



UNIVERSITY OF THE
WITWATERSRAND,
JOHANNESBURG

University of the Witwatersrand

Faculty of Health Sciences

School of Public Health (SPH)

Master of Science in Epidemiology (Field of Implementation Science)

A research report submitted to the School of Public Health, University of the Witwatersrand, Johannesburg, in partial fulfilment of the requirements for Master of Science in Epidemiology in the field of Implementation science for the year November 2020.

Title: Examining fidelity of health care providers to Tuberculosis (TB) Diagnosis Guidelines in Tanzania.

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DECLARATION

I, Vangilisasi Msola declare that this thesis is my own, unaided work. It is being submitted for the Degree of MSc Epidemiology at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination at any other University.

V. Msola

(Signature of candidate)

27 day of November 2020 in Dar-es-Salaam

DEDICATION

To everyone who has invested their time, money and efforts in me, this is for you; thank you for believing in me!

ABSTRACT

Introduction: Globally, Tuberculosis (TB) is a leading cause of morbidity and mortality. The majority of TB cases are in low- and middle-income countries (LMIC). Healthcare providers' fidelity or adherence to TB intervention guidelines is critical to facilitate positive cases to care and to decrease the incidence of TB. In Tanzania, in 2013 the National Tuberculosis and Leprosy Programme (NTLP) issued a manual/guideline for the management of TB and Leprosy to facilitate health workers in the detection of TB cases in public health facilities. Little is known of health worker fidelity to these guidelines. Therefore, the present study aimed to examine the level of implementation fidelity and its determinants in relation to the adherence to TB guidelines among healthcare providers.

Methods: The study employed an explanatory sequential mixed design to collect data from 26 healthcare facilities that provide TB care in Ubungu district, Dar-es-Salaam, Tanzania. Quantitative data were collected first, followed by in-depth qualitative interviews. The qualitative component sought to explore concepts including stakeholders' involvement, willingness and readiness to adhere to TB guidelines as well as facilitations and strategies to adhere to TB guidelines that had been examined in the quantitative component. To analyse the quantitative component, an overall fidelity score was first generated. Second, implementation fidelity was ranked as low, moderate or high. Third, an Exploratory Factor Analysis (EFA) was employed to extract latent factors/determinants enabling implementation fidelity. These latent factors were used in regression modelling to examine their relationship to implementation fidelity. Lastly, qualitative data guided by an in-depth interview guide were collected through individual in-depth interviews (IDIs) to further explore the constructs generated by the quantitative phase. The Qualitative

Analysis Package (MAXQDA) was used to facilitate qualitative analysis which was guided by the framework approach.

Results: One hundred and thirty-eight healthcare providers participated in the quantitative part of the study and 12 healthcare providers participated in the qualitative phase. In the quantitative phase most healthcare providers had a mean overall level of implementation fidelity at 92 (66.67%). Four latent variables (factors) were extracted from the EFA and were labelled:

“Stakeholders’ involvement, willingness and readiness to adhere to TB

guidelines/intervention”, “Facilitations and strategies to adhere to TB

guidelines/intervention”, “Knowledge/information sharing and goals’ communication” and

“Client/Patients’ characteristics” for factor 1, 2, 3 and 4 respectively. In multivariate

regression factors 1 and 2 were found to have a statistically significant relationship with

implementation fidelity at $p < 0.05$ as well as a marginally significant relationship at $p=0.06$ with

factor 3. Twelve healthcare providers (six male and six female) participated in individual IDIs

from August to November 2018. The average duration of IDIs was 45 minutes. Themes that

emerged from the IDIs were categorised into five domains. The domains were guidelines’

characteristics, outer settings, inner settings, healthcare provider’s characteristics and process for

implementation. Participants’ mentioned more nuanced themes including: the size and level of

healthcare facility; skills-building capacity; performing internal review or feedback; networking

and communication; and organisational culture as potentially influencing adherence to the

guidelines.

