ref # 2020= 10= 07= CannonLL.

With ethics approval obtained and application from the Department of Health in process, I hereby grant Dr Lesley-Ann Cannon permission to conduct the above study at Marjorie Parrish TB Hospital.

Regards

Signed,


DR M BOTHA
ACTING CEO
MARJORIE PARRISH TB HOSPITAL

04.12.2020
DATE

Appendix 7: Permission from Department of Health



Enquiries: Yvonne Gxosha

Tel no: 079 074 0859

Email: Yvonne.Gxosha@echealth.gov.za / yvongxosha@gmail.com

Date: 12 December 2020

RE: Socio-economic factors influencing Multi- Drug Resistant Tuberculosis
In Makana Sub- District, Eastern Cape. (EC_202012_005)

Dear Dr Lesley-Ann Cannon

The department would like to inform you that your application for the abovementioned research topic has been approved based on the following conditions:

1. During your study, you will follow the submitted protocol with ethical approval and can only deviate from it after having a written approval from the Department of Health in writing.
2. You are advised to ensure, observe and respect the rights and culture of your research participants and maintain confidentiality of their identities and shall remove or not collect any information which can be used to link the participants.
3. The Department of Health expects you to provide a progress update on your study every 3 months (from date you received this letter) in writing.
4. At the end of your study, you will be expected to send a full written report with your findings and implementable recommendations to the Eastern Cape Health Research Committee secretariat. You may also be invited to the department to come and present your research findings with your implementable recommendations.
5. Your results on the Eastern Cape will not be presented anywhere unless you have shared them with the Department of Health as indicated above.

Your compliance in this regard will be highly appreciated.


SECRETARIAT: EASTERN CAPE HEALTH RESEARCH COMMITTEE

TOGETHER, MOVING THE HEALTH SYSTEM FORWARD



Appendix 8: Journal manuscript (PUBLISHED)

Cannon et al. *BMC Public Health* (2021) 21:488
<https://doi.org/10.1186/s12889-021-10267-0>

BMC Public Health

RESEARCH ARTICLE

Open Access

Socio-economic drivers of drug-resistant tuberculosis in Africa: a scoping review



Lesley-Ann Lynnath Cannon*, Kelechi Elizabeth Oladimeji and Daniel Ter Goon

Abstract

Background: Drug-resistant TB (DR-TB) remains a public health concern due to the high morbidity and mortality rates from the disease. The DR-TB is a multifaceted illness with expensive treatment regimens, toxic medications and most often the long duration of treatment constitutes a substantial financial burden on both infected patients and the health system. Despite significant research advances in the diagnosis and treatment, there is a paucity of synthesized evidence on how socio-economic factors are associated with DR-TB. This review aims to address this gap by synthesizing available evidence and data on the common socio-economic drivers of DR-TB infection in Africa.

Methods: A systematic search was conducted on PUBMED and Google Scholar databases from January 2011 to January 2020 using Joanna Briggs Institute's scoping review approach. An updated search was conducted on 21 September 2020. The eligibility criteria only included systematic reviews and studies with quantitative research methods (cross-sectional, case-control, cohort, and randomized-control trials). Studies conducted in Africa and focusing on socio-economic factors influencing DR-TB burden in African countries were also considered. Data was extracted from all the studies that met the eligibility criteria based on the study's objectives.

Results: Out of the 154 articles that were retrieved for review, 20 abstracts of these articles met all the eligibility criteria. Of the 20 articles, 17 quantitative and 3 reviews. Two additional articles were found eligible, following the updated search. The following themes were identified as major findings: Social and economic drivers associated with DR-TB. Substance abuse of which, stigma and discrimination were the prominent social drivers. Economic drivers included poverty, financial constraints because of job loss, loss of productive time during hospital admission and treatment costs.

Conclusion: This review has highlighted which socio-economic factors contribute to DR-TB. This is relevant to assist DR-TB management program and TB stakeholders in different settings to address identified socio-economic gaps and to reduce its negative impact on the programmatic management of DR-TB. Therefore, redirecting strategies with more focus on socio-economic empowerment of DR-TB patients could be one of the innovative solutions to reduce the spread and eliminate DR-TB in Africa.

