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PERCEPTIONS OF HEALTH CARE PROVIDERS OF MULTI-DRUG RESISTANT TUBERCULOSIS SHORTER-COURSE TREATMENT REGIMEN IMPLEMENTATION IN HARARE, ZIMBABWE



BY

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(1918312)

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JUNE 2022

DECLARATION

I, Tuso Audrey Tanda, declare that this research report is my own, unaided work. It is being submitted in partial fulfilment of the requirements for the Degree of Master of Science in Epidemiology (Field of Implementation Science) at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at this or any other University.

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Date: June 24th, 2022

DEDICATION

This work is dedicated to all those that have been affected by multi-drug resistant tuberculosis and to those that have contributed significantly to addressing the public health problem. To my daughter, Michelle Takomborerwa Hama, for persevering through this research journey. May this work inspire you for greater achievements. To my father, thank you for always being there to support my dreams. In memory and love, I also dedicate this to my mother, Alice Mdaka-Pepa, who nurtured and supported me during the time we spent together.

Lastly, to my family members who supported me tirelessly and encouraged me through Christ who gave us strength.

ABSTRACT

Title Perceptions of health care providers of multi-drug resistant tuberculosis shorter-course treatment regimen implementation in Harare, Zimbabwe.

Background Globally, TB remains a major public health concern with multi-drug resistant tuberculosis (MDR-TB) contributing substantially to the tuberculosis (TB) burden. Slow progress has been made over the years in global detection and enrolment of MDR-TB patients on treatment. The global Covid-19 pandemic negatively impacted access to TB services reducing the detection and enrolment of MDR-TB patients in 2020. Nine of the thirty countries with the highest burden of MDR-TB are in Europe. Accounting for the burden of MDR-TB in African countries remains a challenge, with only half of the African countries having conducted a drug resistance survey. Inappropriate regimens for MDR-TB patients enrolled on treatment remains a challenge in European and African countries. The World Health Organization (WHO) 2016 TB guidelines recommended the use of a standard regimen with a shorter duration of 9-12 months. In July 2018, the Zimbabwe National Tuberculosis Program (NTP) launched the implementation of the recommended standard shorter treatment regimen. There is a paucity of information on how health providers perceive the implementation of MDR-TB shorter-course treatment regimen in Harare, Zimbabwe.

Objective The objective of this study was to explore the facilitators and barriers to implementation of the standardised shorter treatment regimen for MDR-TB from a health care providers' (HCP) perspective in Harare, Zimbabwe.

Methods The study was an in-depth qualitative study. Health care providers from public health facilities within Harare province were purposively sampled for in depth interviews. These were guided by an open-ended interview guide. The data collection was conducted between April and July 2021. The consolidated framework for implementation research (CFIR) guided the interview guide development, data collection and the data analysis process. Data were managed and stored using MAXQDA 2020. The framework approach was used for data analysis.

Results Ten participants constituting doctors, nurses and environmental health officers participated in the study. Seven major themes emerged from the study guided by the CFIR domains and constructs. These salient themes were: 1) Health care provider perceptions of patient needs and preferences. 2) Health care provider perceptions of the shorter MDR-TB regimen. 3)

Health care provider perceptions of the health service environment. 4) Health care provider perceptions of global and local policies and guidelines. 5) Health care provider perceptions of opportunities for information dissemination. 6) Health care provider description of the MDR-TB shorter treatment regimen implementation process and, 7) Health care provider perceptions on collaborations and stakeholder engagements. Meeting patient needs, supporting the health care providers in the work environment, involvement of stakeholders, aligning implementation to global and local policies were perceived as facilitators. Major barriers identified were related to inadequate resources, failure to meet patient and health care provider needs.

Conclusion Health care provider perceptions of implementation of the shorter treatment regimen for MDR-TB were similar across all CFIR constructs in Harare health facilities. The implementation of the shorter regimen is influenced by several barriers and facilitators from all the five CFIR domains. Implementation of the shorter treatment regimen for MDR-TB requires strategies that go beyond the health facility. Developing an all-inclusive approach to implementing recommended treatment regimens may improve the outcomes for MDR-TB patients. Measures to mitigate the impact of Covid-19 on the MDR-TB program need to be swiftly adopted by the Zimbabwe National TB program.

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My heartfelt gratitude goes to the participants, who took time to contribute significantly to this study. Their contribution to this study and more importantly to the fight against tuberculosis is greatly appreciated.

I am grateful for my supportive family, friends and the Wits 2019 Implementation Science class who inspired me to persevere till the end. To Ella Chamanga and Nicola Chivandire, I am indebted to you. Thank you for your patience and invaluable support during my Implementation Science journey.

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TABLE OF CONTENTS

DECLARATION ii

DEDICATION iii

ABSTRACT iv

ACKNOWLEDGEMENTS vi

TABLE OF CONTENTS vii

LIST OF FIGURES xi

LIST OF TABLES xii

LIST OF ABBREVIATIONS xiii

CHAPTER 1: INTRODUCTION 1

1.1.1Global MDR/RR-TB epidemiology 1

1.1.2 MDR/RR-TB burden in the European region 2

1.1.3 MDR/RR-TB burden in Africa 2

1.1.4 MDR/RR-TB burden in Zimbabwe 3

1.1.5 Management of MDR/RR-TB in Zimbabwe 3

1.1.6 Efficacy of the shorter course MDR-TB treatment regimen 4

1.1.7 The Consolidated Framework for Implementation Research 5

CHAPTER 2: LITERATURE REVIEW 8

2.1 Recommended MDR-TB treatment regimens 8

2.2 Implementation of recommended guidelines for MDR/RR-TB management 10

2.3 Health care provider perceptions on implementation of the recommended MDR-TB guidelines 12

2.4 Application of the CFIR in exploring barriers and facilitators for health interventions 15

2.5 Problem statement 17

2.6 Justification 18

2.7 Study Objectives 18

2.7.1 Research question 18
2.7.2 Aim 19
2.7.3 Objectives 19
CHAPTER 3: METHODS 20
3.1 Study design 20
3.2 Study site 20
3.4 Sampling 22
3.4.1 Inclusion criteria 23
3.4.2 Exclusion criteria 24
3.5 Data collection 24
3.5.1 Instrument design 24
3.5.2 Pretesting of the tool 24
3.5.3 Data collection process 25
3.6 Data management 26
3.7 Data analysis 26
3.7.1 Step 1: Familiarisation with the data 27
3.7.2 Step 2: Identifying a thematic/analytical framework 27
3.7.3 Step 3: Indexing 27
3.7.4 Step 4: Charting 28
3.8 Trustworthiness 29
3.8.1 Credibility 29
3.8.2 Transferability 29
3.8.3 Dependability 29
3.9 Ethical considerations 30
CHAPTER 4: RESULTS 31
4.1 Demographic characteristics 31
4.2 Study results 32

4.2.1 Health care provider perceptions of patient needs and preferences 35
4.2.2 Health care provider perceptions of the shorter MDR-TB treatment regimen.....38
4.2.3 Health care provider perceptions of the health service environment 41
4.2.4 Health care provider perceptions of global and local policies and guidelines 46
4.2.5 Health care provider perceptions of opportunities for information dissemination..48
4.2.6 Health care provider description of the MDR-TB shorter treatment regimen implementation process 49
4.2.7 Health care provider perceptions on collaborations and stakeholder engagements 52
CHAPTER 5: DISCUSSION.....55
5.1 Health care provider perceptions of MDR-TB patient needs and preferences 55
5.2 Health care provider perceptions of the shorter MDR-TB treatment regimen 58
5.3 Health care provider perceptions of the health service environment.....60
5.4 Health care provider perceptions of global and local policies and guidelines. 64
5.5 Health care provider perceptions of opportunities for information dissemination 66
5.6 Health care provider description of the MDR-TB shorter treatment regimen implementation process. 67
5.7 Health care provider perceptions on collaborations and stakeholder engagements.....69
5.8 Study strengths 69
5.9 Study limitations 70
CHAPTER 6: CONCLUSION AND RECOMMENDATIONS 72
6.1 Short term recommendations 74
6.2 Long term recommendations.....75
REFERENCES 77
CHAPTER 7: APPENDICES 91
7.1 Plagiarism declaration form 91
7.2 Turnitin report 93
7.3 University of the Witwatersrand human research ethics approval.....94
7.4 Medical Research Council of Zimbabwe approval letter.....95

7.5 Ministry of Health and Child care authorisation letter.....96
7.6 City of Harare authorisation letter.....97
7.7: Informed Consent Form.....98
7.8: Certificate of Consent.....101
7.9 Audio-recording consent form.....102
7.10 Interview guide for healthcare providers.....103

LIST OF FIGURES

Figure 1:Summary description of the five CFIR domains and related constructs.....6
Figure 2:Adapted CFIR to explore health care providers' perceptions of the implementation of a standardised shorter treatment regimen for MDR-TB. 7
Figure 3:Illustration of the conventional longer regimen and the WHO 2016 recommended standard shorter treatment regimen. 9
Figure 4:Diagrammatic representation of the study site – Harare province public health facilities, Zimbabwe. 21

LIST OF TABLES

Table 1: Example of a matrix for charting data for analysis.....28
Table 2: Summary of participants' demographic characteristics.....32
Table 3: Summary of identified barriers and facilitators to the shorter MDR-TB treatment regimen implementation.....32
Table 4: Short term summary recommendations.....74
Table 5: Long term summary recommendations.....75

LIST OF ABBREVIATIONS

ART	Antiretroviral therapy
BETTER2	Building on Existing Tools to improve Chronic Disease Prevention
BZD	Benzodiazepines
CFIR	Consolidated Framework for Implementation Research
CDPS	Chronic Disease Prevention and Screening
DHIS2	District Health Information System (version 2)
DMO	District Medical Officer
DOT	Direct Observed Treatment
DR-TB	Drug resistant tuberculosis
DR/RR-TB	Drug resistant or rifampicin resistant tuberculosis
DST	Drug Susceptibility Testing
EBP	Evidence-based Practice
ECG	Electro cardiography
EDLIZ	Essential Drugs List of Zimbabwe
EHT	Environmental Health Technician
FBC	Full Blood Count
GLC	Greenlight committee
HIV	Human immunodeficiency virus
HPV	Human Papilloma Virus
IEC	Information, Education and Communication
INH	Isoniazid
IPT	Isoniazid Preventive Therapy

LMIC	Low to Middle Income Country
LTBI	Latent tuberculosis infection
MDR	Multi-drug resistant
MDR-TB	Multi-drug resistant tuberculosis
MDR/RR-TB	Multi-drug resistant/rifampicin resistant tuberculosis
MOHCC	Ministry of Health and Child Care
PMDT	Programmatic management of drug-resistant tuberculosis
PTB	Pulmonary tuberculosis
RIF	Rifampicin
RR-TB	Rifampicin resistant tuberculosis
SLD	Second-line drugs
SOP	Standard operating procedure
TASSH	Task Shifting Strategy for Hypertension control
TB	Tuberculosis
U and E	Urea and Electrolytes
US	United States of America
USAID	United States of America International Development
WHO	World Health Organisation
XDR-TB	Extensively drug-resistant tuberculosis
ZNTP	Zimbabwe National Tuberculosis Programme

CHAPTER 1: INTRODUCTION

1.1 Background

1.1.1 Global MDR/RR-TB epidemiology

Multi-drug resistant tuberculosis (MDR-TB) contributes substantially to the global tuberculosis (TB) burden with an estimated 580,000 cases and 230,000 deaths attributed to MDR-TB annually (1,2). MDR-TB is caused by a *Mycobacterium tuberculosis* strain that is resistant to rifampicin (RIF) and isoniazid (INH), two of the most effective anti-TB drugs (3). MDR-TB occurs as either primary or acquired MDR-TB. Primary MDR-TB is when a *Mycobacterium tuberculosis* strain that is resistant infects an individual while acquired MDR-TB is a drug-selective resistant strain that results from inadequate or improper treatment (4). WHO recommends treatment with second-line drugs for at least 9 months and up to 20 months (ref). Expanded access to all-oral regimens is strongly recommended by WHO (5).

The increasing incidence of Rifampicin Resistance or Multi-Drug Resistance tuberculosis (MDR/RR-TB) suggests that this disease is a public health emergency (5). TB infection in general is associated with high morbidity, reduced quality of life, hospitalisation, and mortality. Higher rates of these adverse outcomes are observed for MDR and extensively drug resistant tuberculosis (XDR-TB) (6–8). Globally in 2019, about half a million people developed rifampicin-resistant TB (RR-TB) with about 78% of them having multidrug-resistant TB (MDR-TB). India (27%), China (14%) and the Russian Federation (8%) account for the three countries with the largest share of the global burden (5,9). Responses to this global MDR/RR-TB public health emergency observed in 2019 included a 10% increase in MDR/RR-TB detection and notification globally compared to 2018. Additionally, a corresponding increase in enrolment of individuals on treatment for MDR-TB from 156,205 in 2018 to 177,099 in 2019 (5). On the contrary, the global detection rate and enrolment of MDR/RR-TB declined by 22% and 15% respectively from 2019 to 2020 figures which could be a reflection of the access to TB services during the peak period of the Covid-19 pandemic (5). MDR/RR-TB patients enrolled on treatment was 150,359 in 2020 down from 177,099 reported in 2019 (5). By the end of 2019, the observed achievement of MDR/RR-TB patients who had been enrolled for MDR-TB treatment accounted for only 22% of the global target for 2018-2022 (6). The global

target aims at reaching 1.5 million diagnosed MDR-TB patients with treatment over the 5 years (6). Globally, treatment success rate has steady increased from 50% in 2012 to 58% in 2018.

1.1.2 MDR/RR-TB burden in the European region

In the European Region, about 3% of the 2019 global tuberculosis burden of 9.9 million cases occurred in this region with an estimated 3.7% of patients in the Americas having multidrug-resistant or rifampicin-resistant tuberculosis (MDR/RR-TB) (10). Nine out of the 30 countries with the highest MDR-TB burden in the world are in the WHO European Region. In 2019, ten countries in the European Region accounted for 90% of all estimated cases of MDR/RR-TB with Brazil and Peru being the most affected countries in the region (10). Peru accounted for 28% and Brazil accounted for 24% of all the estimated MDR/RR-TB (10). The highest rates of MDR/RR- TB were reported by Peru (9.5) and Haiti (5.0) (10). From 2017 to 2019, the number of MDR/RR-TB patients enrolled on treatment has been consistently above 80% (10). Of the total reported cases in 2019, about 87% were enrolled on treatment. Despite the high achievement in enrolment, most of the MDR/RR-TB patients did not receive the recommended treatment of the shorter all-oral regimen recommended by the WHO in 2018 (10).

1.1.3 MDR/RR-TB burden in Africa

Countries have accounted for the national burden of MDR/RR-TB by conducting national drug resistance surveys. In Africa, only 51% of the African countries have conducted a formal drug resistance survey posing challenges with accurately determining the burden of DR-TB in Africa (11). Despite the limitations in formal surveys, available drug-resistant data indicated that there is a lower proportion of resistant TB in Sub-Saharan Africa (except for South Africa) when compared to Eastern Europe and some Asian countries (12–14). Several studies have attempted to estimate the MDR-TB burden in Sub-Saharan Africa in response to the paucity of national MDR-TB survey in the Sub-Saharan African countries (15). Lukoye[13] reported a pooled estimate for MDR-TB prevalence of about 1.5% (95% CI 1.0–2.3), while in Ethiopia, the risk of MDR-TB was five times among previously treated tuberculosis (TB) cases compared to new cases (13). Indications from the available literature estimating the prevalence of MDR-TB in Sub-Saharan Africa are that significant differences exist within and between countries (13,15–17). In 2016, the WHO AFRO Region reported between 36,000 and 44,000

MDR-TB cases with 15% of the new MDR-TB patients in the WHO AFRO Region having rifampicin resistant tuberculosis (18). The DR-TB prevalence among new TB patients for some Sub-Saharan African countries has been reported to be about 20% and about 53% among previously treated TB patients (15).

1.1.4 MDR/RR-TB burden in Zimbabwe

Zimbabwe, where this study was conducted has a high burden of MDR-TB recording a minimum of 1,000 cases annually (2). Zimbabwe is listed among the thirty countries classified by the WHO as high burden countries for multidrug-resistant tuberculosis (TB) or rifampicin-resistant TB (MDR/RR-TB) globally (19). In 2017, about 1,300 MDR/RR-TB patients were estimated to be in Zimbabwe with a prevalence of 4.6% and 14% among new and previously treated TB patients, respectively (2). A study conducted in Zimbabwe by Matabo *et al.*[19] to evaluate the outcomes of patients treated for MDR/RR-TB suggested the complexity of MDR-TB in the Zimbabwean setting and the urgency to treating this illness with the appropriate treatment (19).

1.1.5 Management of MDR/RR-TB in Zimbabwe

In 2010, the "Programmatic Management of Drug-Resistant TB" (PMDT) guidelines were released by the Zimbabwe National Tuberculosis Programme (NTP) recommending the use of standardized second-line drugs (SLDs) for twenty months (19). Treatment of MDR/RR-TB in Zimbabwe was initially centralised to treatment centres in Harare and Bulawayo, the two largest metropolitan cities in Zimbabwe (20). The decision to centralise MDR/RR-TB treatment was guided by the TB caseload, availability of expertise as well as accessibility to laboratory services in the two cities at that time (20). Harare and Bulawayo accounted for about 30% of the Zimbabwe TB caseload from about 2008-2011 (20). All MDR-TB notified patients in Zimbabwe sought services at the designated MDR/RR-TB treatment centres from about 2010 to 2013. In 2013, the Zimbabwe NTP decentralised care for MDR/RR-TB patients to the district level in a bid to improve access to health care. After 2014, MDR/RR-TB treatment services were further decentralised to health facility level (47). Following the recommendation from WHO in 2016 for the use of a standardised shorter course regimen for MDR-TB, Zimbabwe adopted the recommendation and launched their implementation under

programmatic conditions in July 2018 (19). The standardised shorter course regimen for MDR-TB was given as direct observed treatment (DOT) at the health facility for the intensive phase, the period when the injectable kanamycin was administered daily. After the intensive phase, continued DOT by the treatment buddy who is selected from the patients' household or community was done. Treatment buddies are taken through sessions by the health care providers on how to manage the patients on MDR-TB treatment. After the publication of the WHO 2019 guidelines, Zimbabwe transitioned from the kanamycin injectable inclusive shorter treatment regimen to the all oral short regimen late in 2020 into 2021, coinciding with the data collection period. The Zimbabwe National Tuberculosis Program (NTP) receives support for human resources, pharmaceuticals, health commodities, non-health commodities, programme management, trainings, equipment, and infrastructure from the Global Fund and United States Agency for International Development (USAID) in addition to the support provided by the Government of Zimbabwe.

1.1.6 Efficacy of the shorter course MDR-TB treatment regimen

The 2010 trial of the shorter course regimen in Bangladesh showed treatment success of 84.4% (21).This prompted the implementation of observational prospective cohort studies in additional countries. Cohorts of notified MDR-TB patients were commenced on the trial 9-12 months shorter course regimen and progressively monitored. These observational studies conducted in Bangladesh and other African countries like Cameroon, Benin, Burkina Faso, Rwanda, Democratic Republic of Congo, Burundi, Cote d'Ivoire and Niger had 82% success rate for treatment using a standardised shorter-course treatment regimen (22). The efficacy of the regimen demonstrated in the observational studies was a significant advance in MDR/RR-TB treatment (23). Conventional regimens yielded around 52% success rate compared to the 82% success rate demonstrated by the shorter regimen (1,21,24,25). The shorter course regimen addressed the concerns of treatment duration and associated adverse outcomes of public health concern including mortality, economic non-productivity and lost to follow-up (1,24). It is against this background that the shorter course was accepted and recommended by the WHO in 2016 for global use as a standardised regimen (26). A standardised treatment regimen has a simplified approach to MDR-TB management and limited reliance on specialist expertise making it a regimen of choice in most LMIC like Zimbabwe where there are shortages of health care providers (1). The regimen can easily be implemented with ease at the lowest levels of health service (1). The programmatic scale-up of MDR-TB treatment has the potential

for a more significant population-level effect (1). A standardised regimen reduces the overall costs of treatment by five to tenfold and the number of health facilities' needs (27). Following the official release of the WHO 2016 recommendations, there were country efforts to adopt and scale-up implementation in practice.

In line with the global recommendation for MDR/RR-TB treatment premised on the demonstrated regimen efficacy, Zimbabwe National Tuberculosis Program (NTP) adopted the 2016 WHO recommendation as the standard of care in July 2018 (28). Adoption and implementation scale-up of recommended treatment largely depends on the countries' preparedness including political commitment, health care providers' competencies, availability of diagnostic equipment, and availability of the medicines among other factors (26,29,30).

1.1.7 The Consolidated Framework for Implementation Research

The consolidated framework for implementation research (CFIR) has been identified as an ideal framework for health service delivery implementation research (31). The framework has been adopted to explore factors that influence the implementation of evidence-based interventions in health care delivery from the health care providers' perspective (31,32). Specific use of the CFIR has been demonstrated in reviewing barriers and facilitators of complex implementations in primary health services (33). Developed by Damschroder *et al*.[34], the 'meta-theoretical' framework has five main domains with 39 constructs that are a synthesis of existing theories (34). The five main domains are: 1) Intervention characteristics (for example, complexity and strength of the evidence), 2) Inner setting (for example, culture in the organization and the level of engagement for leaders), 3) Outer setting (for example, external policy and incentives), 4) Process (for example, planning and engaging key stakeholders), and 5) characteristics of people involved (for example, self-efficacy with using the evidence based intervention) (35). The definitions of the five main domains of the CFIR are summarised in the table below.