Conclusion: The study concluded that fidelity in relation to adhering to TB guidelines among healthcare providers was moderate. Qualitative data suggest that “**Stakeholders’ involvement, willingness and readiness to adhere to TB guidelines/intervention, and “Facilitations and strategies to adhere to TB guidelines/intervention”** were found to significantly influence implementation fidelity and their significances were supported by themes/sub-themes and quotations emerging from IDIs.

ACKNOWLEDGMENTS

I wish to thank the following individuals for assisting the research:

My supervisors: Drs Sumaya Mall and Daniel Nyogea, I thank you for guiding me throughout the write-up of this dissertation.

Dr Innocent Maposa for assisting me with quantitative data analysis.

My sponsor, the World Health Organization-Tropical Disease Research (WHO-TDR), a special programme enabling Research and Training in Tropical Diseases.

I wish to thank my fellow MSc class of 2017 for all your support. Thank you for walking this journey with me. We now have the edge!!!

My family, for their support and prayers.

Last but not least, to God almighty for strength, grace and favour. He grants me every single day; without Him, this work would not be possible.

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DEFINITION OF TERMS

Fidelity: The degree to which the evidence-based intervention is implemented as intended by the programme's developer to achieve a specific implementation outcome (1). In this study, fidelity is defined as the degree to which healthcare providers adhere to TB diagnosis guidelines so as to achieve optimal TB management outcomes.

Manual/Guidelines: a statement or directory containing systematic steps and synthesis of relevant information, based on scientific evidence to assist health care providers in adherence to evidence-based practice (2).

Healthcare providers: Any clinician who delivers health services in the designated study area. S/he must be either at the level of an Assistant Clinical Officer (ACO), have completed a Certificate of Medicine, Clinical Officer (CO); completed Diploma of Medicine, Assistant Medical Officer (AMO); completed Advance Diploma in Medicine, Medical Officer (MO); completed Degree of Doctor of Medicine (or equivalent), and a Medical Specialist (completed any Postgraduate Degree of Medicine).

ACRONYMS

AIDS	Acquired Immunodeficiency Syndrome
CFIR	Consolidated Framework of Implementation Research
HIV	Human Immunodeficiency Virus
LMIC	Low- and Middle-Income Countries
MDR TB	Multi-Drug-Resistant Tuberculosis
NIMR	National Institute for Medical Research
NTLP	National Tuberculosis and Leprosy Programme
PARiHS	Promoting Action On Research Implementation in Health Services
PLWHA	People living with HIV/AIDS
TB	Tuberculosis
TDR	Tropical Diseases Research
WHO	World Health Organization

CHAPTER ONE

1.0.0. Introduction

This chapter provides background information about the global Tuberculosis (TB) epidemic and then gives context to the Tanzanian TB epidemic. The chapter comprises the following sections:

1.1. Background to the problem, 1.2. Conceptual framework, 1.3. Literature review, 1.4. Problem statement, 1.5. Justification, and 1.6. Research question and study objectives.