Keywords: Drug-resistant TB, Socio-economic drivers, Africa

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Hare, East London, 5200 Eastern Cape, South Africa



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Background

Tuberculosis (TB) is a global public health concern and one of the leading causes of morbidity and mortality worldwide [1–3]. Drug-resistant TB (DR-TB) has evolved due to a high TB defaulter rate, leading to complications with TB diagnosis and case management especially in low- and middle-income countries [4–6]. As described in the World Health Organization (WHO) global TB report for 2019, roughly 500,000 persons (range 417,000–556,000) developed or acquired rifampicin-resistant TB (RR-TB) and of these, 78% had multidrug-resistant TB (MDR-TB). Of all newly reported TB cases globally, a projected 3.4% had RR-/MDR-TB while among previously treated patients, 18% had RR-/MDR-TB [7]. Further, there is an increase in DR-TB case notification worldwide as indicated in the total number of 186,772 cases of MDR/RR-TB detected and notified in 2018 when compared to the 160,684 notified DR TB cases in 2017. Similarly, increased number of DR-TB cases (156,071 in 2018 compared to 139,114 in 2017) commenced treatment. Even with this increased number placed on treatment, treatment success globally remains low, at 56% [7].

The precise burden of DR-TB in the African countries is poorly described; with only 51% of countries having done official reviews [8]. Thus, DR-TB is commonly missed in Africa and this looms prospects to attain the year 2035 targets of the End TB strategy [9]. This can lead to difficulty in estimating the accurate degree of the problem in the African Region. Available data reveals that between 36,000 and 44,000 MDR-TB cases were reported in the AFRO Region in 2016 and of these, 15% of new MDR-TB patients were found to have RR [3]. Empirical evidence indicates that DR-TB is a multifaceted illness with expensive treatment regimens, toxic medications and long duration of treatment creating a substantial financial burden on the health system [10, 11]. Consequently, socio-economic status, job loss, overpopulation, poor hygiene, immunocompromising illnesses and malnourishment have been identified as risk factors that influence this disease burden hence it is commonly referred to as the disease of the poor [12]. Other facilitators of the disease burden influencing the disease management and outcomes include treatment inaccessibility and distance to the healthcare facility, transport expenses and costs experienced during hospitalization [9, 13–15]. Though significant research developments have been made in the diagnosis and treatment aspects of DR-TB [16], research focused on socio-economic factors associated with DR-TB are limited.

Scoping review research question

Drug resistant TB is a huge public health problem as discussed, hence this review set out to answer these questions:

- 1) What are the social factors that contribute to the burden of DR- TB and treatment outcomes in Africa?
- 2) What are the economic factors influencing the burden of DR-TB and treatment outcomes in Africa?

Scoping review objective

The objective of this review was to synthesize published articles to identify socio-economic drivers contributing to the burden of DR- TB in Africa.

Methods

This scoping review was conducted using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) for scoping review [17] and framework by Joanna Briggs Institute (JBI) [18]. This review was not registered in the Prospective Register of Systematic Reviews (PROSPERO) since it is a scoping review and not a systematic review. However, there is the prospect of change in trend where registration for scoping review becomes mandatory in databases like PROSPERO, Open Science Framework and Figshare [18]. This scoping review was therefore registered in the Open Science Framework (<https://osf.io/m23pk>).

Search strategy

PubMed and Google Scholar databases were searched to retrieve articles published between the year 2011 and 2020. Accordingly, only studies meeting the eligibility criteria discussed below was included in the review. The initial search was done on 7 January 2020 and an updated search on 21 September 2020. The following search terms and keywords were used; socio-economic factors, drug-resistance TB, multidrug-resistant tuberculosis, extremely/extensively drug-resistant TB, Africa, social factors, economic factors, contributing factors, and risk factors. During the data sources search process, sorting by year of publication was first applied and next, we only considered the first 10 pages of the search results due to multiple similarities (duplicates) and unrelated articles (not about TB/ not SES).

Eligibility criteria

Inclusion criteria

Since this is a scoping review, we used the PCC (Population / Concept / Context) framework recommended by JBI [18] to identify eligible studies as discussed below.

- **Population (P)** – Drug Resistant TB patients
- **Concept (C)** – quantitative studies investigating the influence of socio-economic factors/ drivers/ status on treatment outcomes such as adherence/ cure and treatment completed rates/ Death rates/ Reinfections.
- **Context (C)** – we carried out our search process between 1 January 2011 to 7 January 2020. Only cohort, case-control, cross-section studies and systematic reviews evaluating socio-economic factors influencing adult DR-TB patients from African countries were included for further screening and synthesis. An updated search was carried out on 21 September 2020.