Domain	Definition
Intervention characteristics	The characteristics of the intervention being implemented include whether: the intervention is perceived to be developed external or internal to the organization, there is evidence supporting its effectiveness, and its implementation will be advantageous to its alternatives. Other characteristics include how the intervention is presented, its adaptability, complexity and whether it can be tested on a smaller scale.
Outer setting	The external context of the organization includes: patient needs and the ability to meet them, networks with other organizations, pressure to implement the intervention and external policies and incentives to adopt the intervention.
Inner setting	Features of the organization including its structural characteristics (such as size, age of the organization and division of labour), networks and communication (such as connections and information sharing between individuals, units and services), cultural norms and values, implementation climate, organizational capacity and readiness for change.
Characteristics of individuals	Staff knowledge and belief about the intervention, their ability to execute their respective aspects of the implementation, and their individual stage of change. Other characteristics include individual identification with the organization and other personal attributes.
Process	Active change process, the purpose of which is to promote uptake of the intervention by the organization. This is influenced by the level of planning prior to implementation, and engaging organization stakeholders through appointing implementation leaders and champions of the intervention. This includes the ability to execute the implementation of the intervention as planned and to continuously reflect on and evaluate the quality of implementation and intervention as it progresses.

Figure 1*:Summary description of the five CFIR domains and related constructs*

Source: *Adapted from Kadu and Stolee,*[31]

The 39 constructs under the 5 major CFIR domains influence interventions implementation as either facilitators or barriers. The CFIR allows for the management of data while capturing the complexity of implementing MDR-TB treatment. Adoption of the CFIR in implementation research standardises research for implementation programs thereby helping the researchers compare research findings from similar qualitative studies (31). Studies adopt CFIR constructs relevant to their study objectives and rarely are all the constructs explored in a single study (32,36,37). Kalkan *et al.*[30] in their study selected the CFIR framework as it suited the explorative nature of the study. A deductive approach for follow-up questions and probes based on the CFIR framework was used for their study (32). Garbutt *et al.*[33] in their study designed general and specific questions for the interviews addressing the main constructs of the CFIR framework. The questions were used to determine factors that either facilitated or created barriers to HPV vaccine implementation. Weir *et al.*[34] in their systematic review used the CFIR to synthesize the data from the studies.

This study will explore all the five domains of CFIR, adapting 14 of the 39 constructs. The CFIR domains and constructs adapted for this study are illustrated below.

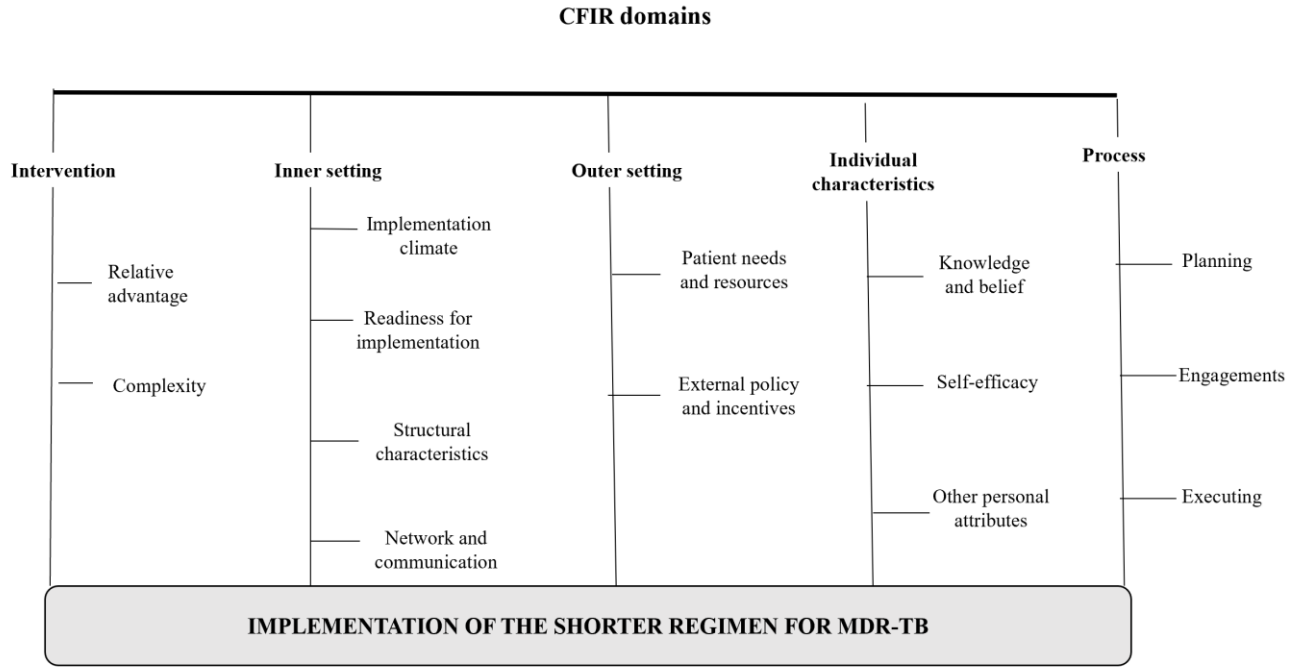


Figure 2*:Adapted CFIR to explore health care providers' perceptions of the implementation of a standardised shorter treatment regimen for MDR-TB.*

The burden of MDR/RR-TB and inappropriate treatment continues to affect both high income and low-income countries (5). A total of 9 out of the 30 countries with the highest burden of MDR-TB in 2020 were in the European region (5). In Africa, Nigeria and South Africa accounted for the highest burden of MDR-TB (5). Zimbabwe remains with a significant burden of MDR-TB and is listed among the 30 high burden countries for MDR-TB (5). This threatens the targeted goal of a 95% reduction in TB incidence (10/100,000) by 2035 (38). The next chapter provides a review of literature which was conducted to provide an insight into the research topic including the MDR-TB regimens, implementation of clinical guidelines by health care providers and the perceptions of health care providers on factors that influence the implementation of recommended guidelines.

CHAPTER 2: LITERATURE REVIEW

2.1 Recommended MDR-TB treatment regimens

MDR-TB emerged as a global concern in the middle 1990s (27). During that period, the WHO recommended conventional treatment regimens with a duration of up to 24 months; 8-months intensive initial phase followed by at least 12 months' continuation or follow-up phase (27). Conventional regimens constitute a high pill burden and require daily administration of toxic drugs (such as, inducing side effects) posing challenges (25,39). The above citation suggests that treatment protocols for MDR-TB require adaptation (25,39). Treatment defaulter rates among MDR-TB patients on these conventional treatment programs were consistently above 20% and up to 52% in some settings (6). In 2010, treatment success rate was 10% globally with only 34 out of 107 countries achieving treatment success rates of 75% or more (4). In response to the need for treatment regimens with better treatment outcomes, in 2016 new recommendations were developed the WHO for the use of a standardised MDR-TB treatment regimen with 9-12 months duration for patients with pulmonary MDR/RR-TB (26). The MDR-TB treatment recommendations are developed according to global standards for transparency, policy development and evidence review which complies with the requirements from WHO (40). Health care providers are responsible for translating recommended guidelines into routine practice.

Eligible patients for the WHO recommended standardised shorter treatment regimen are those who have never received MDR-TB treatment with second-line medicines (26). Additionally, eligible patients should be considered non-resistant to specific groups of MDR/RR-TB medicines namely injectable agents for second line and fluoroquinolones (26). Treatment can be offered to all eligible MDR/RR-TB patients meeting the criteria except for pregnant women (26). Following the success demonstrated by the regimen used in observational studies in Bangladesh and other countries, the WHO then gave a recommendation in 2016 for a shorter-course treatment regimen to be used globally (41). The shorter regimen aimed to reduce the treatment cost, improve MDR-TB cure rates and improve compliance to treatment (41). The WHO endorsed the regimen, consisting of anti-TB agents combined after it demonstrated to be equally effective in the treatment of MDR-TB (42). The regimen consists of 7 medicines: injectable kanamycin, and oral medicines as shown in Figure 1 (43). The 7 medicines are

initiated for the first 4 months and up to six months where sputum smear remains positive (42). Four medicines are administered for 5 months during the continuation phase namely moxifloxacin, ethambutol, pyrazinamide and clofazimine (42). Figure 1 below provides a visual representation of the composition and duration for the conventional treatment regimen and that of the shorter treatment regimen introduced in 2016 (43).

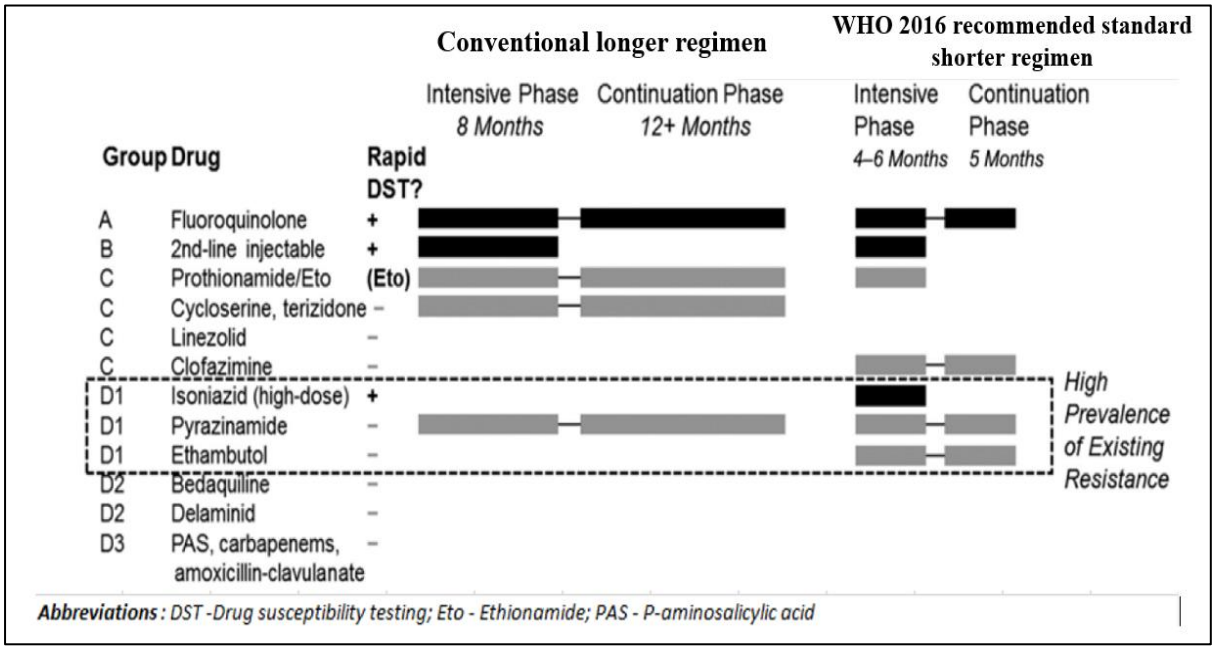


Figure 3:*Illustration of the conventional longer regimen and the WHO 2016 recommended standard shorter treatment regimen.*

Black bars denote drugs for which rapid, high-quality drug susceptibility testing is available; the dashed box denotes first-line agents to which high levels of resistance are expected in multidrug-resistant-tuberculosis. ***Source:*** *(Dowdy et al.[38]).*

The success of a treatment regimen that is shorter (9–12-months) was initially observed on 515 MDR/RR-TB patients from Bangladesh, studies that are expanded on in the literature review (21). Patients were successively enrolled as cohorts in studies conducted between 2005 to 2011. The studies were prospective involving direct observation of patients on the trial shorter treatment based on a gatifloxacin (GFX) (21). Gatifloxacin was an essential medicine for the trial regimen used in Bangladesh (21). MDR/RR-TB patients were initially hospitalized and culture was used for patient monitoring for 2 years after treatment was completed (21). Culture tests determine TB drug resistance or TB drug sensitivity in specimen provided by patients (21). Of the 515 successively enrolled MDR-TB patients in Bangladesh, 84.4% were shown to have a favourable bacteriological result (21). After the 9-month Bangladesh regimen showed

89% success in the 2010 trial, nine West and Central African countries participated in prospective observational studies by enrolling cohorts of patients on the trial shorter treatment (21,22). The nine countries achieved a success rate of 82%. The countries were; Benin, Niger, Burkina Faso, Cameroon, Rwanda, Central African Republic, Burundi, Democratic Republic of Congo, and Cote d'Ivoire (21,22). Thus, the recommendation to implement the shorter treatment was based on using medicines similar in both the composition and the duration as those for the prospective studies (26).

Several patients who received the shorter treatment regimen in African countries were HIV infected and had successful outcomes making it highly recommendable for the Zimbabwe context which has a relatively high prevalence of HIV (44). Where drug susceptibility testing (DST) was not readily available, close clinical monitoring of the patients was required (42). In Central Asia, dominated by advanced TB resistance, the regimen had positive outcomes (42). By the end of 2017, globally, twenty-one countries had launched the shorter 9-12 months' treatment regimen as the recommended care standard (45).

2.2 Implementation of recommended guidelines for MDR/RR-TB management

To reduce inconsistencies in health care practice, clinical guidelines are developed for use to standardise management and care for patients. Clinical guidelines are statements that have been systematically developed to guide health service providers and the patients to make decisions on the most suitable health care for the different clinical conditions (46). One of the effective tools suggested to improve adherence to clinical guidelines and quality was the development and effective implementation of guidelines based on scientific evidence (47,48). The major challenge in clinical practice has been that many guidelines for the different health conditions are not used after dissemination (31,47,48). Despite the growing increase in the number of guidelines for healthcare, practical implementation of these guidelines is sluggish, erratic and complex as outlined below (49,50).

Globally, studies have suggested that adherence to recommended guidelines for different health conditions generally varies among health service providers and between programs (48,51,52). There are a few documented studies that focus on the implementation of MDR-TB shorter treatment regimen guidelines in practice (14,17,53). Since 2010, the WHO recommended the treatment of MDR/RR-TB with predominantly second-line injectables such as kanamycin,

capreomycin, and amikacin (54). These medicines are very toxic, less effective and require a long duration of up to 24 months frequently causing liver damage, nausea and irreversible hearing loss (55). Studies suggest that success rates for patients on conventional treatment regimen is about 52% while for standardised shorter treatment regimen it is over 80% (1,43). Successful treatment outcomes are regarded as TB patients that have been cured and those who have completed treatment (56). Several attempts to reduce the duration of treatment and include more tolerable medicines had been ongoing until positive results were first demonstrated in trials that were conducted in Bangladesh (21). Prospective observational studies of MDR/RR-TB patient cohorts from Bangladesh suggested improved treatment success using a shorter-term regimen of up to 12 months duration (21,23).

Of the few TB and MDR/XDR-TB management surveys conducted in European countries, significant discordance between what was recommended in the guidelines and the practice of health care workers in regimen selection was noted (12). International guidelines for MDR-TB management were not consistently followed in a number of reference centres in the European Union settings (12). Non-conformity to guidelines related to treatment practices, the doses of administered anti-TB drugs, the choice of treatment regimens, and the duration of anti-TB drug was observed (12).

Similar findings were noted in Sub-Saharan Africa where the implementation of the recommended guidelines for the management of DR-TB was not aligned to clinical practice (14). Health care provider concordance with the guidelines in practice was varied according to the setting and Gross Domestic Product (GDP) of the province. Concordance to guidelines was better in Eastern Cape than in KwaZulu Natal (KZN) suggesting that access to resources and training of staff may have had an impact in the implementation of prescribed guidelines (14). There is limited literature that has explored country experiences with implementing the recommended shorter-course MDR-TB treatment in resource-limited settings including Zimbabwe. Generally, implementing evidence-based interventions has posed challenges in resource-limited settings mainly attributed to patient and system related factors. Common barriers to scaling up evidence based intervention include the lack of training among health care providers, limited human resources for health, inadequate infrastructure, high costs related to accessing treatment, unavailability of information, difficulty in accessing diagnostic technology and results as well as interrupted supply of medicines and commodities (57–61).

2.3 Health care provider perceptions on implementation of the recommended MDR-TB guidelines

In a study conducted in four European Union countries, semi-structured interviews were conducted including health care providers as participants (62). The study conducted in Bulgaria, Spain, Austria, and the United Kingdom explored health system factors that influence the management of MDR-TB in Europe (62). The following factors were perceived as facilitators for good treatment results for MDR-TB patients: adequate financial systems enabling access and support for the duration of treatment, diagnosing drug-resistant tuberculosis timeously, employing patient-centred approaches as well as developing strong intersectoral collaboration to address the patients' social and emotional needs. Additionally, motivated and dedicated healthcare workers who are capacitated to support MDR-TB patients; and securing inter-country continuum of care for the management of MDR-TB (62). Health care providers in Europe provided individualised treatment regimen to MDR-TB patients which was not aligned to the international guidelines, arguing the availability of advanced technologies, availability of funds and dedicated staff to provide MDR-TB management (62).

In Vietnam, Hoang *et al*.[63] found that information gaps related to updates of current guidelines contributed to the non-implementation of recommended MDR-TB treatment guidelines (63). In Holland, Lugtenberg *et al.*[48] and Evenblij *et al.*[64] found that doctors generally knew about the guidelines, however doctors were not aware of the specific content of the critical recommendations (48,64). In Vietnam, annual training for programmatic management of tuberculosis (PMDT) was conducted and included training on the new guidelines. Limited funding restricted the number of people who received training for PMDT in Vietnam (63). Restricted funding was perceived to slow down the scale-up of interventions due to limited medical resources, information dissemination or capacity building (24,48,51,65). The ZNTP receives most of its funding from Global Fund and USAID grants. Most of the recommended medicines are procured through the global financing facilities. The challenge that remains is that of limited resources to train all the health care providers on new recommendations, dissemination of information to all stakeholders and day-to-day operating costs resulting in implementation gaps (37,63).

Doctors sometimes fail to accept the recommended guidelines resulting in non-implementation as shown in some studies conducted in the Netherlands among Dutch health practitioners (48).

Some health care providers perceive that standardising treatment may compromise patient needs. Doctors in Holland were of view that the recommendation for latent tuberculosis infection (LTBI) screening among HIV patients was overdone and aimless (64). Some guidelines were noted to lack some relevant information, while some were perceived as too complex or challenging to implement (48). The perception of doctors that implementing a guideline had no extra health benefit resulted in non-implementation in the Netherlands (64). Time constraints and limited resources were also perceived as barriers to implementation in the Netherlands (48). Limited applicability in practice for some of the guideline recommendations was argued particularly for patients with complex conditions (48). MDR-TB may occur together with other comorbid diseases like HIV, diabetes and cancer which doctors perceived that it limited the general application of recommended guidelines to all patients(48). Doctors from the Netherlands perceived that evidence for recommendations was based on the exclusion of other diseases (48). Some doctors were reluctant to implement recommended guidelines due to fear of potential drug-interactions, side-effects, risk of over-treatment, and reduced patient compliance uncertainties (64).

In Karakalpakstan in Uzbekistan, a qualitative study was conducted among patients and health care workers to explore their perspective on the shorter course treatment regimen for MDR-TB (66). The shorter course regimen was perceived to be beneficial to the patient by reducing stigma, promoting involvement in work and social spaces, promoting adherence to medication and also reducing stigma (66). Health care workers in Uzbekistan where aware that implementing the shorter course regimen was beneficial to the health system by reducing the costs to treat an MDR-TB patient (66). Concerns among some health care workers were the perceived ineffectiveness of the shorter course regimen when implemented for a reduced period with essentially similar medicines from those used during the longer treatment (66). Health care workers were also concerned about how they would determine new cases for MDR-TB who would be eligible for the regimen as some patients may not disclose their history of previous infection (66). Additionally, they perceived the regimen to be more suitable for young patients who did not have any other comorbidities which was also the general perception among doctors from Netherlands(52,66). The doctors were of the view that that the guidelines development process excluded other comorbid conditions (66).

A qualitative study was conducted in the Peruvian Amazon exploring health care providers and patients experiences and perceptions on improving outcomes for MDR-TB patients (39). The perceptions were that limited knowledge about MDR-TB by the general population was a

barrier to the achievement of good outcomes for MDR-TB patients (39). Other personal factors like belief in traditional medicines compared to pharmaceutical medicines and fear of stigma were also described as personal factors hindering the achievement of optimal MDR-TB outcomes (39). Family support including nutrition, psychological, financial and emotional were perceived as facilitators (39). Additionally, holistic health care and provision of education to both the health care provider and affected family members were perceived to facilitate better MDR-TB treatment outcomes (39). Side effects and long duration of treatment were noted as barriers, therefore a regimen with less side effects was perceived to improve the outcomes (39). Health care provider relations with the patient were found to have an effect on the MDR-TB treatment outcomes, with open communication and conducive environment to discuss concerns with the patient being perceived as facilitators to improved outcomes (39).

Another qualitative study from Ethiopia which is a developing country, explored healthcare provider perceptions and experiences on the MDR-TB management and control in Addis Ababa (57). The health care providers perceived the MDR-TB burden as a public health threat that continues to be affected by the socio-economic conditions (57). Health facility infrastructure was perceived to be insufficient for management of the increasing number of MDR-TB patients (57). Socio-economic factors like poor living conditions, financial constraints and inadequate nutrition were perceived to worsen the MDR-TB treatment outcomes associating MDR-TB with poverty (57). Movement of patients in search of better employment opportunities was perceived as a barrier to effective MDR-TB treatment as it interrupted directly observed treatment (DOT) which is recommended for MDR-TB patients (57). Health care providers were of the opinion that the community was not aware of MDR-TB (57). Additionally, the lack of clinical knowledge among health care providers was also noted which negatively affected treatment outcomes for MDR-TB patients (57). Observance of cultural values in the community such as physical contact and sharing were also perceived as contributing to the transmission of MDR-TB (57).