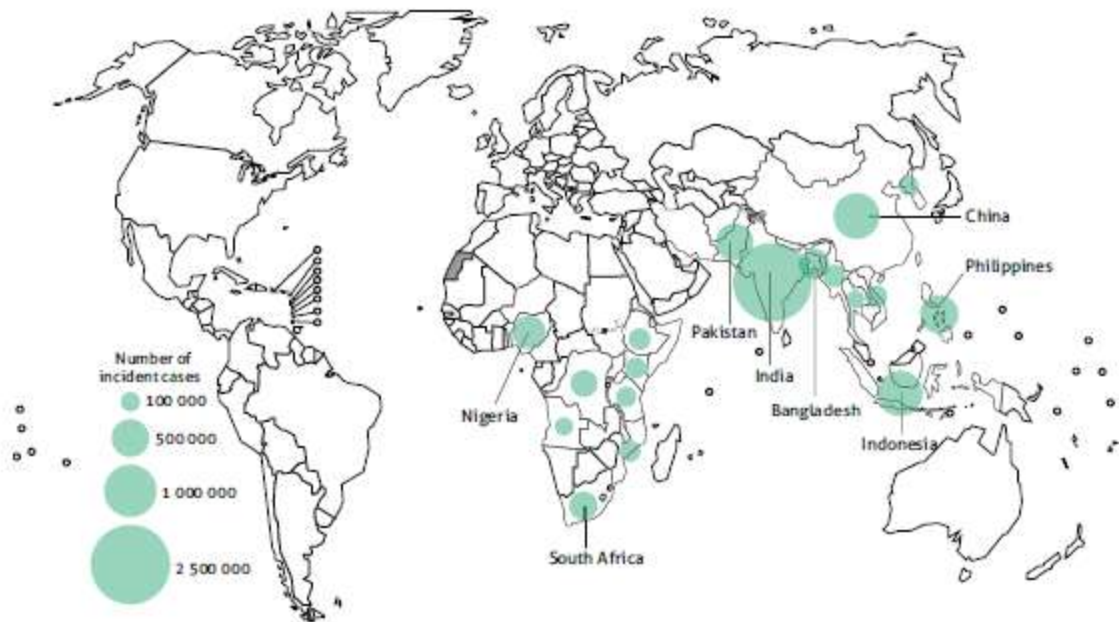
1.1.0. Background

1.1.1. Global burden of TB.

Globally, TB is a leading cause of morbidity and mortality (3–6). In 2018, 10.0 million individuals reported having TB. The majority of these were in low- and middle-income countries (LMIC) (5). Globally, the prevalence of TB has been reported to be relatively stable in recent years, i.e., an average of 10.0 million people reported with TB in three consecutive years, 2016, 2017 and 2018 (5,7,8).

Despite the global decline in both co-infection of HIV and TB and in subsequent mortality, co-infection with HIV and TB is still a pressing public health concern. In 2018, 251,000 TB deaths occurred among HIV-positive individuals compared to 620,000 deaths in 2000, i.e., a 60% reduction of deaths was observed between 2000 and 2018 (5).

Estimated TB incidence in 2018, for countries with at least 100 000 incident cases



Source: WHO-Global Tuberculosis Report 2019(1: p.35).

Figure 1: Map of the world showing an estimated TB incidence in 2018, for countries with at least 100, 000 incident cases.

1.1.2. TB prevalence and incidence in Tanzania

Tanzania is a LMIC and is among the 30 countries with the largest TB burden in the world (5). However, the country's incidence of TB has declined over the last years (4,5,7–9). The World Health Organization's global TB reports of 2016 and 2019 suggest that between 2015 and 2018 in Tanzania there were about 50 per 100,000 decrease in incidence rates of TB infection from 306 per 100,000 to 253 per 100,000 population (4,5).

Researchers have undertaken to examine factors associated with the decline in incidence. For example, Saito and colleagues examined the declined incidence of TB in East Africa (Kenya,

Tanzania and Uganda) between 2007 and 2012. Their analyses of existing data from the International Epidemiologic Databases to Evaluate AIDS (IeDEA) suggest that TB incidence had declined among People living with HIV/AIDS who were accessing both antiretroviral treatment and TB prophylaxis (10). More specifically, Majigo and colleagues examined the decline in incidence among PLWHA in Mainland Tanzania between 2011 and 2014. Overall, they found a decrease in annual incidence of TB over a 4-year period. They found that not accessing antiretroviral treatment, having advanced HIV disease and being older would likely predict TB incidence (11). In 2017, Said and colleagues assembled an ambi-directional cohort of TB patients in Bagamoyo District near Dar es Salaam, Tanzania. They prospectively followed patients with HIV/AIDS and examined their retrospective medical records to study risk of incident TB. The incidence of TB in this sample ranged from 0.8/100 per person years (PY) at risk in the main analysis to 1.7/100 PY at risk (95% CI 1.0–2.6) in subsequent sensitivity analyses. Prior history of TB disease was found to have a significant relationship with an increased risk of incident TB (12). A recent 2019 study examining TB incidence in Northern Tanzania by Mollel and colleagues suggests that among nearly 80,000 people living with HIV/AIDS (PLWHA), 405 patients developed TB over 195,296 PY of follow-up. This suggests an overall TB incidence rate of 2.08 per 1,000 PY. A number of potential risk factors for heightening the risk of TB infection among PLWHA were identified in this study. These were similar to the studies cited above and included sub-optimal nutritional status, low CD4 count and poor adherence to antiretroviral therapy (13).