Exclusion criteria

- 1) Publication not peer-reviewed
- 2) Studies on drug sensitive TB and general TB were excluded
- 3) Other reviews (editorial, commentaries), book chapters, editorials, letters, and conference abstracts.
- 4) Publication of any other language than English.
- 5) Qualitative studies
- 6) Studies including children under 12 years and participants in prison.

Selection process

We adopted a selection process described by the Joanna Briggs Institute online manual. Two reviewers

independently searched for articles using the eligibility criteria. Articles retrieved were exported into MS Excel sheet by both reviewers and assessed for duplication and eligibility. There were no discrepancies in articles selected and screened for inclusion in this review.

Data extraction and analysis

Two review authors (LLC/ KEO) independently screened titles and abstracts of the articles for eligibility using the earlier discussed criteria. Full text screening was then further carried out on identified eligible studies from title and abstract screening. Both the reviewers selected the studies based on full text review. Data was thereafter extracted based on the aim of this study and thematically analyzed. The data extracted is presented in Table 1 and [addendum 3](#) and includes author(s)/, year of publication, country of origin (where the study was published or conducted), methodology, study population, objectives, findings, implications and main SE factors. Themes that emerged will be discussed in the findings and discussion section.

Results

Search outcome

The search process yielded 388 articles on PubMed and 57,560 on Google Scholar on the 7th January 2020 ([Addendum 1](#)). After screening of the titles of these records- 154 articles were selected. From the 154 articles retrieved, 91 were from Google Scholar and 63 from PubMed. Forty-two of these were found to be duplications and removed. The 112 remaining

Table 1 Characteristics of the study population

Characteristics	N	%	Citation
Mean age	33, 7	–	[19–37]
Sex			
Male	276,751	66,9	[19–36, 38–40]
Female	137,025	33,1	[19–36, 38–40]
Type of DR TB			
RR/ MDR	2173	0,5	[19–35, 38, 39]
PRE- XDR	104	0, 03	[19–35, 38, 39]
XDR	330	0,08	[19–35, 38, 39]
Mono drug resistance (other than RIF)	136	0,03	[19–35, 38, 39]
Polli drug resistance)	18	0,004	[19–35, 38, 39]
STB/ controls	2473	0,5	[19–35, 38, 39]
DRTB type not indicated (no breakdown)	408,542	98,7	[36, 37, 40]
Duration of study – Average duration of studies	32 months	–	[19–40]
Treatment outcomes			
Favourable (Cured/ Treatment completed)	89,410	21,60	[29, 31, 33, 37]
Unfavourable (Died/ Defaulted/ LTFU/ Failed/ relapse)	66,063	15, 96	[29, 31, 33, 37]
Transferred out	8	0,002	[31]
Treatment outcome not evaluated in study	258,295	62,42	[30, 32, 34–36, 38–40]

articles were screened for appropriateness. Seventeen articles were removed based on qualitative study design. The 95 remaining articles (19 reviews and 76 quantitative studies), full papers were reviewed and further assessed for eligibility. For articles where the full text was not available, we used the Sci Hub website to retrieve the full text. Of the 95 articles whose full texts were screened, only 20 were found eligible and further assessed. Thus, a total number of 75 articles were further excluded as can be seen in [Addendum 2](#). Out of the excluded articles, 59 were quantitative articles and involved 4 children < 5 years; 23 not Africa; 18 general/ Drug-Sensitive TB (DS-TB); 11 other factors- clinical; 1 isoniazid-resistant (INH) resistance; 2 XDR with unrelated content and 16 reviews excluded: 5 general- DS-TB; 4 other factors-clinical; 3 not applicable; 1 epidemiological study; 3 not systematic reviews. An updated database search was conducted on the 21st of September 2020 to identify the latest research on the topic. The search yielded 26 new articles in PubMed and 2639