In Africa, two studies from Nigeria and South Africa where recently documented exploring health care provider experiences or perceptions with hospitalised care for MDR-TB patients(67,68). A study conducted in Nigeria explored the patients and health care provider perceptions on hospitalised care for MDR-TB in Port Harcourt (69). Health care providers perceived that infection prevention control practices such as wearing masks were stigmatising to MDR-TB patients (69). Unmet socio-economic needs were perceived as major stress factors for the MDR-TB patients (69). Health care providers were disgruntled by the service condition

such as staff shortages and failure to pay allowances by the authorities (69). Infrequent power supply and inadequate equipment for critical care such as oxygen cylinders affected service delivery according to the health care provider opinion (68). In South Africa, another study explored the experiences of health care providers caring for MDR-TB patients at a hospital (67). Patients were hospitalised for the first two months of the intensive phase of the shorter course regimen for MDR-TB (67). Six themes emerged from the study: infrastructural challenges, human resources challenges, lack of equipment and supplies, support, risk and reward and emotions (67). Infrastructural challenges were perceived to influence health care provider attitudes and ease of providing health services (67). Shortages of nurses and doctors was perceived to have a negative impact. Health care providers reported lack of supervision as a result of the shortage of human resources (67). Shortages of equipment and supplies including medicines, the lack of professional support, lack of training, poor renumeration and the lack of incentives were perceived to negatively influence the care for MDR-TB patients (67).

2.4 Application of the CFIR in exploring barriers and facilitators for health interventions

There are currently no available published studies that have documented the use of the CFIR to determine facilitators and barriers for implementation of the standard WHO 2016 recommended MDR-TB treatment. Despite the lack of MDR-TB treatment specific studies adopting the CFIR, there are several studies in health care that have identified barriers and facilitators that influence the adaptation of proven effective health interventions using the CFIR (36,70,71). The evidence-based intervention of interest in this study is the standard shorter-course for treatment of MDR-TB recommended in 2016 by the WHO. The constructs explored were those deemed relevant to the study objectives which assisted in organising the details systematically. All the five CFIR domains were explored, and 14 selected constructs were adopted for the study.

Two separate studies conducted in the United States utilized the CFIR as their theoretical framework to guide the exploration of facilitators and barriers to Human Papilloma Virus (HPV) vaccination. The HPV vaccine is an evidence-based intervention that has proven to be effective for prevention of multiple cancers, especially cervical cancer. Despite the effectiveness of the HPV vaccine, it's use as a method for preventing cervical cancer was underused (36,72). Garbut *et al.*[33] identified characteristics of service providers as strongly distinguishing constructs which were facilitators to implementing the HPV vaccine. The

identified facilitators included knowledge and beliefs, readiness to change and self-efficacy(36). The process to deliver the HPV vaccine (executing) and the perception of service providers of implementing the HPV vaccine were also identified as facilitators (36). From the outer setting, the HPV vaccination study found that peer pressure and financial incentives were facilitators to implementation. Networks communications, implementation readiness and planning processes, engagement processes, reflection, and evaluation influenced implementation from the inner setting. How to adapt the age of initiation and the resources and patient needs were observed as intervention barriers from the outer setting. Cam *et al*,[60] identified electronic health records, concrete tools, and resources, training, and education as well as provider champions as facilitators. The barriers identified in the same study were problems of the electronic health record, issues pertaining to registries for state immunization, vaccine stigma and misinformation of patients, language or cultural barriers, levels of funding, competing priorities, training needs, staff involvement, and low literacy on health issues (72). In another study, the Building on Existing Tools to Improve Chronic Disease Prevention and Screening in Primary Care (BETTER 2) program identified factors impacting implementation based on CFIR (73). The identified elements were: 1) Intervention characteristics such as cost and complexity. Although the practitioners generally liked the intervention, they reported complexity with implementing the intervention which resulted in non-adherence; 2) Inner setting such as the identifying champions in the local area and teamwork. 3) Outer setting including perceived fit such as non-remuneration, inadequate resources particularly limited staff, and the duplication of staff responsibilities, needs of the patients where the mode of care would differ from that recommended by the CDPS ; 4) Planning processes and engagements, teamwork, and collaboration and; 5) Prevention practitioners characteristics such as ability to provide a supportive and motivational environment for patients (73).

In Ghana, West Africa another study explored the nurse's perceptions of implementing a new strategy for hypertension control (68). The study explored specifically the facilitators and challenges experienced during the implementation of the completed Task Shifting Strategy for Hypertension control (TASSH) trial (68). In-depth interviews and focus group discussion sessions were conducted with health care providers (68). A deductive analysis guided by the CFIR showed three emerging themes from the data. The themes were availability of resources, leadership engagement and patient health goal setting (68). The use of the CFIR in qualitative evaluation of implementation interventions was regarded as crucial including consideration of the local context where the program is being implemented (68).

Guided by the literature review this study explored all the five CFIR domains using an interview guide. Health care provider perspectives to identify barriers and facilitators to implementation of the shorter regimen for MDR-TB treatment in Harare, Zimbabwe were identified and analysed using the CFIR.

2.5 Problem statement

Treatment access for the greater proportion of individuals who develop DR-TB globally remains below the desirable coverage (1). Drug-resistant TB treatment scale-up has been generally low (24). The few MDR-TB patients that had access to treatment have received lengthy, toxic treatment with relatively lower treatment success rates. In May 2016, the WHO recommended a standardised, shorter-course treatment regimen for MDR pulmonary tuberculosis (PTB) (26). A survey conducted in June 2017 to assess progress in 29 high TB burden countries showed that despite some form of progress, none of the countries including Zimbabwe had aligned their guidelines with WHO 2016 TB recommendations (30). Zimbabwe launched the WHO 2016 standard shorter-course treatment regimen for MDR-TB in July 2018. Monitoring reports showed that some of the newly diagnosed MDR-TB patients notified between July and December 2018 had not been enrolled for the recommended shorter-course treatment regimen despite the launch of the guidelines (74,75). Additional evidence on the low implementation was by the Green Light Committee (GLC) observation in December 2018. The GLC reported that initiation of the shorter regimen was lagging in Harare, Zimbabwe. Delays in scaling up the most appropriate MDR-TB treatment regimens can be attributed to bureaucratic, operational, and technical obstacles (76). Delays in scaling up treatment pose a risk for increased development and transmission of TB resistant strains, increasing morbidity and mortality (27,77). Although developing and implementing guidelines based on scientific evidence is one of the effective tools for improving quality and care, many guidelines have not been used after dissemination (49,50). From the literature review, limited studies on health care provider perceptions on implementing recommended guidelines in practice were conducted in the African continent. More specifically for the Zimbabwe setting, there is limited published information about health care providers' perceptions of the facilitators and barriers to the implementation of the shorter course treatment regimen for MDR-TB. This suggests that this study could be one of the first of its nature in Africa to explore the perceptions of health care providers of implementing a standardized shorter-course treatment regimen for MDR-TB in Africa.

2.6 Justification

Despite the global efforts that have been made to reduce the burden of TB and MDR/RR-TB, more effective and more innovative approaches are required for the diagnosis and treatment of TB and MDR-TB (5). To my knowledge and based on the above literature search, there has been limited exploration of the subjective experiences that reflect the perspectives of health care providers implementing the TB program in LMIC contexts (57). Health care providers translate treatment guidelines to routine practice through active implementation. Health care providers' experience with MDR-TB treatment and care is important in shaping TB epidemiology. Their perceptions assist in informing strategies for the achievement of universal access to DR-TB services (78). Understanding the facilitators and barriers in implementation of the recommended MDR-TB treatment guidelines is an initial step to addressing guidelines adherence and subsequently the improvement of quality in management of MDR-TB patients (47). It is thus necessary to understand health care providers' perceptions and experiences of the recommended WHO 2016 standardised shorter-course MDR-TB treatment regimen, which has not been well documented globally including in Zimbabwe. Understanding the various factors will assist the TB program to leverage on factors that promote implementation adherence and find solutions to the barriers to rapid scale-up. Results from this study will provide the ZNTP with information to develop evidence-based strategic solutions that optimise the implementation of the shorter-course regimen or other future regimens for MDR-TB. Other health care programs can also draw important lessons for future implementation and scale-up of evidence-based interventions.

2.7 Study Objectives

2.7.1 Research question

What are the perceptions of the health care providers of the barriers and facilitators to implementation of the standardised shorter-course treatment regimen for MDR-TB in Harare, Zimbabwe?

2.7.2 Aim

The study sought to explore some of the factors that influence the implementation of a standardised shorter-course treatment regimen for MDR-TB in Harare, Zimbabwe from the health care providers' perspective.

2.7.3 Objectives

1. To explore barriers to the implementation of the standardised shorter-course treatment regimen for MDR-TB in Harare, Zimbabwe, from a health care provider's perspective.

2. To explore facilitators to the implementation of the standardised shorter-course treatment regimen for MDR-TB in Harare, Zimbabwe, from a health care provider's perspective.

According to the literature review, MDR-TB continues to be a public health threat with concerns of increasing cases in the future. The lack of documented literature to explore the health care providers' perceptions on implementing the shorter treatment regimen for MDR-TB may compromise the attainment of global targets to END TB by 2030. The next chapter focuses on the methodology adopted by this study to explore the health care provider perceptions of the MDR-TB shorter treatment regimen.

CHAPTER 3: METHODS

3.1 Study design

The study design was an in-depth, exploratory qualitative study. A qualitative approach was used to provide elaborate textual descriptions of healthcare providers' experiences and the in-depth understanding of the success and failure of recommended evidence-based practice (79). Qualitative studies help in the identification of strategies to facilitate implementation (80). To identify contextual determinants of the implementation of MDR-TB shorter-course treatment regimen in Harare, the consolidated framework for implementation research (CFIR) was used to guide the development of the interview guide, data collection, and data analysis process. The main goal of this qualitative study was to gain a rich and complex understanding of the facilitators and barriers to implementing the WHO 2016 MDR-TB guideline recommendations in Harare province public health facilities.

3.2 Study site

The study was conducted in the Harare metropolitan province, Zimbabwe. Harare is the capital city of Zimbabwe. The estimated population of Harare city is 2,140,485 with 50 public health facilities as shown in **Figure 4** below. The public health facilities in Harare include two infectious disease hospitals, three central hospitals, 16 polyclinics, 13 primary care clinics, 10 satellite clinics and six family health centres. Public health facilities within Harare province are largely owned by the City of Harare local authority and the government owns the three central hospitals. One participant was recruited from Wilkins infectious diseases hospital, one participant from Mabvuku polyclinic, one participant from Kuwadzana polyclinic, two participants from Chitungwiza central hospital, two participants from Highfield polyclinic and three participants were drawn from Beatrice road infectious diseases hospital. The selected health facilities are the most active in MDR-TB management in Harare province as guided by the gatekeepers. Health care providers selected from these health facilities have vast experience in providing TB services thereby meeting the inclusion criteria for this study. Only one government owned facility was included in the study as they only constitute 6% of the health facilities in Harare province. Harare province records relatively high TB incidence (74). It is one of the two provinces that initially piloted the management of MDR-TB in Zimbabwe (19).

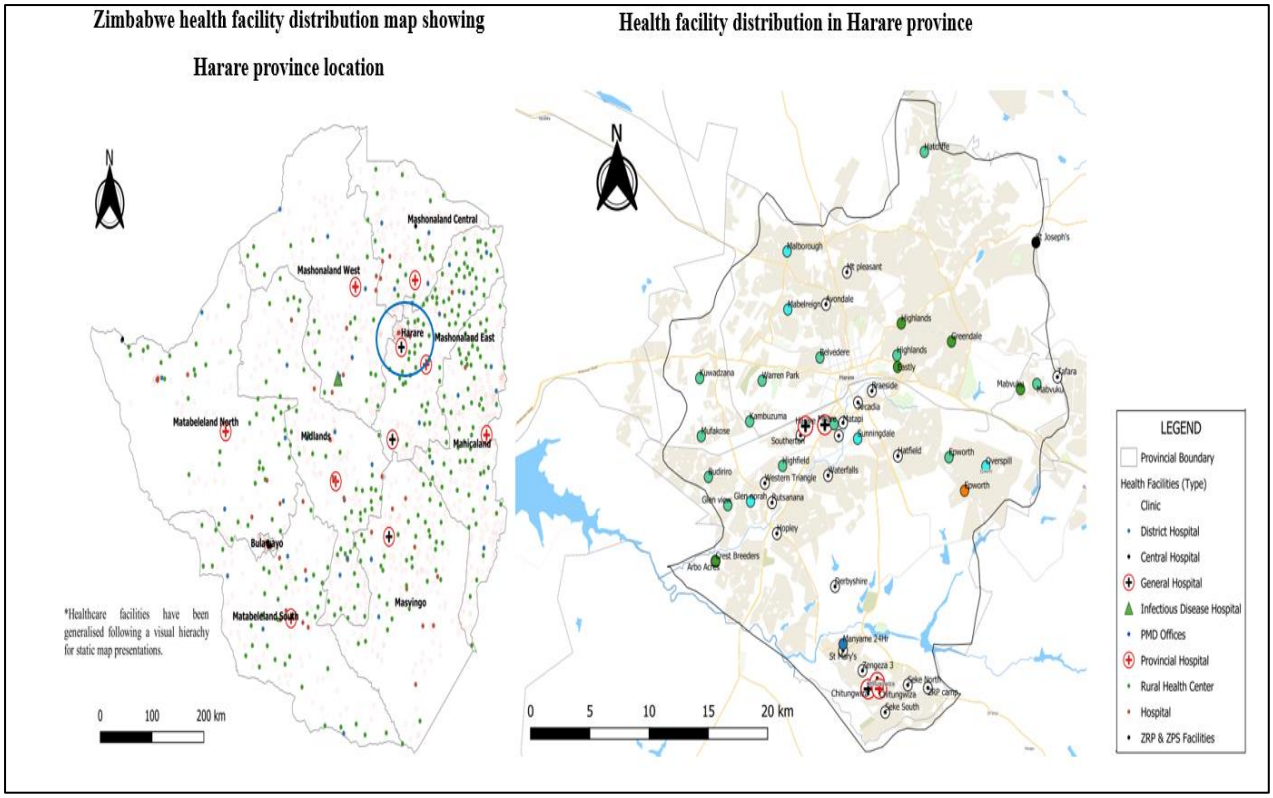


Figure 4*:Diagrammatic representation of the study site – Harare province public health facilities, Zimbabwe.*

3.3 Study population

The study population comprised of health care providers working within Harare province public health facilities. Public health facilities that were considered in this study constitute government and local authority-owned facilities. The selected central hospital owned by the government, infectious diseases hospitals and selected polyclinics under council ownership were selected as they had extensive experience in the management of MDR-TB by focal TB persons in these health facilities. Health facilities with health care providers that have been implementing MDR-TB management since the conventional treatment regimen were selected. For this study, health care providers are referred to as "anyone working in health facilities whose work contributes towards the process of treating TB patients". Health care providers that were interviewed constituted any of the following cadres: doctors, nurses, and environmental health officers. The selection of the three broad groups of participants was based on their active involvement in the TB treatment program in Zimbabwe. The study excluded health care providers working full-time in private health facilities and health care providers who had no experience working with the MDR-TB treatment program.

3.4 Sampling

A systematic 2-step approach using criterion sampling followed by stratified purposeful sampling was done to select health care providers eligible for participation. The sampling method ensured participant representation from all the three defined professions and levels of health care. The sampling frame included all health care providers who worked as doctors, nurses, or environmental health officers in public health facilities in Harare at the time of the transition from the conventional regimen to the shorter treatment regimen. Combination or mixed purposive sampling of participants was used as the sampling strategy to achieve as much variation as was possible in responses. The chosen sampling strategy was appropriate to the qualitative and exploratory study as it included participants from different clinics and different health care provider categories who may have had a variety of responses. Purposive sampling for qualitative research enabled the capturing of diversity around the phenomenon of enquiry (80).

Step 1: Criterion sampling

Central to the research objective, the first step was to identify health care providers that met the required criterion to address the research question adequately. The list of health care providers who met the requisite inclusion criteria was provided by the Harare Provincial TB Coordinator after the principal investigator explained the nature of the research. The list of potential participants was drawn leveraging on the knowledge that the Harare TB Coordinator had about the health care providers. Experience with TB management and MDR-TB workload in the respective health facilities was considered as part of the selection criteria. The criteria for participation included health care providers who have worked or were working in Harare province public health facilities as doctors, nurses, or environmental health officers at the time of transition from the longer to the shorter term MDR-TB treatment regimen. Additionally, the participant should have worked directly with the TB program for at least a year during their service in the public health sector.

Step 2: Stratified purposeful sampling

The eligible health care providers who met the required criterion for the study were stratified according to the three categories: doctors, nurses, and environmental health officers. In each stratum, representation of professionals from both the government and local authority owned health facilities was ensured during the selection of participants. Two participants where from

the government health facility (a nurse and a doctor) while the remainder of the participants were from the local authority owned facilities. The representation of an Environmental Health personnel was not possible from the Chitungwiza hospital which does not have Environmental Health personnel at the hospital facility. Instead, the Environmental Health personnel that were servicing the communities around the hospital are personnel from local authorities. The representation was predominantly nurses as they constituted a significant proportion of health care providers working as frontline workers for the MDR-TB program.

The Harare province TB coordinator assisted with the selection of appropriate health care providers to take part in the study. The principal investigator reached out to the Harare City Council authorities who then assigned the Harare TB Coordinator to assist with the research process. The principal investigator explained to the TB Coordinator the requirements of the study and provided the TB Coordinator with the information sheet for the consent process for reference. After providing the study details to the Harare TB Coordinator, she then identified possible participants who would be able to provide the information outlined in the study. Additionally, the Harare TB Coordinator provided a list with the possible participants' contact details and health facilities where they were currently working. The participants were reached and provided with the information sheets including the authority from Harare City Council to conduct the study. Willing participants confirmed with the principal investigator and appointments for the telephonic interviews were set. The research objectives and the study population characteristics such as their diversity and size determined which participant and how many of them to select (79). Ten health care providers were targeted for interviews, with careful consideration of theoretical saturation. Doctors constituted three participants and the environmental health officers constituted three participants. Four nurse participants were selected for the study. Availability and saturation were considered during the data collection process. The principal investigator scheduled appointments with the nominated participants per telephone. The process for scheduling the appointment involved introducing the principal investigator, explaining the research purpose and objectives, information on the permission and ethical clearances to conduct the study.

3.4.1 Inclusion criteria

The study included health care providers from public health facilities working as doctors, nurses, and environmental health officers providing TB services during the period of regimen

transition in 2018/2019. A minimum of one year working with the MDR-TB treatment program was a requisite for all study participants.

3.4.2 Exclusion criteria

Health care providers not defined in the three categories of doctors, nurses and environmental health officers were excluded from the study. Health care providers permanently employed in the private health sector and those with less than one year experience with the MDR-TB treatment program were excluded.

3.5 Data collection

3.5.1 Instrument design

An open-ended, interview guide was utilized for the data collection process (refer to **Appendix 6.10**). Literature informed the development of the data collection instrument. The interview guide was customised according to the CFIR constructs and objectives of the study. The interview guide collected demographic data and included key questions for the research. The interview guide contained additional probes and follow-up questions illustrating and clarifying the responses which reflected the objectives of the study (81). Members of the ZNTP working with the MDR-TB program reviewed the interview guide for logic and content.

3.5.2 Pretesting of the tool

To pre-test the data collection instrument, a pilot study was conducted to guarantee that the questions were understandable to the participants and that the flow was logical. A health care provider who was working closely with the TB program at a health facility in Bulawayo was interviewed to pre-test the interview guide. Bulawayo was the other pilot province for the programmatic management of MDR-TB together with Harare province. The pilot test showed no need for adjustment of the interview guide but rather the need to probe further where individual participants may need to provide more details useful to providing comprehensive answers to the research questions. The pilot interview tested the average time that would be required to complete the interview. An average of one hour was required to complete the interview. All participants were informed that the interviews would take at most an hour before

they consented to participate. Interviews were digitally audio-recorded using a mobile phone audio recorder and transcribed verbatim by the principal investigator.

3.5.3 Data collection process

Ten in-depth interviews were conducted telephonically during the Covid-19 pandemic between April and July 2021when face-to-face interviews were not possible. The in-depth interviews sought to explore health care providers' knowledge, understanding, interpretations, beliefs, experiences, perceptions, attitudes, behaviour, and interactions towards MDR-TB shorter treatment regimen implementation. These were meaningful attributes that the research questions sought to explore (81). Interviews were conducted in English by the principal investigator. Mobile phones with an inbuilt digital recorder were used to record the interviews. The permission letters from the health authorities were provided before requesting for consent from participants for the interviews. Copies of the permission letters were either sent as soft copies or the principal investigator delivered them in-person at the participants workplace while observing all Covid-19 protocols. The principal investigator and participant agreed on a convenient time for the interview. Where the initially agreed times were no longer possible, communication was made, and another time would be scheduled for the interview. The principal investigator contacted the participants before the interviews explaining the processes and how the interviews will be conducted. This conversation was not recorded. At this point, the principal investigator explained the use of a pseudo-name where the principal investigator needed to use a name during the interview. The participant and principal investigator then agreed on a pseudo-name that the participant would answer to during the interview. The exploratory interview employed an open approach to questioning so that the research issues are deeply understood. The principal investigator probed participants where necessary, giving the flexibility to ask why or how health care providers perceived specific issues following a response (82). The principal investigator took down notes as the data collection process was being conducted.