1.1.3. TB care delivery and promoting implementation fidelity in Tanzania

The Ministry of Health, Community Development, Gender, Elderly and Children (MoHCDEC) and the National Tuberculosis and Leprosy Programme (NTLP) are responsible for funding and overseeing all TB prevention, care and control services in Tanzania (14). Several initiatives have been implemented by this programme. These programmes' main goals are to provide the latest knowledge and, in relation to TB and Leprosy care and control, to facilitate the delivery of effective high-quality interventions across the country (14). To inform effective TB interventions as well as to enhance evidence-based medicine and implementation research, NTLP in 2013 revised their manuals and issued the current edition (i.e., the sixth edition) of a manual for the management of Tuberculosis and Leprosy in Tanzania (14). The manual emphasises the integration of TB care within the general primary healthcare system as well as active TB case finding in communities to facilitate accessible TB care and case detection (14). This approach of active TB case finding entails systematically screening individuals at high risk of TB, e.g., contacts of people who have tested positive for TB or PLWHA and assists access to TB care and facilitates TB case detection in the country (15).

In addition, in 2014, the WHO endorsed the End TB strategy, a global strategy aiming to prevent and control the TB epidemic (16). The NTLP adopted the global End TB strategy to reduce TB infection suggesting commitment to End TB strategy's milestones as well as endorsing any update done by WHO to align with current WHO TB guidelines. The strategy's indicators are 95% reduction of TB mortality and 90% reduction of TB incidence rate by 2035 (16). Given that TB has strong associations with poverty-related conditions such as over-crowding, airflow and food insecurity (17,18), the strategy also aims to support financially insecure households who have been affected by TB (16). Moreover, accurate and early TB diagnosis, timeous treatment and prevention

are among further components of the End TB strategy that have been assimilated into the NTLP(16,19).

Furthermore, in 2016 NTLP, in collaboration with Global Fund, launched Quality Improvement (QI) in TB cases Detection Initiative to increase TB cases notification and reporting in the country (20). The initiative appears to be succeeding. After 18 months from implementation, TB cases notification increased by 12.4% from 62,180 to 69,818 cases (20). We cannot be certain if the increase in notification is due to the implementation and subsequent fidelity to these guidelines. Mhimbira and colleagues, who conducted a Cochrane review of interventions to increase TB case detection at primary healthcare or community level services suggest that there are many processes that could potentially increase TB case detection. These include screening for TB in the community, home visits and also providing printed information about clinical services available (21). In another study by Colvin and colleagues who worked in Tanzania, there were efforts to engage with traditional healers and community members to improve and increase TB case detection. There are many unaddressed questions around fidelity to guidelines and the impact on TB case detection (15).

1.2. Conceptual Framework/ Model for implementation fidelity

Given that there are many unaddressed questions with regard to fidelity and TB guidelines, it makes sense to examine conceptual frameworks from the field of implementation science. There are not many implementation science conceptual frameworks, theories or models that have been applied to TB research questions. However, in other fields researchers have developed and published many useful implementation theories, conceptual frameworks and models to promote

effective implementation of intervention programmes (1,22,23). They recommend incorporation of conceptual frameworks, theories or models in research to increase consistency and relevance of the findings (1,22,23).