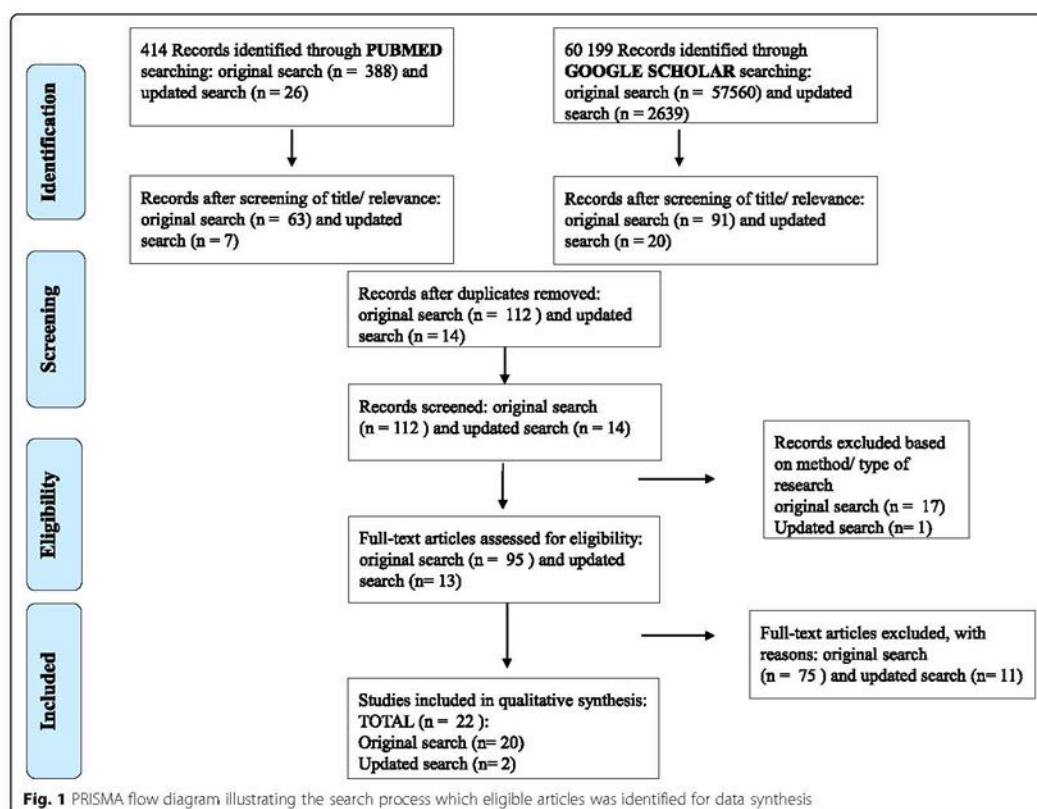
in Google Scholar ([Addendum 1](#)). These articles were screened for eligibility as presented in Fig. 1. Only 2 of the articles were identified as eligible. Figure 1 below presents a schema for the search process and the outcome of the article selection process.

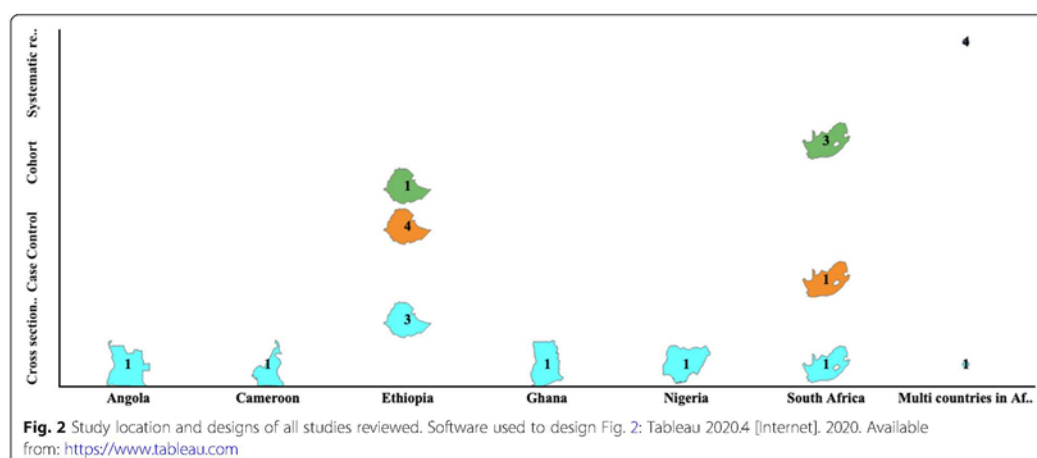
Study setting of reviewed articles

Among the 20 eligible articles selected for review, eight studies (7) were conducted in Ethiopia, five (5) in South Africa and then respectively one (1) in each of the following countries: Cameroon, Nigeria, Ghana, and Angola. The three systematic reviews and one (1) cross-sectional study featured more than one nation all including Sub Sahara African countries. The 2 eligible articles in the updated search were done in Ethiopia (cross-sectional) and Sub Sahara African countries (systematic review). This is illustrated in Fig. 2.