3.6 Data management

Digitally audio-recorded data on the mobile device was uploaded onto a password encrypted computer on the day that the interview was conducted. Data were transcribed verbatim, and the two supervisors validated three of the interview transcripts by randomly matching the transcribed data to the audio records at selected time points. The principal investigator familiarised herself with the data collected from the field, generated codes, searched, reviewed and named emerging themes. The principal investigator and one of the supervisors developed a codebook using 3 of the in-depth interview transcripts. The qualitative data codebook that was developed was based on the adapted CFIR framework and objectives of the study. Data from transcripts was stored and managed using MAXQDA 2020 (VERBI Software 2019, Berlin, Germany). The identity of all the participants remained anonymous with the use of a unique identifier and pseudo names. Transcripts were coded using the final set of codes. Emerging themes from the transcripts were added to the codebook where necessary. The supervisor validated the codebook. The recorded audios shall be securely stored for two years maximum if there is no publication and for six years if there is a publication from the research.

3.7 Data analysis

The review of data and subsequent analysis was conducted in parallel with data collection to enable the principal investigator to identify saturation during the data collection process (81). The framework approach was used to assist with the analysis of data for the study, and the CFIR framework was used as the analytical framework (82). The framework approach is used commonly for conducting a thematic analysis of semi-structured interview transcripts (82). A deductive approach to the qualitative data analysis was employed based on a pre-existing theory of factors influencing an intervention outlined in the CFIR framework. The data analysis process included five steps recommended by Ritchie and Spencer in 1993: familiarisation with the data, identification of a thematic framework, indexing, charting, mapping, and interpretation of the data.

3.7.1 Step 1: Familiarisation with the data

Familiarisation is the process where the researcher becomes acquainted with the data transcripts and gains insight of the collected data. The principal investigator immersed into the collected data by repeatedly reading the transcripts line by line and listening to the recorded audio. The process assisted the principal investigator to become aware of critical ideas and recurrent themes that were useful for a formalised coding process.

3.7.2 Step 2: Identifying a thematic/analytical framework

The principal investigator selected the CFIR analytical framework to guide this study. The CFIR framework was used to generate themes and codes which were pre-selected based on previous theories and literature (82). The five domains of the CFIR represented the major themes, while 14 constructs were selected to represent the sub-categories and codes. The five major themes that guided the study adopted from the CFIR were outer settings, intervention characteristics, characteristics of individuals, inner settings, and the process. The selected constructs that represented sub-categories and codes were; the relative advantage and complexity of the MDR-TB shorter-course regimen, implementation climate, health facilities' implementation readiness, organisational structural characteristics, network and communication, MDR-TB patients needs and resources, external policies and incentives, individual characteristics such as self-efficacy, knowledge and beliefs, engagements with different stakeholders and the planning process for implementing the recommended regimen. Initial coding of three transcripts ensured that all the essential aspects of the data had been included. Emerging themes such as network and communication that had not been documented in the codebook were included. The supervisor validated the customised codebook before coding of the remaining transcripts. The transcripts were coded guided by the codebook.

3.7.3 Step 3: Indexing

The CFIR was applied, indexing transcripts using the pre-defined codes and categories (82). Numbers were assigned to each code for easy identification. The numbers were used for indexing references and were annotated in the margin beside the text (82). MAXQDA 2020 was used to organise and store data for easy access during the data analysis process.

3.7.4 Step 4: Charting

Charting involves summarising data by defined categories from each transcript. Pre-defined categories generated for the study were used to ensure data reduction while maintaining originality in meanings and "feel" of the participants. A matrix generated in excel spreadsheet was used to "chart". The matrix comprised one column for each participant and one row for each code. References to interesting quotes or illustrations were included in the matrices under the relevant code.

Table 1: Example of a matrix for charting data for analysis

Themes	**1.Intervention Characteristics**		**Inner setting**		
Codes	Relative Advantage	Complexity	Structural Characteristics	Implementation Climate	Readiness to Implement
Participant 001D					
Participant 002N					
Participant 003N					
Participant 004E					

3.7.5. Step 5. Mapping and interpretation

The framework approach helps to compare data easily across cases and also within individuals during qualitative data analysis (82). A systematic model is provided by the framework approach for managing and mapping data (82). The framework approach situates each participants' perspective in context by maintaining the connection to the other aspects of each participant's account. 'Respondent validation' was done to rule out interpretation problems. The validation process involved the submission of an electronic version of preliminary findings to the participants through emails (83). The participants provided their feedback to the principal investigator after going through the preliminary findings. The CFIR provided a theoretical basis on which the findings from the study were interpreted.

3.8 Trustworthiness

For this qualitative research, trustworthiness was employed to ensure data quality and integrity for the study. The principal investigator used the four measures of credibility, dependability, transferability, and confirmability (80).

3.8.1 Credibility

The selection of participants for this study was based on a clear criterion of purposively selected individuals who are well experienced and directly involved with MDR-TB treatment. This selection criteria ensured the participants eligibility to provide credible information. Furthermore, the supervisors and the Wits assessment committees examined the methodology for appropriateness and avoidance of bias in the study. Direct quotes from the transcribed data were also used in the research write-up for credibility of the findings.

3.8.2 Transferability

To ensure that the findings from this study can be transferred to other settings or contexts, the research process was fully documented including the framework that guided the data collection (CFIR), interview guide development and the data analysis process. The methodology section in chapter 3 provides the step-by-step guide on the processes taken during the research. Interviews conducted with the health care providers were recorded and all other necessary research documents kept safe.

3.8.3 Dependability

Raw data of recorded audios of interviews and the description of how data was collected and analysed were kept safe by the researcher for future review on consistency and replicability of the processes used for data collection. To substantiate the perceptions of health care providers reflected in the study findings, selected quotes were extracted from the transcribed raw data from participant interviews.

3.8.4 Confirmability

Data was recorded and recording kept safe to ensure the confirmability of the study findings. Details describing all the steps from data collection through to data analysis are well documented. The interview guide that was used to collect data for the research has been annexed to the research report (**Annexe 6.10**). Data collected during the study was also discussed with the research supervisors.

3.9 Ethical considerations

Ethical approval was obtained from the Wits Human Research Ethics Committee approval M201101 -attached as **Appendix 6.3** and the Zimbabwe Medical Research Council approval MRCZ/B/2025 attached as **Appendix 6.4**. Authorisation to conduct the study was obtained from the MOHCC Zimbabwe and Harare City Council. Written consent for voluntary participation and audio-recording was obtained from all study participants before the interview. Electronic copies of consent forms were sent out to participants before the interviews. Where participants were not able to print or provide electronic signatures, consent forms were signed in-person at the participants' health facility on the same day the principal investigator delivered permission letters to conduct the study from health authorities. Consenting participants returned the signed consent forms electronically or physically to the principal investigator. There was no incentive offered for taking part in the study. The principal investigator assured participants of confidentiality and privacy in the research process. Pseudo names were used for participants during the audio recording process for confidentiality, and data obtained will only be used for this study. Participants could withdraw their participation anytime even after providing consent. Information on the study was provided before the interview was conducted, and the participants were allowed to clarify any issues related to the study. For other issues and questions related to the study, details for the ethics committees and supervisors were provided to the participants. Gatekeepers for the study sites in Harare were approached to seek permission to conduct research with the public health facility staff.

After data was collected, transcribed and analysed; the results from the study were presented in the next chapter.

CHAPTER 4: RESULTS

Results on the perceptions of the health care providers of the facilitators and barriers to WHO 2016 recommended standardised shorter-course treatment regimen for MDR-TB implementation in Harare, Zimbabwe are presented in this chapter. The specific objectives were to explore the barriers and facilitators to the implementation of the standardised shorter-course treatment regimen for MDR-TB in Harare, Zimbabwe as perceived by health care providers in public health facilities. The analysis of data from the 10 interviews that explored 14 selected CFIR constructs summarised results into seven major themes:

4.2.1 Health care provider perceptions of MDR-TB patient needs and preferences.

4.2.2 Health care provider perceptions of the shorter MDR-TB treatment regimen.

4.2.3 Health care provider perceptions of the health service environment.

4.2.4 Health care provider perceptions of global and local policies and guidelines.

4.2.5 Health care provider perceptions of opportunities for information dissemination.

4.2.6 Health care provider description of the MDR-TB shorter treatment regimen implementation process.

4.2.7 Health care provider perceptions on collaborations and stakeholder engagements.

The demographic characteristics of the participants are presented below.

4.1 Demographic characteristics

Ten health care providers from Harare province public health facilities were interviewed. The participants consented to participate before the interviews as well as providing demographic data. The table below presents the participants' demographic characteristics.

Table 2: Summary of participants' demographic characteristics

Variables	Variable description	N (%) or (mean)
Gender	Females	2(20%)
	Males	8(80%)
Age	Years (mean)	50.8
Profession	Doctors	3(30%)
	Nurses	4(40%)
	Environmental health personnel	3(30%)
Participants by health facility ownership	Government	3(30%)
	Harare City Council	7(70%)
Experience in TB treatment services	Years (mean)	17.9

4.2 Study results

The findings from this study were guided by the five CFIR domains and 14 constructs. Below is a summary of barriers and facilitators to the implementation of the shorter MDR-TB treatment guidelines in Harare province as described by the healthcare provider.

Table 3: Summary of identified barriers and facilitators to the shorter MDR-TB treatment regimen implementation

THEME	FACILITATORS	BARRIERS
HCP perceptions of patients' needs and preferences	-Providing nutrition education, supplementing, and diversifying the patients' diet. -Decent accommodation (adequate water and sanitation facilities) -Allowances/stipends	-Prolonged treatment period -Frequent visits to health facility -Injections -Medicines with side effects

THEME	FACILITATORS	BARRIERS
	-Psychosocial support -Flexible modified direct observed treatment (DOT) -Reduced treatment period	
HCP perceptions of the shorter MDR-TB regimen	-Reduced duration (less burden on HCP and patient) -Cost effective -Reduction of workload -Decongestion of health facilities -Improves patient adherence and compliance	-Kanamycin injectable -High pill burden
HCP perceptions of the health service environment	- Availability of resources human resources, o *medicines* o *diagnostic and monitoring equipment,* o *reference documents* o *transport and communication* - Leadership support - Incentivising HCPs	- Inadequate infrastructure for MDR-TB management - Poor remuneration - Limited or non-availability of resources o *human resources* o *medicines* o *diagnostic and monitoring equipment* o *reference documents* o *transport and communication*
HCP perceptions of global and local policies and guidelines	-Adoption of current WHO guidelines for MDR-TB management -Free MDR-TB services in the public sector	-Fees charged for investigations o *Electro-cardiography (ECG),* o *Liver function test* o *Chest x-ray,* o *Full Blood Count (FBC),… etc.* -Employee sick leave policy -Covid-19 regulations for person movement
HCP perceptions of opportunities for information dissemination	-HCP access to knowledge and information on the MDR-TB shorter treatment regimen. - Ready availability of guidelines in hard copy format	-HCP knowledge gaps -Guidelines dissemination on WhatsApp platforms

THEME	FACILITATORS	BARRIERS
	-Electronic based data management systems	
HCP description of the MDR-TB shorter treatment regimen implementation process	-Decentralization of Gene x-pert technologies -Prioritized information dissemination with adequate coverage of HCPs -High commitment by patient -Feedback and support within the health system	-Limited knowledge and information among HCP -Intensive monitoring and follow-up schedule -Fees charged for investigations o *Electro-cardiography (ECG),* o *Liver function test* o *Chest x-ray,* o *Full Blood Count (FBC),… etc.*
HCP perceptions on collaborations and stakeholder engagements	-Collaboration with other entities (government, parastatal, academia, religious organisations, donors and implementing partners. -Engagement with key stakeholders	-Failure to collaborate and engage

The details of the results that were obtained reflecting the health care provider's perceptions are presented below.

4.2.1 Health care provider perceptions of patient needs and preferences

Results on the health care provider perceptions of patients' needs and preferences partly reflect factors from the outer setting of the CFIR domain that were perceived to influence the implementation of the shorter treatment regimen for MDR-TB. Socio-economic issues including financial support, nutritional support, psychological support, and treatment preferred by the patient were commonly referred to by all the interviewed health care providers regardless of category and health facility ownership.

Socio-economic issues

Participants described a wide range of socio-economic issues that were perceived as common barriers to implementing MDR-TB treatment. The socio-economic issues identified ranged from financial, nutritional, accommodation related, and psychological issues.

Social and economic issues affecting patients were summarised in the following statement.

> *In terms of the material things at home, they don't have enough of those things that I've mentioned, like food, they don't have clean water supply. They don't have ventilation in their rooms. They are overcrowded and there are a lot of other issues surrounding them. This could hinder treatment and, they end up defaulting treatment. (Participant_5)*

Most participants expressed that MDR-TB patients faced challenges with their finances. Participants attributed this financial incapacitation to the increased demand to meet medical and living expenses against depleted income sources. The need to meet transport costs to the health facility, ensure adequate nutritious meals, school fees and health care for the dependants were cited.

These financial factors were perceived as barriers to implementing the shorter treatment regimen as highlighted below.

> *The first one I said was that they (MDR-TB patients) should access money for investigations like FBC (Full Blood Count), U and E's (Urea and electrolytes), liver function tests and chest x-ray. (Participant_3)*

The form of employment is affected. They (MDR-TB patients) also have families... but then where to get money now to support their family or even for transport to the local health centre is really an issue. (Participant_8)

There are certain industries where they cannot work. They cannot go to work until they are certified to go to work so.... they run out of income as a result. So that is a problem because running out of an income where you need food, you can't get adequate food, where you need to send your child to school, you can't get money to send your child to school. (Participant_1)

Most participants emphasized the need for nutritious food for patients during the treatment phase. Consumption of nutritious food was perceived as a facilitator while the lack of nutritious food was perceived as a barrier.

These views are exemplified below:

And I think the other one thing, the MDR-TB patients should be on a diet. It should be a high protein diet. So, we educate them so that they can use available resources at home. (Participant_3)

Also giving them food, nutritional food to boost their nutrition because most of them (their nutrition) will be bad. Especially those that come from foreign countries who are bedridden MDR, they require nutritional support. (Participant_10)

I think some of the needs, some (MDR-TB patients) they don't have money to come from where they stay, and you find with the medication they need a lot of food. (Participant_5)

Some participants perceived that decent accommodation and sanitation facilities as a potential barrier to the uptake of the MDR-TB treatment among some of the patients. This perception was exemplified below.

Some don't even have enough amenities like even, you know, clothing. Even where to sleep, proper housing with the ventilation and sanitation. There's no water there. And sewages are just you know, all over. (Participant_5)

Participants noted that resources were offered to MDR-TB patients which addressed in part some of the barriers to MDR-TB uptake. Food vouchers and allowances to cater for transport

and other basic costs were among the examples mentioned and were viewed favourably by participants.

> *They came, they gave them hamper forms to go and collect food at OK, at TM. It assisted our patients a lot. (Participant_6)*

> *Well, now they were being given 25 dollars per month. Which could most of the time come after three months being 75 dollars. I think if it could be possible. If they (MDR-TB patients) could get something like 50 dollars, at least, I think it would go a long way to fend for their families. (Participant_4)*

> *I told you about people getting money for bus fare. But I think if that could be improved, let's have a certain amount people getting let's say like $200 a month for example during the treatment. That would support them in in a big way. That will cover, if they lose income then at least they would get some food on the table. (Participant_1)*

Psychosocial support for MDR-TB patients at the health facility level, community level and household level were regarded as a facilitator by the participants. Stigma and discrimination were noted to be the greatest fear among the MDR-TB patients.

The following extracts resemble the need for psychosocial support as described by participants.

> *I have patients in that OPD and there is the MDR patient who particularly requires a specialized, customized, or differentiated support. Psychologically. Mentally, spiritually, physically, socially. Imagine DR it's... what I'm saying is that the diagnosis for TB itself brings with it depression and to worsen the situation DR is even more than that. (Participant_5)*

> *And joining support groups. There are no support groups like in HIV. If there are those support groups in TB and those activities in TB, it will help for them (MDR-TB patients) to be on treatment. (Participant_2)*

Patient treatment preferences

Some of the participants were of the perception that the prolonged treatment for MDR-TB required implementation of modified direct observed treatment (DOT). Modified DOT was perceived to lessen the burden of frequent health facility visits by the MDR-TB patient.

Modified DOT was perceived as a facilitator as illustrated below.

They (MDR-TB patients) would also want modified DOT treatment because they argue that they are on lifelong treatment. They question why DR patients are asked to come every day to the health facility and are not allowed and trusted to take their medications at home and only come to the health facility after a month. So, they would want modified more friendly DOT schemes rather than the strict facility-based DOT. (Participant_7)

Some of them they prefer to be given their supply for a longer period. (Participant_2)

Participants perceived that the injection was a hinderance to the effective implementation of the shorter course treatment regimen. The injectable required experts to administer at the health facility. There were also side effects noted to be persistent for patients on the shorter treatment. An injectable free regimen was perceived to alleviate some of the challenges associated with the WHO 2016 recommended shorter treatment regimen for MDR-TB and was therefore recommended by the participants.

We tended to have side effects with the injectables that were available, so doing away with that regimen which had an injectable means less side effects for the patient. (Participant_1)

4.2.2 Health care provider perceptions of the shorter MDR-TB treatment regimen

Aspects of the intervention characteristics as one of the CFIR domains were described by the health care providers. The shorter treatment regimen for MDR-TB was the intervention of interest. Health care providers referred to the relative advantages of the shorter treatment regimen when compared to the conventional regimen. Perceptions among some participants were that despite the reduction in the duration of treatment, 9-12 months was still a long time to be on treatment and a further reduction would be preferrable. The transition from the kanamycin inclusive regimen to an all-oral regimen was also recommended as the best option for MDR-TB so far available in the Zimbabwe setting. The complexity of implementing the shorter MDR-TB regimen was also articulated.

Most participants were convinced that the shorter treatment was preferable to the longer treatment regimen. The interviewed participants cited that the regimen was acceptable and flexible for the patients which facilitates its uptake.

The patient can quickly accept it. Or it will be very difficult to tell them they will be on treatment for 24 months rather than to say 9 to 12 months. (Participant_2)

The advantage is that the shorter period is more accommodative than the longer one. And... it gives a chance to the patient to do other activities. To upgrade or to do other things for his or her social life. (Participant_6)

Some of the participants cited that the reduced duration for the shorter treatment provided several advantages to the patients, the health care provider as well as the health system. Participants perceived that the shorter treatment reduces costs, reduces burden on the health care provider, improves patient compliance and adherence to treatment. These factors were to facilitate implementation.

The perceived advantages of the shorter treatment are expressed in the quotes below.

And to the health care system as a whole, it's cheaper and for follow-up purposes, it would be better to follow-up a patient for six months rather than for two years. It's cheaper and it's affordable for the patient. (Participant_3)

... also, to the health worker because of the period, it lessens the burden of care. Because instead of giving the patient for 24 months, you are now giving for less so the healthcare worker can cover more patients in a short time and provide adequate care to the patient since the burden will be reduced. (Participant_10)

I think a shorter term is best for the clients because we are sure that they will complete the treatment and that they'll be cured and the chances of them defaulting are lesser unlike when they are on a longer regimen. (Participant_2).

Participants were of the perception that workload was reduced by the shorter treatment citing the reduced timeframe that MDR-TB patients are managed at the health facility.

The factors outlined above were viewed as facilitators to implementation as illustrated below.

You have fewer patients at a time because most of them will have completed their treatment. So, it's easier when we look at the workload. (Participant_4)

Yes, I think even for us (health care providers) it means less work because previously I think we followed them (MDR-TB patients) for almost two years. Now if you are going to follow them for nine to twelve months, it means less workload and you can monitor them consistently. (Participant_9)

In addition to the reduced workload, participants cited decongestion of the health facility when the shorter regimen is implemented. Efficiency gains across the different collaborative

departments such as consultation, pharmacy, laboratory, and the environmental health services were cited saving time and resources. This was noted as beneficial for Harare province where attrition of health care providers was reported to be relatively high during the study period.

> *Another advantage is it decongests the facility because of the short period. It also helps in sourcing adequate treatment for the available patients by reducing the shortages of treatment since the treatment period will be short. (Participant_10)*

Some of the participants were of the view that implementing the shorter regimen was cost effective to the health care system, noting that it is cheaper and affordable to follow-up a patient for six months rather than for two years. These factors were perceived as potential facilitators for implementation of the shorter regimen as expressed below:

> *Yes, I think so because it's also cost effective. It reduces costs considering our economy as well as the manpower. We have got a shortage of human resources as well as all the other resources. What we need in delivering services to these clients is less costly. (Participant_2)*

Some of the participants cited that despite the advantages of the shorter treatment regimen, there were side effects noted with some of the medicines. The side effects could lead to discontinuation of medication by the MDR-TB patient. A regimen with fewer side effects would be preferable to the shorter treatment regimen to facilitate implementation. The side effects were perceived as a potential barrier, and this was reflected by one of the participants.