Therefore, the present study used Carroll *et al.*'s Proposed Conceptual Framework for Implementation Fidelity (1) and the Consolidated Framework for Implementation Research (CFIR) (22) to examine the level of implementation fidelity and its determinants to adherence to the guidelines. To address this research question, an integrated mixed-method design, i.e., cross-sectional study design followed by individual In-depth Interviews (IDIs) was employed. Given that to my knowledge these models have not been applied to TB-related questions, this application, the core of this research report presents a novel contribution to the field.

The Carroll *et al.* Proposed Conceptual Framework for Implementation Fidelity has 9 constructs and is grouped into 3 categories (1) (See appendix iv). The fidelity/adherence category has 4 constructs, i.e., details of content, frequency, coverage and duration. The constructs coverage, frequency and duration to adherence are broadly subcategorized into dose (1) (See appendix iv). Likewise, the CFIR has a broad spectrum of constructs grouped into five domains, i.e., interventions' characteristics, outer setting, inner setting, individuals' characteristics and the process for implementation (22) (See appendix v).

1.2.0. Literature Review

A literature review was conducted to inform the problem statement of this research report. The databases PubMed, Google Scholar and the Cochrane Library were searched using the following

search terms: Tuberculosis, TB, diagnosis, implementation, fidelity, providers, healthcare providers and permutations of these terms. The literature accessed for this report is presented under the following themes: 1.2.1. Implementation, 1.2.2. Fidelity, Factors that influence the implementation fidelity of Health Care clinical guidelines, and 1.2.3 Healthcare providers' challenges with TB case detection (diagnosis) in Tanzania.

1.2.1. Implementation Fidelity

Although the literature on fidelity in relation to TB diagnosis or treatment is sparse as mentioned above, some studies in different domains of health, including substance use and mental disorders, have engaged with the concept. These studies are robust and allow for a thorough engagement of the literature and also for applicability to the question of fidelity in TB care. They are fully described below:

Dusenbury and colleagues conducted a review of the fidelity of implementation in relation to drug abuse prevention in schools. Their results suggest that, when an intervention is delivered with fidelity, outcomes tend to be favourable. They also reported that adherence to the programmes in both clinical and community settings yielded positive results only if a programme was carried out with fidelity (24).

1.2.2. Factors that influence the implementation fidelity of Health Care Clinical Guidelines

Healthcare clinical guidelines are essential components of many health service interventions. Literature suggests that guidelines are not always implemented successfully as originally intended (2,25). There are a number of publications of TB related guidelines. For example, in 2015 Getahun

and colleagues report on guidelines produced by the World Health Organization (WHO) for a public health response to latent TB infection. Such a public health response would entail a systematic testing process followed by treatment of latent TB infection in PLWHA, contacts of pulmonary TB cases and immune compromised patients (26). Another notable example of health care clinical guidelines is that of the World Health Organization (WHO) antenatal care (ANC) guidelines which recommend diagnostic screening and treatment of infectious diseases (HIV/AIDS, TB, malaria) during pregnancy (27). Odjidja and colleagues suggest that in Tanzania, where these guidelines were implemented, it was critical to understand the health system's capacity to fully integrate them. In a 2019 publication, Odjidja and colleagues report on their assessment of the Tanzanian public health system's capacity to implement these guidelines using the WHO's service availability and readiness assessment (SARA) framework. They found that availability of accessible staff was a strong predictor of the implementation of these guidelines (28).

Generally, factors that influence clinical guidelines utilisation can be categorised into healthcare clinical guidelines' characteristics (innovation), professionals' characteristics, patients/clients' characteristics, environmental characteristics and process for implementation strategies (1,2,25,29).