Summary of the studies reviewed

Table 1 presents the characteristics of the study population. [Addendum 3](#) shows a summary of all 22 eligible





articles, with specific focus on the main objectives and socio-economic factors that influence DR-TB. Of these selected studies, sixteen (17) were quantitative and three (3) were systematic reviews. Of the 17 quantitative articles, 5 were case controls, 4 cohort studies, 8 cross-sectional. These studies broadly focused on socio-economic risk factors, social issues, and financial issues. Eleven (11) of the articles reviewed focused on only social aspects, four (4) only on financial/ economic issues and five (5) articles covered both social and economic aspects. Of the selected articles, with the updated search one (1) was a cross-sectional study focusing on social aspects and a systematic review covering both social and economic aspects.

Emergent themes from studies reviewed

1. Social issues influencing MDR-TB

Thirteen studies identified in the initial search and both the studies in the updated search looked at the social issues influencing MDR-TB. This included apprehensions on stigma and prejudice, the impact of ethanol on the management of MDR-TB, low educational level, overcrowding, lack of treatment support and problems related to MDR-TB/HIV coinfection.

- **1.1 Substance use and abuse:** Five articles on treatment outcomes among the eligible studies found that alcohol consumption influenced MDR-TB. Alcohol consumption was found to be a predictor of MDR-TB poor treatment outcomes [21], while substance use was observed to cause poor adherence to treatment [40]. Hence, substance

use and abuse were identified as risk factors for MDR-TB acquisition or development and conversely, alcohol consumption was associated with treatment default and failure rate among new DR-TB cases [28].

- **1.2 Poverty:** The highest rates of DS-TB and DR-TB were discovered in the disadvantaged settings of the community such as the rural areas, overcrowded households and congested areas [19, 23, 38]. Biru et al. (2020) found that residing in a one-roomed house is an independent factor related to DR-TB [36]. Low-income people and persons with little educational exposure had an increased risk of infection [35, 40]. Poverty may result in poor nutrition, which may be related, with alterations in the immune system, causing an increased vulnerability. Poverty, on the other hand, results in congestion, poor ventilation and unhygienic environments, increasing the risk of TB transmission [40].
- **1.3 Stigma and Discrimination:** Thomas et al. (2016) highlight stigma and discrimination as the drivers for the infection and transmission of MDR-TB [40]. Stigma and discrimination in MDR-TB burdened setting was shown to also affect a patient's health-seeking behavior and access to healthcare negatively. Stigma and discrimination included rejection from family, friends or health workers, financial uncertainty and feelings of anxiety and depression [40]. It was found that MDR-TB patients would willingly isolate themselves for fear of infecting other members of the family. This can often result in isolation, cancellation of engagements, failed relationships and separation within the family [40].

2. Economic Factors influencing MDR-TB

MDR-TB has a vast financial effect on patients due to the complex nature and long duration and of treatment regimens. Socio-economic barriers affecting patient care included treatment distance, inaccessibility, transport costs and costs experienced during hospitalization [34]. Oga-Omenka et al. (2020) identified the inability to pay care-related costs as a barrier for diagnosis and treatment of DR-TB [37]. There was also associated job losses and production time loss during the initial intensive phase of treatment [24, 25]. Thomas et al. (2016) found that patients who had not returned to work after 1 year of being on medication were their family's breadwinners which had to cease working for a substantial amount of time [40]. Decrease in income due to absenteeism from work and the treatment-related loss of income and extra costs was generally catastrophic [24].

Quality of evidence

The Mixed Method Quality Appraisal Tool (MMAT) Version 2018 [41] was utilized to assess the quality of all the included quantitative studies (17) while, The Critical Appraisal Skills Programme (CASP) [42] tool was used to assess the systematic reviews. Two reviewers (LLC/ KEO) assessed the quality of the articles. The following categories were assessed: the appropriateness of the aim of the study, adequacy and methodology, study design, participant recruitment, data collection, data analysis, and findings presented. The quality score ranges from ≤50% as low quality, 51–75% an average quality, and 76–100% high quality. All the 17 included quantitative studies had high quality percentage of 76–100%. None of the included studies for quality assessment scored low quality. The case control study retrieved through the update search, also scored high quality. The CASP has 3 domains which has 10 questions. Two of the reviews were found high quality and one average. The review generated from the updated search scored high quality with an overall of 70%. Quality assessment of evidence is attached as additional files (Addendum 4.1 and 4.2). The studies were considered to have minimal risk of bias.