> *… this shorter regimen has got a lot of drugs which have got lot of side effects. (Participant_2).*

> *And one student I think also was affected, I think the hearing problem was in Form 4. I don't know if you continued and finished his school. (Participant_9)*

Most of the participants perceived that although the regimen was preferable to the longer regimen, there remained some complexities with the shorter treatment mainly related to injectable medicines and the pill burden. The kanamycin injectable required a health care practitioner to administer while patients had to visit the health facility three times per week, creating barriers for treatment access for patients who were unable to reach the health facility as exemplified below.

Three times a week, it was difficult. You would find that the patients would at times deteriorate. On initiation of treatment, the patient would be able to talk and walk but because of fear of unknown and the injectables and knowing very well that the treatment would go on for such a period would at times cause the patient to deteriorate (Participant_10).

The other one is because of the treatment now, some of the patients, they lose their jobs because they must come to the hospital for especially during the intensive phase, the injection. (Participant_9)

Additionally, participants perceived that the number of prescribed tablets for the patient for the daily dose was relatively high which could be a barrier to the uptake of treatment. The health care providers were of the view that a self-administered oral regimen with fixed dose combinations for the medicines may address the complexity related to the shorter MDR-TB treatment regimen thereby improving its acceptability among patients.

The complexity related to the shorter treatment was described below.

…although it's shorter, it's still a challenge because taking six or so drugs taking five from each. One ends up taking thirty tablets or so. It's a challenge. I don't know if there was that combination, fixed dose combination. (Participant_2)

4.2.3 Health care provider perceptions of the health service environment

The health service environment mainly articulated factors related to the CFIR domain, inner setting. The factors described included infrastructure and the health facility readiness to implement the shorter MDR-TB treatment regimen. The implementation climate within the health facility to support the shorter MDR-TB treatment regimen was also described. Additionally, network and communication within and between the health facilities was described. Perceptions on readiness to implement and, network and communication were similar for all participants while the perceptions on infrastructure and implementation climate differed between health facility ownership.

Some of the participants particularly from the council owned clinics perceived that the health facility infrastructure was non-aligned to requirements for MDR-TB treatment. On the contrary, participants from the government owned facility perceived the infrastructure to be adequate. The government health facility has adequate structures dedicated for HIV and TB

management which was different form the council-owned facilities. Participants from council-owned health facilities described the ventilation as inadequate and the rooms too small acting as barriers for provision of MDR-TB services.

The inadequacy of the infrastructure was described below:

> *Yes, the infrastructure is not enough, and we don't manage the patients indoors, mostly outside. (Participant_6)*

> *…there's not enough ventilation. And the unit considering that we have got a lot of clients coming, they're not only TB patients some walk ins even come in from anywhere if the people think that this is a hospital. The space is small. (Participant_2)*

Most of the participants reported that leadership from all the levels supported the shorter regimen implementation process. Leadership support was regarded as a facilitator.

These views were exemplified below.

> *That's the team that comprises the director, the environmental health within the nursing staff. And the infection control focal person or manager who is based at BRIDH (Beatrice Road Infectious Disease Hospital). That's the team that usually, moves around looking at this. (Participant_5)*

> *We are talking of ordering and supplying of these TB drugs and the stationery to be used. We are also getting support in the sense that wherever we get challenges here and there we even consult, "DMO (District Medical Officer) here we have got a challenge. How are we going to manage this patient?" He says, "No, do ABCD. Or if ever it is really an issue please refer him, book him for a review on such and such a day." Then he comes, he sees the patient, he assists the patient, orders medication or whatever then we take over. (Participant_8)*

> *Well support is at different levels, we have distribution of guidelines, SOPs, in-house training and mentorship. And review of complicated cases. (Participant_7)*

Most of the interviewed participants perceived resource availability in the health facilities as strongly influencing the implementation of the intervention. On the contrary, participants believed that inadequate resources posed barriers for implementation.

The preferred situation with regards to the availability of resources was described below.

But what we are saying if ever we get adequate tools and equipment to do our work properly and all those tools are available, the drugs are available, trainings have been done of which each one knows how to manage (MDR-TB). You are left with the TB clinic. Then if you are trained, you know what to do. Then for us, it's fair and fine (Participant_8)

Participants perceived the shortage of human resources in Harare province public health facilities as a barrier. High staff attrition was reported for Harare province council-owned health facilities leaving the available staff overwhelmed. The onset of the Covid-19 pandemic further worsened the situation as staff were either infected or affected leaving minimal staff at the health facilities. The human resource shortage posed challenges for health service providers making it difficult for them to provide treatment services, specialised monitoring services and to attend trainings.

The human resources for health situation in Harare province was described by different participants as reflected below.

Because these days with this issue of Covid-19. The doctors are not accessible here most of the times. They are supposed to be here, but they are being overwhelmed otherwise with other duties. (Participant_6)

… at times someone may not attend the workshop because of shortage of staff or competing activities within the department but once they miss the workshop they would have lost out on important information. That person is the one who is working directly with the patients. (Participant_10)

We have an ECG machine of course, we were given by the Union I think, but it still goes back to the shortage of manpower, who is going to do it. (Participant_2)

On the contrary, the participants were of the view that providing the requisite staff to work collaboratively in the respective departments: consultation, laboratory, pharmacy, health promotion, data management, environmental health among others facilitated implementation.

We should have people from the laboratory, we should have people from the environmental health, we should have nurses, we should have doctors. It's a multidisciplinary approach that is required. (Participant_1).

Some of the participants perceived that the provision of incentives for health care providers could facilitate MDR-TB shorter treatment regimen implementation. At the time of study, there were no incentives that were being provided to the health care provider for MDR-TB services.

These views were exemplified below.

> *Okay, you know, the main problem is money. If there could be some form of a monetary incentive. The whole chain really from laboratory, from the actual where the samples are taken through laboratory, diagnostics, notification and follow-ups in that case. If the system would have a way of incentivizing the health care worker in terms of monetary incentives, then I think people would be better motivated to do the right thing at the right time. (Participant 1)*

> *We were asking for an allowance... which I might say now the Global Fund is now taking over. Otherwise, we were thinking the local authority head could also look at that work and incentivise the team. (Participants_4)*

There were mixed perceptions among participants on the availability of medicines regardless of health facility ownership. While some participants perceived that the medicines were available in adequate quantities, some of the participants cited non-availability of some medicines that constitute the shorter treatment regimen for MDR-TB at specific health facilities. Unavailability of ethionamide and levofloxacin was commonly referred to.

> *We never run out of the medicines unless if we don't order from the central level. (Participant_5)*

> *... I think sometimes, there were times that we would not find drugs like ethionamide or the antibiotic levofloxacin. (Participant_9)*

> *And as a result, we experienced that some of the patients who were supposed to be on the shorter regimen were put on the longer regimens. So that was one of the problems which we which we encountered...because there were no medicines. (Participant_4)*

Additionally, the provision of shorter treatment medicines, all participants perceived that the health system should be able to provide ancillary medicines for the management of adverse effects. Common medicines like chlorpheniramine were reported as not readily available at the local health facility, a potential barrier to the uptake of the shorter treatment regimen.

I prescribe medication, those basic like chlorpheniramine. They're not there for the clients. (Participant_2)

If the patient also came with some side effects and you wanted to prescribe some medication, those who could not afford I think ended up not getting the treatment because the clinic only offered basic medication, some of the medication they didn't have. (Participant_9)

Some of the participants argued that patients required ready access to diagnostic and monitoring equipment to facilitate the treatment process. Participants expressed that MDR-TB diagnosis had been decentralized to the local health facility laboratories in Harare province, offering Gene x-pert and microscopy services. Centralization of DST culture to the national reference laboratories was perceived as a barrier as described by one of the participants.

… if we would be able to test here, we are a big institution, an infectious disease hospital. We have got the laboratory, if our laboratories would be capacitated to do the test, let's say the culture DST test here. Sometimes we need to confirm when the result comes out as indeterminant, we need to confirm as quickly as possible whether this indeterminant will eventually go to sensitive or drug resistant. (Participant_1)

Limited availability of reference documents in Harare public health facilities was believed to contribute to initial delays in accessing treatment by most of the participants. The 2016 TB and leprosy guidelines, TB job aides, EDLIZ, the algorithms, registers, patient booklets, information, education, and communication (IEC) materials were reported to be available in limited quantities and not readily accessible by the health care providers at the health facility.

The manual is there... but one manual the whole district. (Participant_6)

We do have very limited resources... even the registers themselves... we don't have enough registers. There are these booklets for each client, now we don't even have them at our clinic and the notification forms at times we run short of them (Participant_4)

We don't have charts, we don't have anything that we can... besides telling health education to the patient, there is nothing that someone can just read. Pamphlets which will allow individuals to read on their own about MDR, about TB. There isn't much left here. (Participant_10)

Some participants perceived that transport and communication means were not readily available in the health facilities posing a potential barrier.

These views were exemplified below.

> *Those are some of the challenges we are having. Stationery, transport, airtime to phone the patient… to name but a few. (Participant_6)*

> *You ask for a vehicle. There's no transport for me to go and suppose I want to see that there's a problem with this clinic they don't know how to manage TB. I want to go and mentor them. How do I go there? I don't have transport. (Participant_2)*

> *There is no one to do the contact tracing. The EHTs don't have transport to go and trace. If you wait for the clients to come, they don't come. Very few will come. We don't even have a cell phone to just phone... to say we need to see your contacts. There is nothing. (Participant_2)*

4.2.4 Health care provider perceptions of global and local policies and guidelines

Policies and guidelines emerged as important factors of the CFIR domain outer setting, having a significant influence on regimen implementation. Policy issues were better articulated by the doctors than the other professional categories. Understanding the effect of policies was not commonly understood among the participants despite the major influence they are perceived to have on implementation of the shorter treatment regimen for MDR-TB in the Harare context.

A few of the participants related the adoption of the global guidelines from the WHO to financial incentives to the country. Incentives cited included grant awards that fund the procurement of recommended medicines on behalf of the government thereby facilitating implementation.

This view was expressed in the statement below.

> *The other incentive is once you also adopt global guidelines like these MDR-TB medicines are global procurement channels. So, you benefit from those grants. (Participant_7)*

Most of the participants indicated that MDR-TB services were offered for free in the public health facilities as provided by the national policy, which they viewed as a facilitator. Despite the national policy for free MDR-TB services, some health facilities charged fees for medical investigations services such as liver function tests, U and Es, full blood count (FBC) and electro cardiography (ECG) which posed as a barrier to effective implementation of the regimen.

These perceptions are illustrated below.

> *They don't pay for the treatment. Consultation is free. Everything if free. (Participant_3)*

> *The clinical tests we should have FBC (Full blood count) before commencing the patient and the chest x-ray is mandatory. And thirdly you should have the liver function test and urea U and E's, urea and electrolytes which checks the kidney. They are available (at our institution), but the patient should pay. (Participant_3)*

Some of the participants expressed the effects of the current Covid-19 pandemic regulations on the implementation of the regimen. Their perception was that some of the measures enforced by the government to control Covid-19 such as the lockdown restriction policy prohibiting person movement negatively affects diagnosis and medicines pick-up for MDR-TB patients. These factors were perceived as potential barriers to implementing the shorter regimen as described below.

> *... they had a problem in the movement from their living quarters to the clinic to get their medication because for you to move from one point to the other then they would say you need to have a letter to confirm that you are an MDR-TB patient. (Participant_8)*

Additionally, some of the participants were of the view that the labour policies such as the number of sick leave days granted to an employee influenced implementation. Participants perceived that the labour policies were not accommodative of the shorter treatment regimen duration which increases the chances for job losses among patients.

Their views are expressed below.

> *They go on sick leave and then they are eventually removed from their form of payment because of that. But for these ones who would go for a year, nine months to a year, most of employers were tolerant to those ones. So, they would eventually go back to work. (Participant_1)*

> *The other one is because of the treatment now, some of the patients, they lose their jobs because they must come to the hospital for especially during the intensive phase, the injection. So, they lose their job. (Participant_9)*

4.2.5 Health care provider perceptions of opportunities for information dissemination

Participants also described factors aligned to the inner setting of the CFIR domain, referring to communication within and between the health facilities. Available resources and means of communication were described. Existing gaps in the current information dissemination methods were articulated. Participants also suggested ideas on how communication could be improved for better implementation of MDR-TB management.

Participant perceptions of access to knowledge and information on the MDR-TB shorter treatment regimen among health care providers varied. While some participants were of the view that they were adequately equipped with information others reported gaps in knowledge and information on the MDR-TB shorter regimen. The lack of information was perceived as a barrier while adequate information was perceived as a facilitator.

> *And even the health care providers you find, for example, some nurses they don't want to work in those departments with TB because they fear to contract the disease. But if you have got the knowledge, you know how it is spread and how to make sure you don't get infected. (Participant_5)*

> *And the issue of knowledge seems to have played a part, it seems like there are a few of our doctors who are knowledgeable of MDR and most of them they will know later. They are not the first ones to be given information. The nurses may get the information earlier, but the nurse cannot implement it alone. (Participant_10)*

While other participants perceived that dissemination of information through training, sensitisation, and provision of guidelines was required for effective implementation others perceived that the ready availability of guidelines only was sufficient to facilitate implementation.

Participants expressed the following views.

> *The protocol, how to even if the medication is new, like even the way you're supposed to give it. You just need to follow; all you need to do is to be meticulous to detail. (Participant_5)*

> *Maybe it was the issue of information dissemination. And even the trainings in the management of this new regimen. You will find some of our guys, they never got trained but then they just got into the program. (Participant_8)*

Some of the interviewed participants perceived the WhatsApp platform as a common method in widely disseminating guidelines and other reference materials. Other participants perceived those users of the guidelines experienced challenges with accessing information shared on the WhatsApp platform with time and users preferred hard copies instead.

This perception was illustrated as follows.

> *So, if we send guidelines as a PDF on a WhatsApp message on a group, after a month some people won't have access to it, they won't even know where it is within their gadgets to be able to refer to. So that is a problem (Participant_1).*

Some participants perceived that in addition to the paper-based and telephone communication, there was need for an electronic based system linking up all the health facilities. Strengthening network and communication to include electronic systems was perceived as a potential facilitator as expressed below.

> *... we need to use the papers; the paperwork I am sure you have the transmittal sheets. It's about the communication, both a written communication as well as using phones. (Participant_5)*

> *... I think I.T. should come in place. These paper-based issues… I think we should have an I.T. system whereby we have got a linkage with our clinics. (Participant_2)*

4.2.6 Health care provider description of the MDR-TB shorter treatment regimen implementation process

The health care providers also articulated the factors related to another construct from the CFIR domain, intervention characteristics. Health care providers described the implementation process of the MDR-TB management and the related factors that would facilitate or complicate the implementation of the shorter regimen as outlined below.

The process for implementing the MDR-TB shorter treatment regimen includes the diagnosis of DR/RR TB using gene x-pert technology, notification of the DR/RR-TB confirmed cases, follow-up and monitoring of the patients. Data is routinely reported to the national level data repository. Most of the participants perceived that the decentralization of gene x-pert technology to lower-level facilities in Harare province was a facilitator for implementation.

But with the introduction of the gene x-pert machines to the polyclinics, it now became easier for us whether the DMO is available or not available that day. If ever we diagnose a case, we just prescribe. (Participant_8)

I think for any patient who comes who is suspected of any type of TB, there is a gene x-pert that is there at the clinic… (Participant_9)

We have a laboratory facility here. When we are doing a Gene x-pert, there is that element of testing the drug resistance, Rifampicin resistance. When it is picked, automatically we will have identified the case. (Participant_6)

Participants perceived that knowledge was limited to a few cadres in clinical practice resulting in a barrier in treatment access for MDR-TB diagnosed patients. Some participants cited that in the absence of knowledgeable cadres at the health facility, there was a risk of delayed treatment initiation or that of patient being initiated on a longer treatment regimen.

These views were expressed in the following statements.

Imagine one is diagnosed, a patient is diagnosed here but there is no one who will commence that patient because cadre A who has the knowledge is not there. Will we wait for two weeks for that cadre to come? There is a gap already. (Participant_6)

So, the doctors will also be required to know earlier so that all health care providers are able to move together with the same knowledge. We encountered hiccups when the doctor who was knowledgeable at that time would not always be available and the doctor who would be available but not knowledgeable about the shorter treatment regimen would opt to continue with the old regimen. (Participant_10)

Furthermore, some participants were of the view that information dissemination needed to be prioritised. Effective implementation was perceived to be possible when information dissemination is prioritised to the key drivers of implementation. Prioritising key drivers of implementation among health care providers for information dissemination was perceived as a facilitator while failure to disseminate information to key health care providers, a potential barrier.

These perceptions were expressed in the statements below.

The Sister-in-Charge who is supposed to have the knowledge about the drugs came and asked me which drugs we are giving for the short regimen. Which indicates a very big

gap when we are administering TB management, DR management. When the Sister-in-Charge is not aware. How about the general cadre? (Participant_6)

And the issue of knowledge seems to have played a part, it seems like there are a few of our doctors who are knowledgeable of MDR and most of them they will know later. They are not the first ones to be given information. The nurses may get the information earlier, but the nurse cannot implement it alone. So, the doctors will also be required to know earlier so that all health care providers are able to move together with the same knowledge. (Participant_10)

Follow-up and monitoring required routine visits to the clinic and monitoring tests for the client as expressed by participants. Other participants perceived that the process was demanding, affecting the daily routine for the MDR-TB patient. A high commitment to the process was therefore required from the patient. These factors potentially influence implementation as cited below.

Then the other issue that came up was that with MDR-TB you would need a bit more monitoring .... monitoring kidney functions, monitoring the hearing and you would need to have a clinician administer that injection. So, for that regimen to be complete then it means a clinician was required to inject that injection that meant almost a daily visit to the health facility. And that would mean interference even with the dividends of life. You must touch the clinic every day to get an injection. (Participant_1)

Some of the participants expressed difficulties experienced by patients in trying to access the monitoring tests. The challenges were perceived as barriers to treatment access for MDR-TB patients

These views were exemplified in the following statements.

The clinical liver function tests and all those full blood count tests, we have got problems because of the city council, Harare city council which is not functioning very well. I'm sure you may be aware that it's not functioning very well. (Participant_5)

but when they go to the hospital, I think because of the issues of privatization that was there... they would be told that you needed to pay something. So, it was a circle and most of these patients they came back without those tests being done. (Participant_9)

During the implementation process, participants reported that health care providers are required to provide TB data for their facilities through standard quarterly reporting forms and scheduled

review meetings. Leaders and technical experts in the health sector also conducted support and supervision visits, providing feedback to health facilities. Some participants perceived that these processes were potential facilitators as described below.

> *So, when we were mixing with other districts when we were doing quarterly reports statistics, that's when we saw that there is need for this shorter regimen. (Participant_6)*

> *I think they support by giving us feedback when they observe something maybe during the quarterly evaluations. Every quarter when they give a report, they provide feedback on the quarterly performance including how many cases of MDR-TB we have and whether the cases are increasing or decreasing. They update on the deaths recorded for the existing patients. That is the feedback they provide. (Participant_10)*

4.2.7 Health care provider perceptions on collaborations and stakeholder engagements

Collaborations and stakeholder engagements engaged as important aspects from the CFIR domain, process. Health care providers articulated the need for a collective approach when implementing MDR-TB processes. Addressing the needs of a patient on MDR-TB treatment requires several interventions including socio-economic, health system factors and community support systems as discussed below.

Participant's perceptions were that MOHCC NTP needs to jointly work with other bodies to provide comprehensive care for the MDR-TB patient. Collaboration with other donor agents, academia, churches and government entities was believed to alleviate some of the barriers to implementation.

These views were exemplified below.

> *I think the government through the Department of Social Work should look into that. Because you will find with the TB, it's a condition that is mainly ignited by poverty. (Participant_5)*

> *And we also get some sort of assistance from these other organizations who come in doing research on MDR-TB management. (Participant_8)*

> *Not really. But I know we have some of these churches they do have their clinics. They also do their awareness campaigns to their churches about various diseases. They*

conscientize the community, their community on TB, HIV, we talk of typhoid, cholera and everything else. They do conscientize. (Participant_8)

Participants identified several stakeholders who they perceived were necessary to facilitate implementation. Stakeholders at international, national, local, community and household level. The engagement of stakeholders who contribute to different roles was believed to promote the uptake of the shorter treatment. A collective approach to management of MDR-TB patients was perceived to facilitate MDR-TB treatment adherence. Influential members of the society like community leaders and political leaders need to be aware of the regimen and the needs of the MDR-TB patients.

These views were exemplified in the following quotes.

There is need for training at management level. Management will need to appreciate the context for all the activities that will be carried out in the program. (Participant_1)

I think there should be a community component where the community itself also take ownership of the program so that the decentralization is complete when the program reaches the community. (Participant_1)

… someone who has experienced it, people are likely to learn more from them. So, if we could make use of those expert patients. (Participant_1)

The exploratory study sought to describe some of the facilitators and barriers to WHO 2016 recommended standardised shorter treatment regimen implementation in Harare, Zimbabwe as perceived by health care providers. Important findings yielded from the study suggested that health care providers in Harare perceived that a wide range of factors influenced implementation. To facilitate implementation, participants perceived that MDR-TB patients required decent accommodation, nutritional, financial and psychosocial support. The reduced treatment duration of 9-12 months was perceived as an advantage reducing workload, burden to the patient, decongesting health facilities and reducing the cost of treatment thereby facilitating implementation. Additionally, leadership support, feedback forums, addressing knowledge gaps, collaboration and engagements with other entities and stakeholders were perceived as facilitators. Availability of resources in the work environment such as adequate expertise, medicines, diagnostics equipment, incentives, reference documents, use of electronic systems, transport and communication facilities were perceived as facilitators. Modifying the direct observed treatment (DOT) to a home-based approach was perceived as a facilitator while

the intensive treatment follow-up schedule, injectable kanamycin requirements, high pill burden, relatively long duration and adverse events were perceived as barriers. Participants perceived the inadequacy of required resources and infrastructure as barriers to implementation. Furthermore, fees charged for patient investigations and the policy on employee sick leave were perceived as barriers. Failure to collaborate and engage relevant entities and key stakeholders was perceived as a potential barrier. Surprising and interesting findings were suggested by the study. Firstly, the prohibition of person movement regulations during the peak of Covid-19 was perceived as a barrier. Secondly, the dissemination of guidelines on the WhatsApp platform was regarded as a barrier with health care providers preferring hard copy formats. The next chapter will discuss these findings, reflecting on the study results and comparing with other previously published studies.