The characteristics of the healthcare clinical guidelines can determine how easy or complex it is to follow and adhere to subsequently affecting fidelity (25). Guidelines which are well structured, well organised and developed through professional consensus, are generally likely to be implemented effectively (25). Feder and colleagues, in a series of publications in the field of implementation research, report on the issue of adaptation of clinical guidelines for specific

contexts. They found that guidelines which were adapted to political, legal and social contexts were more amenable to healthcare providers (30).

This theme of adaptation to local social and political contexts was prominent in several studies. This theme emerged in a study done by Kitson and colleagues who evaluated the successful implementation of evidence into practice by using the Promoting Action on Research Implementation in Health Services (PARiHS) framework, as well as in a review conducted by Carroll and colleagues to propose their conceptual framework for implementation fidelity (1,2). Carroll and colleagues found that a patient's culture, preference and financial status frequently influence the adherence of healthcare providers to clinical guidelines (1).

Examples of the patients' characteristics thought to have a prominent influence on fidelity to guidelines include the ability to pay for investigation, the patient's cultural acceptability to undergo investigation, the presence of co-morbidities or multiple medical conditions (1,2). Similarly, the contextual factors of a facility setting such as peers support, adequate resources and enthusiasm were reported by many studies to influence a positive implementation climate for an intervention (25,29–31). These factors were also found to improve interpersonal skills, interaction between management and staff, as well as to promote a friendly environment in the workplace (25,29–31).

Likewise, for the guideline of any intervention to be successful, it needs appropriate implementation strategies. There are many implementation strategies which have been reported to facilitate an intervention to be implemented with fidelity. They can be simple or complex depending on who is using them and the context. Examples of such strategies to improve adherence to guidelines include regular training, regular auditing, feedback, computerised diagnosis algorithm and reminders such as wall posters, pop-up messages on the computer screen and reminder worksheet in a patient file reported (25,29,32,33). These strategies can be used

concurrently or as a single strategy, as appropriate: There is no evidence that multiple strategies yield better outcomes compared to a single strategy. Rather, it depends on the context, which determines the appropriate strategy to be used, as well as whether multiple strategies are required (25,29,32,33).

Nevertheless, healthcare providers are those at the frontline in the health system. Their capabilities, willingness and readiness are needed to implement an intervention with fidelity. This is supported by many implementation studies (29,34–36). Studies suggest that healthcare providers' awareness to the existence and familiarity with the guidelines, as well as having enough knowledge on the guidelines' contents, increase probability of the provider's adherence to that particular guideline (25,29). Other studies, which were done to evaluate adherence of TB national guidelines among healthcare providers in Uganda, Pakistan and north-western Somalia have suggested that providers' experiences, attitudes and behaviours can motivate or hinder the use of the guideline (34–36). For instance, the healthcare providers who perceive that following all steps of a guideline is a waste of time, and who do not perceive the source of the guideline to be credible, are less likely to adhere to that guideline (34–36). Tamir and colleagues report results of a study of TB infection control practices among healthcare workers in Ethiopia. Their findings suggest that protection control measures were not well implemented by the participants. Interestingly and relevant to the present enquiry, knowledge of the presence of a TB infection control plan and national guidelines were strong predictors of TB infection control practice (37).

1.2.3. Healthcare providers' challenges with TB case detection (diagnosis) in Tanzania

Despite the existence of TB guidelines, endorsement of the global End TB strategy and select studies suggesting that TB incidence is in decline, in Tanzania, new TB cases are still under-detected or under-reported by healthcare providers at health facilities due to several factors (9,38–40). In a study conducted in Tanzania, Senkoro and colleagues reported that under-detection of TB cases at health facilities could be associated with lack of support for, and suboptimal training of, the healthcare providers (38). Similarly, Verhagen and colleagues found that most healthcare providers in Tanzania were not well supported, equipped or trained to diagnose TB infection (39). Conversely, Adams and colleagues reported that the attitudes, skills and levels of knowledge of the paediatric TB providers suggested that they were adhering to the national guidelines (41). Other researchers, Ndagaya and colleagues, revealed that under-detection of TB cases was due to lack of active TB case findings in communities in Tanzania. Case detection and screening are routine practices and happen at the healthcare facilities when the patients present either with TB symptoms or symptoms of other medical conditions, including HIV/AIDS (42). The above findings suggest that several questions in the field of fidelity to guidelines remain unanswered.