Discussion

This review specifically focused on the African region as this area has a high rate of DR- TB with limited resources to combat the disease burden. Thus, it is of utmost importance to identify these factors to stimulate the development of interventions to improve DR-TB treatment outcomes and decrease the incidence rate of DR- TB.

The social factors identified in the reviewed articles include apprehensions around stigma and prejudice, the impact of alcohol on the management of DR-TB, low educational level, overcrowding, and lack of treatment support. The social causes of TB are attributed to the mode of spread of TB, as well as the risk factors for acquiring the disease. This review highlights the social factors influencing DR-TB specifically emphasizing overcrowding as a major contributing factor. Eradicating extreme poverty and providing social protection could significantly reduce DR-TB. Patients with DR-TB would willingly isolate themselves for fear of infecting other members of the family, due to discrimination and stigma. This can often lead to separation, cancellation of engagements, failure of relationships and separation within the family [40]. In places like Africa where TB and HIV are still regarded as a "killer disease", TB clients could suffer detrimental effects of being isolated, negatively affecting their treatment adherence status, thus, creating a risk for increased morbidity and mortality. Substance use is frequently observed among patients with poor adherence and has an impact on MDR-TB management. Substance abuse is also associated with high poverty and unemployment levels. In the population with an increased drug and alcohol utilization, it is empirical to study the impact of this increased substance abuse on MDR-TB and to identify intervention strategies to curb the problem.

The review also identified economic factors influencing DR-TB. Numerous factors were identified to cause financial constraints- job loss, loss of productive time, absenteeism, and regular reviews all due to the long duration of care and admission time. Breadwinners who are admitted cause significant emotional distress in families- these are also reasons for defaulting and absconding, to avoid admission- to be able to provide for the family. There are also treatment-related costs- getting to review date has associated transport cost. Serious effort needs to be made to address and develop strategies to decrease the financial burden.

There is, however, limited evidence to notify policy-makers and TB control officers on how socioeconomic interferences should be used to improve MDR-TB control and reduce MDR-TB-related health disparities. There needs to be an immense scale-up of collaborative efforts toward the implementation of integrated model care, considering the health systems, socio-economic factors as well as medical factors.

Limitations

Although a thorough literature search was conducted, only a small number of eligible articles were available. This limited number of articles could be because only two databases were used to retrieve information. The

authors used these databases because they were robust open-access databases that required no institutional payments before they could be searched for eligible articles. Lastly, this scoping review focused on socio-economic factors that influence DR-TB in African regions. However, these factors could differ in other continents.

Conclusion

In conclusion, this review has highlighted socio-economic factors that contribute to DR-TB. Furthermore, it is crucial to understand these socio-economic factors driving DR-TB in a context-specific setting, to come up with evidence-based intervention strategies that would curb the burden of DR-TB. To achieve the End TB strategy targets, it is imperative to harness both medical and socio-economic efforts to fight against DR-TB disease. DR-TB elimination would require a holistic, comprehensive approach, utilization of available strategies, and associated medical, socio and economic challenges. The management of DR-TB require concerted efforts that address the socio-economic factors as well. To strengthen the findings from this review and the body of evidence, larger-scale randomized control trials to test socio-economic interventions should be undertaken.

Supplementary Information

The online version contains supplementary material available at <https://doi.org/10.1186/s12889-021-10067-0>.

Additional file 1: Addendum 1: Search Strategy.

Additional file 2: Addendum 2: Excluded studies with reasons.

Additional file 3: Addendum 3: Summary of the main socio-economic and other factors associated with DR-TB in Africa.

Additional file 4: Addendum 4: MMAT Quality Assessment Checklist.

Additional file 5: Addendum 4.2: CASP Quality Assessment Checklist.

Abbreviations

DS-TB: Drug-sensitive TB; DR-TB: Drug-resistance TB; LFT: Lost from treatment; MDR-TB: Multi-drug resistance TB; XDR-TB: Extensively drug resistance TB

Acknowledgements

The authors wish to acknowledge the staff and leadership of the public health department, University of Fort Hare.

Authors' contributions

LLC and KEO conceptualized and performed the scoping review, LLC wrote the manuscript using synthesized data, KEO provided guidance to LLC, KEO and DTG revised the manuscript. All three authors approved the final version of the manuscript.

Funding

No funds were received to conduct this review.

Availability of data and materials

All data generated and analyzed for the review are available upon request from the authors.

Ethics approval and consent to participate

Not applicable.

Consent for publication

Not applicable.

Competing interests

The authors declare that they have no competing interests.

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Published online: 11 March 2021

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