CHAPTER 5: DISCUSSION

The following sections discuss the findings under each theme presented in the results section. The themes were derived from the selected CFIR constructs. The selected 14 constructs were useful in guiding the data collection and analysis process for this study conducted in Harare. All the five domains were found to have an influence on the MDR-TB shorter treatment regimen implementation. Although a few differences in perceptions were observed, this qualitative research did not seek to examine differences between findings. This study explored the ideas and perceptions of participants which are presented below.

5.1 Health care provider perceptions of MDR-TB patient needs and preferences

In this study, participants suggested that addressing patients' socio-economic needs and preferences was key in improving treatment uptake, adherence and compliance to the shorter MDR-TB regimen in Harare. Health care providers identified patient needs and preferences according to the CFIR ranging from reduced clinical visits, decent accommodation, transport costs, funds for ancillary medicines, nutritional food supplements to psychological needs. The findings corroborate with results from previous studies focusing on TB management in Europe, India, East Kazakhstan and Thailand (62,84–86). These findings suggest that MDR-TB patient needs do not vary much across settings. In Europe and East Kazakhstan, psychological needs were more pronounced for MDR-TB patients in the hospital setting during the intensive phase of treatment (62,86). Health care providers across regions referred to patient needs and preferences related to nutritional support, motivational counselling, social support, and family support as key facilitators for MDR-TB treatment adherence(62,84–86). In Harare where this study was conducted, patient needs were partially addressed through provision of allowances, food supplements, nutritional education and psychosocial support were possible. The shorter treatment regimen partly addressed patient treatment preferences but there were complexities associated with implementing the regimen such as side effects, a high pill burden, the injectable and frequent visits to the health facilities which deterred effective implementation. Participants acknowledged the need for patient psychosocial support although it was provided inconsistently due to competing demands. A study conducted in East Kazakhstan and the Peruvian Amazon corroborated the participants' perception that providing psychosocial

support facilitates treatment compliance and adherence among MDR-TB patients (39,86). While participants were aware that addressing the needs and preferences of MDR-TB patients could potentially facilitate implementation, it was clear that there were gaps in practice due to several challenges noted. These findings were synonymous with findings by Oshi and colleagues[87] who argued that the needs and resources for MDR-TB patients remain unmet thereby negatively affecting implementation of the MDR-TB treatment (87).

Findings from this study suggested that MDR-TB patients in Harare province were at risk of experiencing catastrophic costs due to increased medical costs during the treatment period against reduced income. Additionally, transport costs were noted to contribute to catastrophic costs in Harare particularly for bedridden patients as they have to hire private vehicles to ferry them to the health facility. Studies that explored costs experienced by MDR-TB patients were conducted in Thailand, Indonesia, Ethiopia, Southern Nigeria and Kazakhstan (85,87–89). MDR-TB patients were found to experience catastrophic costs due to loss of income, transport costs in search of medical services and procurement of nutritional supplements as shown in previous studies (84,85,87–89). A pilot study demonstrated that in Ethiopia, Indonesia and Kazakhstan 72%, 53% and 41% of MDR-TB patients experienced job losses during the MDR-TB treatment phase respectively. Additionally, the pilot study showed a 100% reduction in median income for the MDR-TB patients (88). Costs resulted from transport to the health facility, daily living expenses, investigation tests and ancillary medicines. In a pilot study conducted in Ethiopia, Indonesia and Kazakhstan, a high financial burden was associated with non-diagnosis, failure to initiate treatment and defaulting treatment among MDR-TB patients. (88).

This study noted that most of the MDR-TB patients did not have medical insurance, relying on cash payments when seeking medical services.. This could be attributed to the fact that Zimbabwe is yet to develop systems on community-based or social health insurance. Currently, the private health insurance largely dominates the health insurance sector. Private health insurance provides financial protection to the minority in the upper quartile Zimbabwean hence making access to health insurance difficult for the majority of Zimbabweans (90). Furthermore, Zimbabwe has a national free TB treatment policy in public health facilities. While this is a noble initiative to facilitate implementation, there are limitations related to services offered that have been noted for the public health facilities (91). MDR-TB patients are prompted to seek some of the medical services in the private sector for a fee. Investigation tests like chest x-rays and laboratory tests are not readily available in some of the public health facilities. In such

instances, medical insurance could be considered for MDR-TB patients to access these medical services and therefore facilitate effective implementation. A systematic review and meta-analysis focusing on Chinese TB patients found that the lack of medical insurance was suggested as contributing to the catastrophic costs of TB patients (92).

According to findings from this study, participants cited that the Zimbabwe national TB program through the support from Global Fund, an external funding source, provides food hampers and a monthly stipend of USD$25 to cover related patient costs. Some health care providers strongly felt that the allocated stipend was inadequate to cover costs such as school fees, medical bills for family members and to provide other daily necessities. The results corroborate with findings from a study from south Nigeria (87). To prevent patients from experiencing catastrophic costs due to TB, studies conducted in Nigeria, Ethiopia, Indonesia and Kazakhstan suggested that social protection in terms of financial support was considered important in these settings (87,88). Social protection policies including domestic and external funding were cited as necessary to further reduce catastrophic costs for the MDR-TB patients (85,87,88,93).

Findings from this study showed that participants commonly referred to the provision of grants to support patient treatment, nutritional and financial needs mainly through the Global Fund. In a study done in four European countries, respondents in Bulgaria were more concerned with sustainability of MDR-TB treatment if external Global Fund support was discontinued (84,87,94). Although participants from Harare province suggested the need for the government and local organisations to collectively contribute towards the TB program, none of them discussed the issues of sustainability beyond grants support. While grants and/or livelihoods were perceived as facilitators for implementation in MDR-TB and ART studies, grants support was the most common form of financial protection for MDR-TB patients in Sub-Saharan Africa, Nigeria and India (84,87,94). Grants are however time bound and may be discontinued depending on funds availability and donor priorities. There is need for countries like Zimbabwe that are strongly dependant on external funding such as the Global Fund and USAID to mobilise local funding for the MDR-TB program. Significant local funding may help to ensure sustainability of the MDR-TB treatment program if support is discontinued.

Participants expressed that MDR-TB patients in Harare province received treatment as prescribed by the health care providers. There were no issues related to influencing the implementation of the treatment noted with this arrangement. MDR-TB patients could express

their preferences and challenges with regards to the treatment offered but had no role in deciding the treatment option. This corroborates with a study conducted in Karakalpakstan, East Uzbekistan where findings showed that MDR-TB patients trusted health care providers to decide the most appropriate treatment for them (95). In the same study, a recommendation for a patient-centred approach to treatment was strongly advocated for arguing that it created awareness and fostered ownership and preparedness for MDR-TB treatment among patients (95). These factors were perceived to facilitate effective implementation. In Europe, due to the availability of resources and novel technology treatment was individualised allowing health care providers to determine a suitable regimen for the patient (62).

In Harare, health care providers were of the view that patients preferred an injectable free regimen with less side effects and reduced pill burden. Side effects related to kanamycin injectable included loss of hearing (25,39). Hearing loss was cited as a concern by the participants also noting the limited access to audiometry tests by the patients. Corroborating this study were findings from a recent study conducted in Bangladesh that recommended the discontinuation of the injectables due to their side effects and therefore recommends an injectable free regimen (54).

5.2 Health care provider perceptions of the shorter MDR-TB treatment regimen

From this study findings, the health care provider perceptions of the shorter regimen were mainly related to its relative advantage over the conventional treatment regimen. Acceptability by the patient and health care provider, shorter regimen efficacy, efficiency in reducing workload of the health care provider and treatment burden on the patient. Additionally, cost reduction, the nature and composition of medicines as well as the medicines side effects were also related to the shorter treatment regimen.

All participants from Harare expressed that the shorter course treatment regimen was the preferable treatment option compared to the conventional treatment regimens. The shorter course regimen was also favourable to all health care providers interviewed in studies conducted in Uzbekistan (66,95). The regimen was associated with improved patient outcomes, improved patient adherence and enabled expedited return to “normality” for MDR-TB patients (95,96). Health care providers in Uzbekistan, however, doubted the shorter regimen effectiveness and appropriateness affecting their confidence in prescribing the regimen. This study results contradict with findings from Uzbekistan, MDR-TB shorter treatment regimen

was well accepted by the health care providers in Harare who confidently prescribed the regimen for the patients. The only limitation to prescribing the shorter treatment regimen was medicine unavailability or knowledge gaps among health care providers in Harare. The reduced duration to complete treatment and reduced period for the injectable phase was perceived to positively influence the implementation process.

Tuberculosis treatment is offered for free-of-charge in all public health institutions in Zimbabwe. The Global Fund drug facility supports procurement of the MDR-TB medicines. Cost effectiveness to the health care system was perceived by the health care providers when implementing the shorter treatment regimen for MDR-TB making it a regimen of choice for resource constrained economies. The treatment cost per patient is reduced allowing for chances of sustainability when external funding is no longer available. The results from this study are substantiated by findings from a study that assessed the economic burden of MDR-TB in Vietnamese regions. The average total cost per capita for the 9-month regimen group (US$1480.34 6 211.61) was significantly lower than that for the 20-month regimen group (US$2695.58 6 294.98) (97).

Participants for this study perceived that the complexity of the shorter treatment regimen negatively influenced the implementation process. Experts were required to administer injectables, high pill burden and frequent travel to the health facility were perceived as barriers. Findings from this study corroborated with results from a meta-analysis exploring patient-related factors to ART adherence in Sub-Saharan Africa, high pill burden was identified as a barrier to adherence (94).

Harare health care providers who participated in this study perceived that 9-11 month of treatment was still a relatively long duration for treatment but believed that it significantly reduced the risk of prolonged exposure to medicines when compared to the conventional medicine. Participants perceived that the benefits outweighed its complexity and would prescribe the regimen for deserving patients. The findings were inconsistent with findings from Uzbekistan (Central Asia). Health care providers doubted the shorter regimen effectiveness and appropriateness affecting their confidence in prescribing the regimen (66). Participants from Harare reported adverse side effects of the medicines such as hearing impairment, peripheral neuropathy, and gastrointestinal intolerance for patients initiated on the shorter regimen. Corroborating these are several studies where the development of at least one adverse event was common in patients on the shorter course treatment regimen for MDR-TB (39,87,96,98).

5.3 Health care provider perceptions of the health service environment

From this study, participants from council-owned health facilities in Harare perceived that the infrastructure in the public health facilities was inadequate and too old, having been constructed without the thought of an emerging infectious disease. Their perceptions were that the infrastructure in most health facilities was not suitable for MDR-TB treatment. Poor ventilation and limited space were some of the concerns raised that affect the effective implementation. Small sized rooms and old infrastructure design in some health facilities were not aligned to maintaining privacy of patients, infection, prevention, and control measures. Nevertheless, health care providers improvised with available infrastructure to provide treatment to patients. Health care providers continue to lobby for suitable infrastructure to ensure that MDR-TB patients are protected and access services in privacy. These findings corroborates strongly with findings from a study by Wilcox and colleagues[99] where they described the infrastructure from Zimbabwe, Mozambique and South African settings as generally old and difficult to change (99).

In Harare, the perception of participants was that the support they received from their leaders during the implementation process was a facilitator. Leaders were reported to be providing technical support, transport, ensured adequate stocks of medicines and other medical sundries in Harare province health facilities. Corroborating this study findings were studies conducted in the Bahamas, South Eastern Nigeria and a meta analysis of data from 22 countries (33,100,101). A systematic review by Kadu and Stolee[33] showed that strong, highly committed, and engaging leadership facilitated implementation of interventions (33). Supportive administration and supervisors who have clear goals were described in the reviewed studies as the form of leadership necessary to facilitate implementation (33). In another study in Nigeria, leadership support was described as a facilitator to implementing general TB control (100). Additional support from the institutions was noted as a facilitator in a multi-institutional study where nurses required support from their employment institutions to enable them to effectively implement evidence-based practice (EBP) in their routine work (101).

Participants perceived that high staff attrition in Harare province overwhelmed the available health care providers with responsibilities. The onset of the Covid-19 pandemic was shortly after the country started implementing the shorter treatment regimen, further impacting on the numbers of staff available for health service delivery. To support these findings, the shortage

of human resources for health was perceived as the main challenge in Africa (102). A study by Kadu and Stolee[33] also found that staff loss and turnover were institutional factors that increased the burden of responsibilities on existing health care providers (33). From another multi-institutional study exploring barriers and facilitators to EBP implementation, nurses were of the view that insufficient staffing was a major barrier while work overload was a common barrier to implementation (101).

Furthermore, participants from Harare health facilities perceived that most health care providers had lost morale for the MDR-TB program since the withdrawal of incentives. The lack of incentives was perceived as negatively influencing implementation in Harare province. The participants further described monetary incentives as the preferred form of incentives in Harare. This could be attributed to the need to compensate poor remuneration packages that have resulted in high staff attrition to other organisations or countries. Initiatives for paying to improve the performance or the quality of health service have increased in several countries (103–108). Currently, there is minimal rigorous evidence showing success of initiatives that pay based on performance in primary health quality improvement despite their popularity (109). Additionally, financial incentives were suggested as a weak intervention for influencing commitment to goals especially when performance is affected by other external forces that cannot be controlled by the health service provider (106).

Findings from the current study in Harare suggested that first-line medicines for the shorter treatment regimen for MDR-TB such as levofloxacin were sometimes unavailable at specific health facilities. The reasons for non-availability of some medicines were mainly because of late ordering and in rare cases unavailability of medicines at central level. Unavailability of medicines that constituted the shorter treatment regimen resulted in delays of patient initiation or health care providers reverted to the conventional regimen. Participants perceived that the non-availability of medicines was a major barrier to implementing the regimen while the availability of all the recommended prescription medicines was perceived to facilitate implementation. Additionally, the health care providers perceived that the provision of ancillary medicines in the health facilities to manage side effects from the shorter treatment regimen medicines was necessary. This was perceived to facilitate quality improvement for health and also reducing the patient financial burden and risk of experiencing catastrophic costs. The institutionalisation of the shorter treatment was largely dependent on the availability of all the recommended medicines. Similar findings were noted from a study conducted in an African country, Malawi where some of the programmatic challenges noted with

implementation of MDR-TB included the lack of alternative second-line medicines (53). To further support the findings, a qualitative study conducted in West Gojjam Zone, Northwest Ethiopia, showed that intermittent supplies of anti-TB medicines particularly paediatric fixed dose combinations and IPT were as a result of late delivery to the health facility or late ordering of medicine supplies (59).

Results from this study conducted in Harare province suggested that decentralising the gene x-pert and microscopy services to health facility level had improved access to diagnostic and monitoring services related to Gene x-pert techniques. Participants perceived that despite the decentralisation of the Gene x-pert, the centralisation of the DST culture at the national reference laboratories still posed difficulty in accessing DST culture services by the general population. This resulted in long turn-around-time and loss of information causing treatment delays which served as barriers to implementation. A study conducted in Malawi supported the increase in turn-around-time of DST results if the technology is not widely accessible (53). Furthermore, in instances where laboratory commodities such as cartridges and chemical reagents were not available, implementation of diagnostics and monitoring were impacted negatively. The laboratory function is of paramount importance in controlling TB. The laboratory provides diagnostic testing, monitoring of treatment, and health system surveillance (84). Diagnosis and monitoring of MDR-TB patients is largely dependent on a functional laboratory system. To improve treatment rates, there is need for improved access to diagnostic and monitoring facilities. In Uganda, the lack of infrastructure at community centres such as refrigerators and inadequate transport systems from lower level facilities to Gene x-pert centres affected the scale up of testing for TB (110). In other developing countries, the lack of laboratory equipment was predominantly illustrated, being perceived as the major barrier in implementing EBPs in Bahamas (101). A systematic review demonstrated with high confidence that inadequate resources particularly equipment was a major barrier to implementing evidence-based guidelines and the finding was consistent for the reviewed articles (111).

Participants from Harare perceived that updated guidelines, algorithms, job aides, standard operating procedures (SOPs), Essential Drugs List in Zimbabwe (EDLIZ), charts, information, and educational (IEC) material among other reference documents are necessary to facilitate implementation. Participants reported that the provision of updated guidelines was limited and very slow in Harare while other materials were sporadically distributed which negatively affected implementation. Information was limited to key personnel working closely with the

TB program. The PMDT like any other health program heavily relies on guiding documents where health care providers refer to for patient management. Consistent with these study findings was a qualitative study in Mozambique, South Africa and Zimbabwe. All participating hospitals mentioned the availability of reference material, training material among others material resources as enablers to implementation while non-availability of the material resources was a perceived as a barrier (99). In Vietnam, updated guidelines, SOPs, PMDT training modules, presentations were some of the reference materials that were perceived to facilitate implementation. The timing for providing reference documents in Vietnam was misaligned, SOPs were provided after two years of release of updated guidelines. Health staff referred to inconsistent delivery for trainings which generated some uncertainty of the recommended implementation procedures (63).

Additionally, health care providers in Harare perceived that hard copy formats of the updated guidelines were preferred by health care providers. Hard copy format was perceived to be easily accessible at the health facility and easy to use by health care providers in Harare province. The distribution of electronic copies via WhatsApp or email was perceived to have challenges with accessing the documents. This study findings showed that the health care providers perceived that the hard copies were limited in circulation in health facilities. The findings corroborated with results from a study conducted in KwaZulu Natal and Northwest provinces, South Africa. Non-availability and limited access to guidelines were identified as barriers in the study that explored facilitators and barriers to TB and HIV treatment guidelines adherence (51). While some of the health care providers in Harare found it easy to follow guidelines when provided in the format they preferred, some health care providers required training before they could utilise the guidelines. Interesting findings regarding the availability and use of the guidelines were shown in a study that explored barriers and facilitators to TB and HIV treatment guidelines adherence in KwaZulu Natal and North West provinces. Health care providers who had access to the guidelines perceived the guidelines to be complex and difficult to use (51).

Participants for this study perceived that the availability of strong transport and communication facilities were potential facilitators. Regular meetings to review the performance of the TB program were reported by the participants. The availability of communication platforms such as WhatsApp were perceived to facilitate communication and dissemination of information on the shorter treatment regimen. Adoption of electronic-based systems in managing patient level data was perceived as a facilitator. Electronic-based systems offer real-time data and

participants perceived that there would be expedited transmission and minimal loss of patient information. The implementation process for MDR-TB was perceived to be a a multi-disciplinary process requiring clinical staff, laboratory personnel, pharmacy, finance, data management, health promotion and environmental health personnel among others. The processes for notification, treatment, follow-up, and reporting requires strong network and communication channels. Consistent with the observed study results were findings from Canada by Sopcak *et al*.[73] where multiple disciplines involved during implementation came with different workplace practices, culture for teamwork and different agendas (73). Collaborating and practicing teamwork were therefore cited as potential facilitators and need to be examined and negotiated during implementation. Additionally, regular conversations were perceived as necessary to facilitate implementation (33,73).

5.4 Health care provider perceptions of global and local policies and guidelines.

Doctors from Harare perceived that the adoption of global and local policies for MDR-TB facilitated implementation. Other health care provider categories in Zimbabwe were not familiar with global policies and their effect on implementing the shorter MDR-TB regimen. Doctors from Harare health facilities perceived that the WHO was the regulating body for health policies at global level. Consistent with this study findings were results from a separate study on malaria where four countries identified WHO as the leadership for guiding health recommendations (112). Adopting evidence-based guidelines with support from the government and implementing partners was believed to expedite the implementation and to improve patient treatment outcomes. Despite the release of guidelines in 2016 for the shorter treatment regimen for MDR-TB, Zimbabwe launched the regimen implementation in 2018. The delay in implementation could be attributed to the costs associated with transitioning to the new recommendations including writing of guidelines, training of health care providers, and procurement of medicines. Zimbabwe heavily relies on Global Fund and USAID funding for TB program support. This finding corroborated with a previous study where the cost of implementing an intervention was suggested as a determinant in implementing health policies in Africa. Donor dependency was found to slow policy adoption (113). Doctors in Harare perceived that adopting WHO global policies was of benefit to implementing countries, creating global partnerships for procurements and other NTP program activities. The country adopted the WHO 2016 recommendations to the local context culminating into the, “Clinical guidelines for the management of drug-resistant tuberculosis” released in 2018 by the

Zimbabwe NTP programme (28). All health care providers in Harare agreed with the current guidelines and perceived that improved access to updated guidelines could facilitate implementation.

The local "Free TB treatment policy" was perceived as a potential facilitator by the health care providers in Harare. The policy applies in public health facilities only. MDR-TB patients must access MDR-TB health-related services for free according to the policy. Prescription medicines for the shorter regimen are provided at no cost in all public health institutions. In this study, participants were of the view that despite the policy for free TB treatment, MDR-TB patients were charged for monitoring tests in some health facilities. Of note were monitoring tests that are not widely available in public health facilities such as chest x-rays and liver function tests. A systematic review of the financial burden of TB patients in low-and-middle income countries by Tanimura *et al*.[114] supported this finding (114). Results from the study by Tanimura *et al*.[114] indicated that despite having the free TB treatment policy in place, the MDR-TB patients still faced an additional financial burden as they were required to pay for other services available in private institutions and ancillary medicines that are not provided free-of-charge (114). The additional financial burden was perceived as a barrier to implementation. No cost access to TB diagnostics and treatment services in private and public facilities was perceived as a facilitator. Free access reduces the costs, thereby preventing catastrophic costs (45, 79)

This study participants also cited other local policies that had an influence on the regimen implementation including the employee sick leave policy and the Covid-19 regulations. Participants perceived that the shorter treatment regimen was better tolerated by some employers; however, the risk of job losses were still possible given the period required for treatment. The sick leave policy in Zimbabwe for formally employed persons provides for 180 days sick leave with the initial 90 days on full salary and an additional 90 days on 50% salary. The sick leave duration is less than the treatment period provided for in the guidelines spanning for 9-12 months. MDR-TB patients risk job loss resulting in increased financial burden and ultimately deterring treatment access. This finding corroborates with results from a study from a similar urban setting context. Delays in return to work or job losses due to the effects of TB were cited (115). Prohibition of person movement during the early phases of Covid-19 was perceived as a barrier, deterring access to MDR-TB services by patients without the adequate documentation. People were restricted to move but this has significantly improved with the introduction of Covid-19 vaccines.

5.5 Health care provider perceptions of opportunities for information dissemination

Participants perceived that there were inadequate resources to ensure adequate training coverage for all health care providers in Harare province. Inadequate training resources deterred implementation. Training and capacity building for health care providers were identified as key solutions to the challenges in the health sector in Africa (102). High staff turnover in Harare health facilities was perceived as a barrier contributing to loss of trained cadres. This further created gaps in training and knowledge among health care providers. Information dissemination to implementers is of importance when considering implementation of new guidelines. Consistent with the findings from this study were results from a study conducted in Vietnam. Although annual trainings for programmatic management of tuberculosis (PMDT) were conducted and included training on the new guidelines, there were challenges with ensuring that all health care providers were equipped with adequate skills for PMDT management. Firstly, the number of health care providers that could be trained was limited due to the restricted funding and secondly, high staff turnover impacted negatively on capacity development for PMDT (63). In a resource-limited context training and orientation of all health care providers on new guidelines is not feasible because of the limited resources. This was corroborated in studies on MDR-TB management in the hospital setting from Ethiopia and South Africa. where variations in MDR-TB knowledge among health care providers were observed (57,67). While formal training was provided to some health care providers, some had to learn on the job when deployed for MDR-TB management section (57,67).

In a study involving Saudi Arabia physicians, their perception was that the country specific health ministry are supposed to provide mandatory training courses and to encourage attendance by doctors, building knowledge among the health care provider (116). The health ministry in Zimbabwe needs to come up with alternative strategies to ensure that all the health care providers are reached with the information on updated guidelines. On the job training through peers or leaders, online resources, handouts, and adequate reference documents may be considered for widely disseminating information on the updated guidelines.

5.6 Health care provider description of the MDR-TB shorter treatment regimen implementation process.

The health care providers in Harare perceived that the implementation process of the MDR-TB shorter treatment regimen generally followed the Zimbabwe clinical guidelines for the management of drug-resistant tuberculosis adopted from WHO 2016 guidelines. This is consistent with global standards as the execution process for each country should ideally follow the WHO 2016 MDR-TB treatment guidelines (26). The capacity within Harare province for MDR-TB diagnosis was perceived as a facilitator because of the wider decentralisation of Gene x-pert. Gene x-pert technology is used to test all patients presumed to have TB. Rifampicin resistance is detected by the Gene x-pert and is used as a proxy to MDR-TB in Zimbabwe. Genotypic (DST) is used to confirm indeterminant MDR-TB results and used to monitor sputum during the TB treatment period. In Malawi microscopy and Gene x-pert are used for MDR-TB diagnosis. Malawi uses the DST differently, selecting certain risk group and patients failing on first-line drugs who they consider as at-risk groups for MDR-TB (53). After an MDR-TB case is notified after diagnosis, initiation on treatment follows.

The health care providers in Harare province perceived that only health care providers with the knowledge on current guidelines could initiate the MDR-TB shorter treatment. The findings corroborated with studies from different settings; Singapore, Uzbekistan, Malawi and Niger where initiation on treatment was done by a health care provider with adequate knowledge after a confirmed MDR-TB case is notified (53,95,117,118). Administering the MDR-TB treatment regimen and patient monitoring varied depending on the health facility in Harare. MDR-TB patients were initiated on a regimen provided by the health care provider. Depending on the varying circumstances across the health facilities, patients were either initiated on the conventional or shorter treatment regimen. Availability of medicines and availability of knowledgeable cadres was shown to greatly influence the regimen to be initiated to the confirmed MDR-TB patient in Harare health facilities. Some patients were initiated on the conventional regimen because of the unavailability of medicines to constitute the shorter regimen. Unavailability of medicines for the shorter treatment regimen thereby served as barriers to implementing the regimen. Some health care providers continued patients on treatment for more than the recommended time due to the lack of access to knowledge and information. These findings corroborated with a study conducted in Malawi where the management of MDR-TB involved treatment with both the shorter and longer treatment

regimens (53). Addressing knowledge gaps, providing adequate medicines, and distributing the MDR-TB guidelines widely among health care providers was perceived as a facilitator to implementation. Sopcak *et al.*[73] supported the idea of orientation and information dissemination to all the implementers to ensure that all health care providers are on board with the specific implementation requirements (73).

Participating healthcare providers in this study explained that TB patients were attended as outpatients except in severe cases requiring hospitalisation. The patients were required to visit the health facility frequently for treatment and monitoring. Treatment buddies were identified who helped by supporting treatment for MDR-TB patients from home. Health care providers sometimes visited the patient homes to check and monitor treatment progress. Injections and DOT are administered at the health facility during the intensive phase. These findings were consistent with a study on the management of MDR-TB done in Malawi involving outpatient and community-based strategy. MDR-TB patients receive treatment from the health worker or treatment supporter from home (53). The frequent travel to the health facility was perceived as a potential barrier in Harare, altering the patients' daily routine, and resulted in additional costs for transport. Inconsistent with these findings are studies conducted in Indonesia, Ethiopia, Kazakhstan and the Vietnamese region where the intensive phase of implementing the MDR-TB treatment involved hospitalisation (88,97). Hospitalisation while convenient for DOT of patients, increased the cost of treatment. Studies conducted in South Africa and Europe found that hospitalisation facilitated regimen implementation(62,67). Monitoring MDR-TB patients involved laboratory tests such as FBC, U and E's, chest x-ray, audiometry, and liver function tests among others. Participants in Harare reported challenges with access to these monitoring tests, as they were limited to a few facilities. MDR-TB patients were in most cases required to pay extra fees to be able to access these tests in other private health facilities in Harare. These findings were consistent with previous studies conducted in Indonesia, Ethiopia, Kazakhstan and the Vietnamese region where pre/post diagnostic tests partly accounted for catastrophic costs for the MDR-TB patients (88,97).

Participants in this study from Harare reported that data are collected and aggregated for reporting to the national repository District Health Information system 2 (DHIS2). The lack of adequate tools and training among health care providers resulted in incomplete documentation to failure to document. These documentation gaps are a potential barrier to implementation and monitoring. Similar findings were found in a study assessing challenges in tuberculosis control in West Gojjam Zone, Northwest Ethiopia where poor documentation was cited. Health care

providers did not consider documentation as part of their responsibilities (59). Communication through designated recording and reporting forms, meetings, electronic platforms like email, calls and WhatsApp are done to address patient management and review PMDT progress in Harare. Participants perceived that strengthening these platforms was a facilitator to implementation. This corroborated with findings from a conference conducted in Washington D.C. which suggested that using different platforms to communicate about patient management during the shorter treatment regimen facilitated collaborations and communication among key players in MDR-TB management (119).

5.7 Health care provider perceptions on collaborations and stakeholder engagements

From this study findings, stakeholder engagements were considered as high priority by the participants, providing influence on the success of the program. To facilitate implementation from case identification to treatment support, health care providers were of the view that different stakeholders needed to be engaged from the health facility staff, community leadership, expert patients, other stakeholders including donor organisations, private organisations, other government ministries, churches, schools, well-wishers, and household members. Failure to engage the different stakeholders was perceived to result in information gaps which would result in stigma and discrimination. Stigma and discrimination are major barriers to treatment access. Stakeholder engagement for the purposes of the study context refers to the active involvement of the patients, health professionals, the public sector, private sector and other decision makers throughout the implementation process (120). Considering stakeholder engagements provides an opportunity to assess barriers and facilitators to quality improvement, reach to the general population, and the impact of implementing the shorter treatment. Stakeholder engagement is driven by the belief that wider engagement enhances the program quality, relevance of the program, and acceptability of the shorter treatment regimen to all stakeholders (120). In India public-private sector collaboration was shown to significantly improve treatment success among TB patients(121).

5.8 Study strengths

This qualitative study explored the perceptions of three heath care provider categories (doctors, nurses, and environmental health personnel). These cadres are the closest to the MDR-TB treatment process and interact directly with MDR-TB patients. The participants were well

seasoned in TB programming with some having over 15 years' experience. Selection of participating health care providers ensured representation from the two dominant health facility ownerships in Harare province, the government, and the local authority, allowing the integration of the different perspectives. Infectious diseases hospitals and polyclinics were selected for council owned health facilities as these facilities are designated for the management of MDR-TB patients in Harare province. The principal investigator administered all the interviews thereby providing reasonable basis for consistency in the methods and design in which the study was conducted. The telephone interviews assisted with the data collection process during the peak of Covid-19. Physical distance was ensured allowing the researcher and the participant to adhere to recommended guidelines for preventing the transmission of Covid-19. The interview time was flexible allowing the participants to select a convenient time for the interview. Valuable insights were gained which were important in understanding the contextual factors influencing implementation. Key factors that influence implementation were identified and recommendations drawn to facilitate effective implementation.

5.9 Study limitations

The objectives were to qualitatively explore the facilitators and barriers to the shorter treatment regimen implementation for MDR-TB in Harare province. Some limitations were identified. Firstly, the results cannot be generalised to other settings outside Harare province. The geographical area covered was limited to Harare province only. Barriers identified in Harare province may not be present in other settings excluded from the scope covered by this study. The main thrust of the study was to gain a rich and complex understanding which typically took precedence over eliciting generalisable data (81). To quantify the study results, the principal investigator recommends a survey with a larger sample of health care providers. Secondly, the selected three professional categories of nurses, doctors and environmental health officers included in the study were not exhaustive of the health care providers working within the MDR-TB treatment program. Wider consultation with other professions from the laboratory, pharmacy, health promotion and all other key stakeholders identified for MDR-TB health service delivery is critical in addressing implementation challenges. The principal investigator probed the participants for responses covering other areas outside their scope of work. The setup and interaction of health care providers at most of the health facilities was conducive to allow inter-departmental information sharing. Thirdly, data collection was done at the peak of the current pandemic, Covid-19 which could have affected day-to-day health

service delivery in the health facilities. The available health care providers were overwhelmed with the Covid-19 response against a limited number of human resources. The participants provided time slots that were suitable for them to participate in the study where they did not have any interruptions. Lastly, the study was subject to recall bias by the participants, as they had to recall some of the information retrospectively. The principal investigator employed probes and follow-on questions to triangulate responses where possible.

Health care provider experiences of implementing the shorter treatment regimen for MDR-TB in Harare was noted to be similar in Malawi, Africa (53). The challenges faced by MDR-TB patients across settings were also similar. Health care provider knowledge on MDR-TB treatment varies amongst individuals. Policies and guidelines were found to be important determinants for the implementation of the multi-drug resistant tuberculosis shorter treatment regimens. Additionally, a conducive work environment that includes adequate health care staff, adequate equipment, adequate supplies and good remuneration packages were found to be great influencers of implementation. The Covid-19 pandemic affected the implementation of the shorter treatment regimen in Harare by reducing access to MDR-TB services, access to current information and resources for MDR-TB. Additionally, the health workforce was overwhelmed with additional Covid-19 priorities compromising the delivery of MDR-TB services. Health care providers were also not spared from Covid-19, forcing the health facilities to operate with minimal staff. The following chapter concludes the research report by outlining some of the proposed recommendations to improve implementation of the MDR-TB shorter regimen in Harare, Zimbabwe.

CHAPTER 6: CONCLUSION AND RECOMMENDATIONS

Chapter six presents the overall conclusions from the study and proposes recommendations after exploring the barriers and facilitators to the implementation of the shorter MDR-TB regimen in Harare, Zimbabwe. The identification of barriers and facilitators is important to promote best practices and to address barriers to MDR-TB treatment. The CFIR was very useful in determining the factors that influence implementation of the MDR-TB treatment regimen in Zimbabwe. Isolation of factors with the greatest impact is of paramount importance to guide the development of strategies that address the barriers and enhance the facilitators to implementation. Failure to address barriers has the potential to jeopardise the attainment of the global target to End TB by 2030. Health care providers in the public health facilities in Zimbabwe play an extraordinary role in the management of MDR-TB and their perceptions towards the implementation process ought to be explored. This study noted that the health care providers were advocating for greater support for the heath workforce, patients and provision of adequate resources required for MDR-TB management. Support from all the relevant stakeholders for the MDR-TB treatment program is top priority to improve the implementation process.

The success of the regimen in the Harare context was perceived to be dependent on multiple factors including availability of multi-disciplinary teams, availability of adequate staff, competitive remuneration, providing incentives, availability of required needs and resources, trainings, information dissemination, provision of adequate current guidelines, good network and communication facilities among others. As a recommendation, the shortage of healthcare staff in Harare can be resolved by expediting the recruitment process for human resources to fill in the vacant posts in the short term. The major challenge that has affected the health care sector is that of failure to get the requisite staff to fill up the positions resulting from skills flight to other organisations or countries in search of better working conditions. Recently, the government has resolved to include the council-owned health care staff on the government payroll, however, the package remains non-competitive in the current macro-economic environment in Zimbabwe. For the long-term, the government and supporting partners need to develop a strategy to ensure that the available healthcare staff are retained by providing competitive remuneration packages for health care providers. The government through the Ministry of Health and Child Care needs to expedite training of critical staff in the health sector to fill in the gaps. Expediting trainings also requires innovative strategies as the health

education department has also been equally affected by the skills flight. Resources and needs for the MDR-TB patient requires a collaborative approach which involves working with other relevant stakeholders to comprehensively address issues emerging from the CFIR domain on patient needs and preferences. The current strategies of providing allowances and food supplements to the MDR-TB patient are largely donor supported threatening their sustainability beyond grant awards. In the long term, the government through the different departments needs to develop adequate capacity to support the MDR-TB patients on treatment. The government may consider providing food packages, supporting medical and education costs. After MDR-TB treatment, the government may also provide access to loan facilities for income-generating projects that will enable the MDR-TB patient to be self-sufficient after treatment. Continued efforts to improve the shorter treatment regimen are necessary to address the treatment duration, pill burden and side effects experienced by the patients. In other literature, promotive policies that allow MDR-TB patients to readily access health services such as social protection schemes or universal health coverage can also be recommended for the long term to avoid patients experiencing catastrophic costs (89,90,114). Training and support for health care providers continues to be of priority. The new world order brought about the Covid-19 requires adaptation to ensure continuity of MDR-TB services. Virtual technologies can be utilised for information dissemination. Adaptation of virtual technologies calls for provision of data bundles to health care providers in the short term while considering internet access at all health facilities in the long term. Access to current MDR-TB guidelines is of paramount importance. The Zimbabwe NTP needs to expedite the dissemination and distribution of adequate current guidelines to all health facilities. Using the existing structures, TB Coordinators can organise strategies to expedite information dissemination and guidelines distribution within their settings. Private-public partnerships could be a solution for the short term which could help to alleviate challenges with access to advanced technologies and specialist services. Most importantly, collaboration with relevant entities and engagement with different stakeholders was also perceived as important in working to effectively implement the MDR-TB shorter treatment regimen.

The following are key recommendations that can be drawn from this study.

6.1 Short term recommendations

Below are summary recommendations that can be employed immediately to address some of the barriers to implementation of the shorter treatment regimen.

Table 4: Short term summary recommendations

RECOMMENDATION	RESPONSIBILITY
To address the shortage of health care providers in Harare, there is need for expedited recruitment of staff to fill in the vacant posts	Harare City Health
Employ innovative strategies that address identified barriers to information dissemination 1. Dissemination and distribution of current guidelines through TB Coordinators. 2. Adapting virtual technologies for dissemination of MDR-TB information; trainings and support. 3. Provide data bundles to health care providers for online access to ongoing virtual sessions and ready access to current MDR-TB information	Zimbabwe National TB Program
To improve knowledge and support for MDR-TB patients, there is need for wider stakeholder engagements during implementation including academia, other government departments, non-governmental organisations, church organisations and other community-based organisations	Zimbabwe National TB Program
To improve MDR-TB patient adherence to treatment 1. Expedite the implementation of an all-oral regimen provided in the WHO 2019 guidelines. 2. Decentralise patient supervision by modifying DOT implementation to the workplace, community, or household level.	Zimbabwe National TB Program

RECOMMENDATION	RESPONSIBILITY
Develop private-public partnership for the management of MDR-TB to enable access to expertise and reduce catastrophic costs related to access of medical services which are not readily available in the public health sector.	Zimbabwe National TB Program
Reduce catastrophic costs experienced by the MDR-TB patient by expediting the payment of allowances and provision of food hampers after enrolment.	Zimbabwe National TB Program
To address gaps related to availability of equipment and infrastructure in the health facilities. 1. Prioritise procurement of medical equipment during nation health sector planning 2. Liaise with supporting partners to provide equipment and infrastructure for health facilities	Government of Zimbabwe (Ministry of Health AND Child Care)

6.2 Long term recommendations

Below are summary recommendations that can be considered in the long term to address barriers to implementation of the shorter treatment regimen.

Table 5: Long term summary recommendations

RECOMMENDATION	RESPONSIBILITY
To address the challenges of skills flight which threatens the gains made so far for the management of MDR-TB. 1. There is need to train additional personnel on critical skills for health to fill in the vacancies. 2. Liaise with supporting partners and donor agencies on a retention strategy for health care providers.	Government of Zimbabwe (Ministry of Health and Child Care)

RECOMMENDATION	RESPONSIBILITY
To enable ready access to online MDR-TB materials and consistent virtual connectivity for trainings and meetings. 1. Consider internet access at all health facilities.	Government of Zimbabwe (Ministry of Health and Child Care)
To mitigate against the risk discontinued MDR-TB programming, there is need to 1. Increase domestic funding for the National TB program 2. Capacitate other government sectors to provide support for the MDR-TB patient such as food, free education and counselling services.	Government of Zimbabwe
Establish social protection policies and interventions including universal health coverage and medical insurance that covers the general populace.	Government of Zimbabwe
To ensure that the MDR-TB patient becomes self-sufficient after MDR-TB treatment, there is need for access to loans for income generating projects	National TB Program

From the study, it is apparent that the factors that influence the implementation of the shorter regimen for MDR-TB are not confined to the health sector. When considering strategies to facilitate regimen implementation, it is important to consider how other social, economic, and external issues can be addressed. A multi-sectoral approach to the development of strategies is thus required to improve the current state of MDR-TB treatment in Harare, Zimbabwe. The commitment of the Zimbabwean government to END TB by 2030 requires an aggressive approach to the public health challenge. A review of current strategies is necessary to assist with the development of realistic plans to meet the target.

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CHAPTER 7: APPENDICES

7.1 Plagiarism declaration form



PLAGIARISM DECLARATION TO BE SIGNED BY ALL HIGHER DEGREE STUDENTS

SENATE PLAGIARISM POLICY: APPENDIX ONE

I _____TUSO AUDREY TANDA_____ (Student number: _____1918312____) am a student

registered for the degree of _Master of Science Epidemiology – Implementation Science_ in the academic year 2019.

I hereby declare the following:

- I am aware that plagiarism (the use of someone else's work without their permission and/or without acknowledging the original source) is wrong.

- I confirm that the work submitted for assessment for the above degree is my own unaided work except where I have explicitly indicated otherwise.

- I have followed the required conventions in referencing the thoughts and ideas of others.

- I understand that the University of the Witwatersrand may take disciplinary action against me if there is a belief that this is not my own unaided work or that I have failed to acknowledge the source of the ideas or words in my writing.

- I have included as an appendix a report from "Turnitin" (or other approved plagiarism detection) software indicating the level of plagiarism in my research document.

Signature: ___  _____ Date: June 24th, 2022

7.2 Turnitin report

1918312 (Tuso Audrey Tanda) Research report 25.02.2022.docx

ORIGINALITY REPORT

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7.3 University of the Witwatersrand human research ethics approval

UNIVERSITY OF THE WITWATERSRAND, JOHANNESBURG

R49 Ms T Tanda

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)
CLEARANCE CERTIFICATE NO. M201101

NAME: (Principal Investigator)	Ms T Tanda
DEPARTMENT:	School of Public Health Division of Epidemiology and Biostatistics Medical School University
PROJECT TITLE:	*Perceptions of health care providers of multi-drug resistant tuberculosis shorter-course treatment regimen implementation in Harare, Zimbabwe*
DATE CONSIDERED:	2020/11/27
DECISION:	Approved unconditionally
CONDITIONS:	
SUPERVISOR:	Ms R Mapuroma
APPROVED BY:	Dr CB Penny, Chairperson, HREC (Medical)
DATE OF APPROVAL:	2021/03/02

This Clearance Certificate is valid for 5 years from the date of approval. An extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office secretariat on the 3rd floor, Phillip Tobias Building, Parktown, University of the Witwatersrand, Johannesburg.

I/we fully understand the conditions under which I am/we are authorized to carry out the above-mentioned research and I/we undertake to ensure compliance with these conditions. Should any departure be contemplated from the research protocol as approved, I/we undertake to submit details to the Committee. **I agree to submit a yearly progress report**. When a funder requires annual re-certification, the application date will be one year after the date when the study was initially reviewed. In this case, the study was initially reviewed in **«Missing mail merge field»** and therefore reports and re-certification will be due in the month of **«Missing mail merge field»** each year. Unreported changes to the study may invalidate the clearance given by the HREC (Medical).

Signature of Principal Investigator

09-03-2021
Date

7.4 Medical Research Council of Zimbabwe approval letter

Telephone: 08644073772/791193
E-mail: mrcz@mrcz.org.zw
Website: http://www.mrcz.org.zw

Medical Research Council of Zimbabwe
Josiah Tongogara / Mazowe Street
P. O. Box CY 573
Causeway
Harare

APPROVAL

MRCZ/B/2025 **30 October, 2020**

Tuso A. Tanda
48 Chiremba Road
Braeside
Harare

RE: Perceptions of Health Care Providers of Multi-drug Resitant Tuberculosis Shorter Course Treatment Regimen Implementation in Harare, Zimbabwe

Thank you for the application for review of research activity that you submitted to the Medical Research Council of Zimbabwe (MRCZ). Please be advised that the Medical Research Council of Zimbabwe has **reviewed** and **approved** your application to conduct the above titled study.

This approval is based on the review and approval of the following documents that were submitted to MRCZ for review: -

- Completed MRCZ 101 new application form
- Study protocol
- Data collection tools

- **APPROVAL NUMBER : MRCZ/B/2025**

This number should be used on all correspondence, consent forms and documents as appropriate.

- **TYPE OF MEETING : EXPEDITED**
- **APPROVAL DATE : 30 October, 2020**
- **EXPIRATION DATE : 29 October, 2021**

After this date, this project may only continue upon renewal. For purposes of renewal, a progress report on a standard form obtainable from the MRCZ offices should be submitted three months before the expiration date for continuing review.

- **SERIOUS ADVERSE EVENT REPORTING**: All serious problems having to do with subject safety must be reported to the Institutional Ethical Review Committee (IERC) as well as the MRCZ within 3 working days using standard forms obtainable from the MRCZ Offices or website.
- **MODIFICATIONS**: Prior MRCZ and IERC approval using standard forms obtainable from the MRCZ Offices is required before implementing any changes in the Protocol (including changes in the consent documents).
- **TERMINATION OF STUDY**: On termination of a study, a report has to be submitted to the MRCZ using standard forms obtainable from the MRCZ Offices or website.
- **QUESTIONS**: Please contact the MRCZ on Telephone No. (0242) 791193, 0864407377203 or by e-mail on mrcz@mrcz.org.zw

Other

- Please be reminded to send in copies of your research results for our records as well as for Health Research Database.
- You're also encouraged to submit electronic copies of your publications in peer-reviewed journals that may emanate from this study.
- In addition to this approval, all clinical trials involving drugs, devices and biologics (including other studies focusing on registered drugs) require approval of Medicines Control Authority of Zimbabwe (MCAZ) before commencement

Yours Faithfully

.....

MRCZ SECRETARIAT
FOR CHAIRPERSON
MEDICAL RESEARCH COUNCIL OF ZIMBABWE

MEDICAL RESEARCH COUNCIL OF ZIMBABWE
2020 -10- 30
APPROVED
P.O. BOX CY 573 CAUSEWAY, HARARE

PROMOTING THE ETHICAL CONDUCT OF HEALTH RESEARCH

7.5 Ministry of Health and Child care authorisation letter



Telephone: +263-4-798620

All correspondence should be addressed to the Secretary for Health and Child Care

ZIMBABWE

Reference:
Ministry of Health and Child Care
P O Box CY1122
Causeway
HARARE

16 October 2020

University of Witwatersrand
Faculty of Health Sciences
27 St Andrew's Road, Parktown 2193
Johannesburg
South Africa

Dear Dr Ntombizodwa Ndlovu

Co: Ms Tuso Audrey Tanda

RE: APPLICATION FOR AUTHORIZATION TO CARRY OUT AN ACADEMIC RESEARCH TITLED: PERCEPTIONS OF HEALTH CARE PROVIDERS OF MULTI-DRUG RESISTANT TUBERCULOSIS SHORTER-COURSE TREATMENT REGIMEN IMPLEMENTATION IN HARARE, ZIMBABWE

Your letter dated 17th of September 2020 refers.

It is noted that you applied for authorization to carry out the aforementioned academic research. Furthermore, it is noted that permission to carry out the study was sought and obtained from University of Witwatersrand.

Please be advised that the request is approved subject to the student obtaining ethical clearance from MRCZ. Kindly note that the student may be requested to share the findings in form of a presentation or written report with MOHCC during the course or upon completion of the studies.

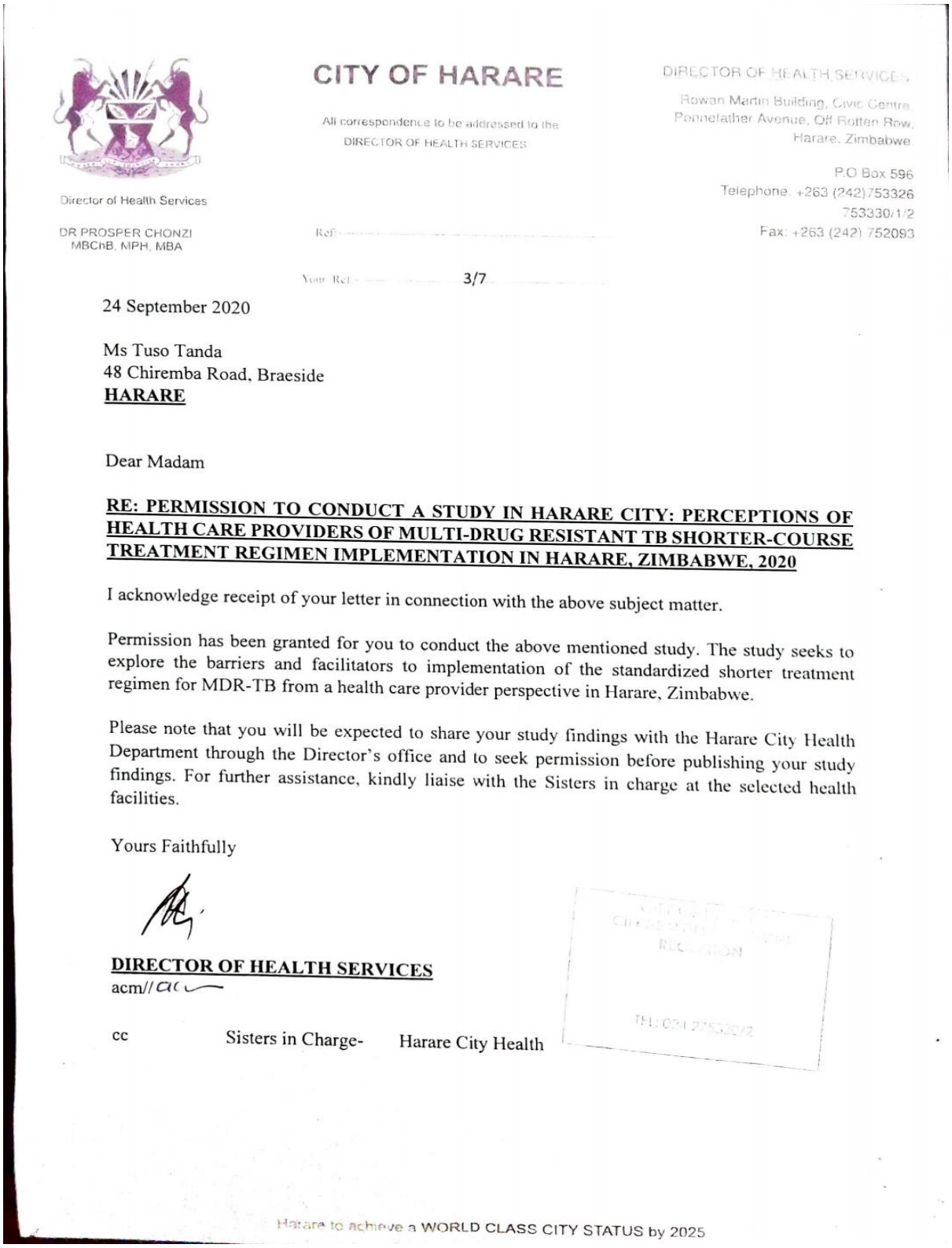
Kindly submit a copy of this communication and the ethical clearance from MRCZ to the Ministry of Health and Child Care. Address your communication to Prof. Nicholas Midzi (Director National Institute of Health Research) at midzinicholas@gmail.com, Cell No. 0785023912.

Regards.

SECRETARY FOR HEALTH AND CHILD CARE
(01) SECRETARY'S OFFICE (01)
21 OCT 2020
P.O. BOX CY 1122, CAUSEWAY
ZIMBABWE

Air Commodore (Dr) J. Chimedza
SECRETARY FOR HEALTH AND CHILD CARE

7.6 City of Harare authorisation letter



CITY OF HARARE

All correspondence to be addressed to the
DIRECTOR OF HEALTH SERVICES

DIRECTOR OF HEALTH SERVICES
Rowan Martin Building, Civic Centre
Pennefather Avenue, Off Rotten Row,
Harare, Zimbabwe

P.O Box 596
Telephone: +263 (242)753326
753330/1/2
Fax: +263 (242) 752093

Director of Health Services

DR PROSPER CHONZI
MBChB, MPH, MBA

Ref:

Your Ref: 3/7

24 September 2020

Ms Tuso Tanda
48 Chiremba Road, Braeside
HARARE

Dear Madam

RE: PERMISSION TO CONDUCT A STUDY IN HARARE CITY: PERCEPTIONS OF HEALTH CARE PROVIDERS OF MULTI-DRUG RESISTANT TB SHORTER-COURSE TREATMENT REGIMEN IMPLEMENTATION IN HARARE, ZIMBABWE, 2020

I acknowledge receipt of your letter in connection with the above subject matter.

Permission has been granted for you to conduct the above mentioned study. The study seeks to explore the barriers and facilitators to implementation of the standardized shorter treatment regimen for MDR-TB from a health care provider perspective in Harare, Zimbabwe.

Please note that you will be expected to share your study findings with the Harare City Health Department through the Director's office and to seek permission before publishing your study findings. For further assistance, kindly liaise with the Sisters in charge at the selected health facilities.

Yours Faithfully

DIRECTOR OF HEALTH SERVICES
acm//ac

cc Sisters in Charge- Harare City Health

CITY OF HARARE
RECEPTION
TEL: 0242753326/2

Harare to achieve a WORLD CLASS CITY STATUS by 2025

7.7: Informed Consent Form

Introduction

My name is Tuso Audrey Tanda. I am studying at the University of Witwatersrand, South Africa. I am researching on health care providers' perceptions of the implementation of a standardised shorter treatment regimen for multi-drug resistant tuberculosis (MDR-TB) in Harare, Zimbabwe. The study seeks to explore the barriers and facilitators to the implementation of WHO 2016 MDR-TB treatment guideline recommendations within public health institutions in Harare, Zimbabwe. The research will seek to understand the implementation of the shorter-course MDR-TB treatment from the health care provider's perspective. I would like to request a few minutes of your time to explain the purpose of my research further. Please do not hesitate to stop and ask me questions where you need clarification.

Purpose of the research

The Zimbabwe Ministry of Health and Child Care launched the implementation of the WHO 2016 MDR-TB treatment guideline recommendations in July 2018. The recommendation was to implement a standardised shorter-course treatment regimen with a duration of 9-12 months for the treatment of MDR-TB patients. The recommendation by the WHO was based on evidence of a more efficacious regimen. The recommended regimen has a shorter treatment duration than the conventional treatment, which has a duration of up to 24 months. Some health facilities have since started initiating new MDR-TB patients on the recommended shorter treatment regimen while some of the health facilities are still lagging on the implementation of these guideline recommendations. Harare is one of the two provinces that have the highest numbers of patients being treated for MDR-TB within its public health institutions. The study, therefore, aims to explore perceptions of health care providers of the implementation of the standardised short-course treatment regimen for MDR-TB patients. We believe that you, as one of the frontline providers of health care for TB patients, can help by telling us about your experience with the treatment and care for MDR-TB patients. We would also want to hear from you how you think the MDR-TB treatment program can be improved.

Type of Research Intervention

This research will involve in-depth telephone interviews with a duration of about one hour with each participant.

Participant Selection

You are being invited to take part in this research because we feel that your experience with the TB treatment and care program will be useful to understand the information to be explored in this study.

Voluntary Participation

Your participation in this research is voluntary.

Benefits

There will be no direct benefit to you. However, your participation is likely to help us find out more about the MDR-TB treatment program, which will, in turn, assist the Zimbabwe National tuberculosis program to come up with effective strategies to improve implementation.

Confidentiality

We will not be sharing information about you to anyone outside of the research team. The information that we collect from this research project will be kept private. During the interview, a pseudo-name will be used and any information about you will have a number on it instead of your name. All recorded data will be transferred from the audio recorder and saved on a password encrypted computer after the interview.

Contact details

If you have any questions about the study, you may contact me,

Tuso Tanda (Researcher)

Contact number: +263 772 622 548

Email address: 1918312@students.wits.ac.za

In case you have questions about your rights as a research participant. You may have queries or wish to report any problems you have related to this study please contact:

Relebogile Mapuroma (Research supervisor)

Contact number: +27785589028

Email address: relebogile.mapuroma@wits.ac.za

Dr Sumaya Mall (Research supervisor)

Contact number: +27846570490

Email address: sumaya.mall@wits.ac.za

Professor Rutendo B.L. Zinyama Gutsire (Research supervisor)

Contact number: +263777052861

Email address: gutsirerbl@yahoo.com

Wits Human Research Ethics Committee (Medical)

Contact number: +27117171234

Email address: HREC-Medical.ResearchOffice@wits.ac.za

Zimbabwe Medical Research Council

Contact number: +2632 4 2791792

Email address: mrc.zimbabwe@yahoo.com

7.8: Certificate of Consent

I have read the above information, or it has been read to me. I have had the opportunity to ask questions about it, and any questions were addressed to my satisfaction. I consent voluntarily to be a participant in this study.

Print Full Name of Participant_____

Signature of Participant _____

Date _____

Day/month/year

7.9 Audio-recording consent form

The reasons for audio-recording the interview have been clearly explained to me. I am aware that I may discontinue the interview at any point without any consequences. The researcher assured me that she would take measures to make sure that the recordings are kept safe for two years if the research is not published and up to 6years if the research has been published. The researcher assured me that the recordings would remain private and confidential at all times.

I consent to have the interview audio recorded.

Participants' full name_____

Participants' signature_____ Date_____

Researchers' name_____

Researcher's signature_____ Date_____

7.10 Interview guide for healthcare providers

Title: Perceptions of health care providers of multi-drug resistant tuberculosis shorter-course treatment regimen implementation in Harare, Zimbabwe.

Step 1: Introduction of the study to the respondents using the information sheet.

Step 2: Explain how the interview will be conducted.

Step 3: Request for an individual's consent for participation.

Step 4: Request for an individual's consent for the digital recording of audio.

Step 5: Confirm that the mobile device is set to record the interview

Step 6: Administer the interview

Interview guide exploring determinants to the implementation of a standardised shorter treatment regimen for multi-drug resistant tuberculosis (MDR-TB) in Harare, Zimbabwe.

Part 1: Demographics

i) Health facility name:	
ii) Health facility ownership	
iii) Professional qualification of respondent:	
iv) Designation of respondent:	
v) Date of the interview:	
vi) Age of the respondent:	
vii) Sex:	
viii) The number of years the respondent has worked in TB treatment services.	

Part 2: Exploring barriers and facilitators to implementation of shorter course MDR-TB treatment regimens (Adapted from CFIR Research Team, 2020).

Domain 1: Intervention characteristics

1a) Relative advantage

Based on your experience of providing treatment and care for MDR-TB patients.

i) What are the advantages of implementing the shorter course treatment regimen for MDR-TB compared to the longer treatment regimen? (to patient, health provider, health care system)

1b) Complexity

i) Which factors could complicate the implementation of the shorter-course treatment regimen for MDR-TB at your institution/in other health facilities? (expertise required, clinical tests, accessibility of medicines, comparison to other regimens, patient preferences).

ii) How can the factors you have outlined above be resolved to facilitate implementation?

Domain 2: Inner setting

2a) Structural characteristics

i) Do you think the infrastructure of your institution (social architecture, age, maturity, size, or physical layout) affects/ would affect the implementation of the shorter treatment regimen for MDR-TB?

Probe: What changes may be necessary to the infrastructure to promote implementation?

2b) Implementation climate

i) How has the implementation of the MDR-TB shorter treatment regimen been generally received in your institution?

Probes: Is there a strong need for shorter treatment regimens for MDR-TB?

From your experience, how well does the shorter treatment regimen fit with existing work processes and practices in your setting?

Are there any incentives to help ensure that the implementation of the shorter treatment regimen is successful at your institution? E.g., rewards, special recognition?

Are there any set goals related to the implementation of the shorter treatment regimen at your institution? Are these goals monitored for progress?

2c) Readiness for implementation

i) At the management level, are there representatives actively involved with the implementation of the shorter treatment regimen?

ii) How do leaders at your institution support the successful implementation of the shorter treatment regimen for MDR-TB?

iii) Are there sufficient resources to implement and administer the shorter-course treatment regimen for MDR-TB?

Probe: At the national level, at the institution.

iv) Have health care providers been provided with training in line with implementing the shorter treatment regimen for MDR-TB?

v) In what ways would training of health care providers have a role in either facilitating or hindering the implementation of the shorter regimen for MDR-TB?

Probe: On the respondent, management and colleagues

vi) Is there any information and materials about the shorter treatment regimen that has already been made available to you?

Probe: SOPs, guidelines, algorithms, job aides.

vii) Is there any information and materials about the shorter treatment regimen that has been planned for individuals in your setting?

Probe: IEC material, campaigns, meetings, media broadcasts

viii) Do you think the dissemination of information and materials to health care providers and individuals in the community could have an effect on the scale-up of the shorter course regimen?

Domain 3: Outer setting

3a) Patient needs and resources

i) What are some of the needs and preferences of the individuals being treated for MDR-TB at your institution that you are aware of?

ii) To what extent are the needs and preferences of the individuals served by your organisation/ZNTP/government/stakeholders when deciding to implement the shorter treatment regimen for MDR-TB?

Probe: Access to services, Individual needs due to less productivity and loss of income

iii) How well do you think the shorter treatment regimen for MDR-TB will meet the needs of the individuals served by your institution?

iv) What are some of the individual needs for MDR-TB patients that the shorter treatment regimen has failed/could fail to meet?

v) What barriers could individuals face in trying to access the shorter course MDR-TB treatment services at your institution?

vi) From working with individuals that have been treated/are currently being treated with the shorter treatment regimen, what are the likely factors that could facilitate/hinder shorter course regimen uptake?

3b) External policies and incentives

i) Are there any performance measures, policies, regulations, or guidelines that could have influenced the decision to implement the shorter treatment for MDR-TB?

Probe: Facilitated, hindered?

ii) Do you think there are financial or other incentives that could have influenced the decision to implement the shorter treatment regimen for MDR-TB?

Domain 4: Characteristics of individuals

4a) Knowledge and beliefs about the intervention

i) At what stage of implementation is the shorter treatment regimen for MDR-TB in your institution?

Probe: Pilot or full-scale implementation

ii) How do you feel about the shorter treatment regimen for MDR-TB being used in your setting?

4b) Self-efficacy

i) How confident are you that you are/ will be able to implement the shorter treatment regimen successfully?

4c) Other personal attributes

Probe: motivation, competence, capacity, and values

Domain 5: Process

5a) Planning

i) Can you briefly describe the plan for implementing the shorter treatment regimen for MDR-TB in Zimbabwe?

Probe: At the national level and local level.

5b) Engaging

i) Who do you think are the key influential individuals at your institution and in the community that are able to facilitate/drive the implementation of the shorter treatment regimen for MDR-TB?

ii) Apart from the formal health sector implementation leaders, who are the other champions who can strongly advocate the use of the shorter treatment regimen for MDR-TB?

iii) Is there someone (or a team) outside your institution who will be helping you with implementing the shorter treatment regimen for MDR-TB? (Individuals, Churches, Organisations).

Probe: Effect on the uptake of the shorter treatment regimen?

iv) What communication or education strategies are currently in place to inform the community about the shorter treatment regimen for MDR-TB?

Probe: What effect has this on the uptake of the shorter treatment regimen?

v) How will you assess progress towards implementation or intervention goals?

We have reached the end of the interview. Once again, thank you so much for your time and invaluable contribution to this study. Do you have any questions for me?

----------**THE END**----------