1.3. Problem statement

Guidelines are essential tools for any intervention to be implemented with fidelity. They guide and explain how to deliver all the essential components of the intervention. Unfortunately, the effectiveness of implementing this kind of evidence-based tool such as TB guidelines by stakeholders (e.g., healthcare providers) in a real life-setting has been a major challenge (43). Also, I am not certain if reduction in incidence in TB or TB-related mortality in Tanzania is due to fidelity of guidelines (14). While this study is not intended as an epidemiological study or whether the fidelity to these guidelines might influence the above TB-related indicators, I believe that it

fills a gap in the literature of addressing several key questions about fidelity of health workers to these guidelines.

1.4. Justification

Healthcare providers are key stakeholders for any prevention, care and treatment intervention programme. Previous studies suggest that their adherence or fidelity to the interventions' guidelines is reported to improve clinical care and treatment outcomes (25,29). Considering the importance for healthcare providers to adhere to the guidelines and that there are a paucity of data on adherence or fidelity to TB guidelines among healthcare providers in Tanzania, the present study employed a framework-informed approach, i.e., Carroll *et al.*, Proposed Conceptual Framework and Consolidated Framework for Implementation Research (CFIR) (1,22) to examine the level of implementation fidelity and its determinants in relation to the adherence to TB guidelines among healthcare providers through quantitative and qualitative approaches sought to fill a gap and provide useful information to TB prevention, care and treatment intervention stakeholders.

1.5.0. Research Question and Study Objectives

1.5.1. Research Question

Is there fidelity in relation to adhering to TB Diagnosis Guidelines in Dar es Salaam, Tanzania among healthcare providers?

1.5.2. Aim

To examine if there is fidelity in relation to the adherence to TB Diagnosis Guidelines in Dar es Salaam, Tanzania among healthcare providers through quantitative and qualitative methods.

1.5.3. Specific Objectives

1. To examine the level of implementation fidelity in relation to the adherence to TB Diagnosis Guidelines among healthcare providers in Dar es Salaam, Tanzania.
2. To examine the factors enabling or obstructing fidelity in relation to the adherence to TB Diagnosis Guidelines among healthcare providers in Dar es Salaam, Tanzania.
3. To qualitatively explore the experiences of healthcare providers about fidelity in relation to the adherence to TB Diagnosis Guidelines among healthcare providers in Dar es Salaam, Tanzania.

CHAPTER TWO

2.0.0. Methodology

This chapter presents the methodology employed in the study. The study consisted of two components: a quantitative component and then a follow up in-depth qualitative component. This approach is known as an explanatory sequential mixed design. The design was appropriate to this study because in implementation research quantitative methods are most appropriate to test and confirm the hypotheses formulated from existing implementation conceptual frameworks, while qualitative methods are used to increase the breadth and depth of understanding of the quantitative outcomes as well as predictors of implementation outcomes (44,45).

In this explanatory sequential study, the integration occurred during the study, i.e., refining the interview protocols for qualitative research after quantitative data analysis as well as during the discussion using a results matrix (see figure 2 below for a visual representation of the methods employed in the study).

The quantitative methods are described first, followed by a description of the qualitative methods. The quantitative components include: 2.1.1. study design, 2.1.2. description of study site, 2.1.3. study population, 2.1.4. sampling, 2.1.5. data collection, 2.1.7. study variables, and 2.1.8 data management, and analysis.

The qualitative components include 2.2.1. study design, 2.2.2. description of study site, 2.2.3. study population, 2.2.4. sampling, 2.2.5. data collection, and 2.2.6. data management and analysis. Ethical considerations are described jointly for both components.

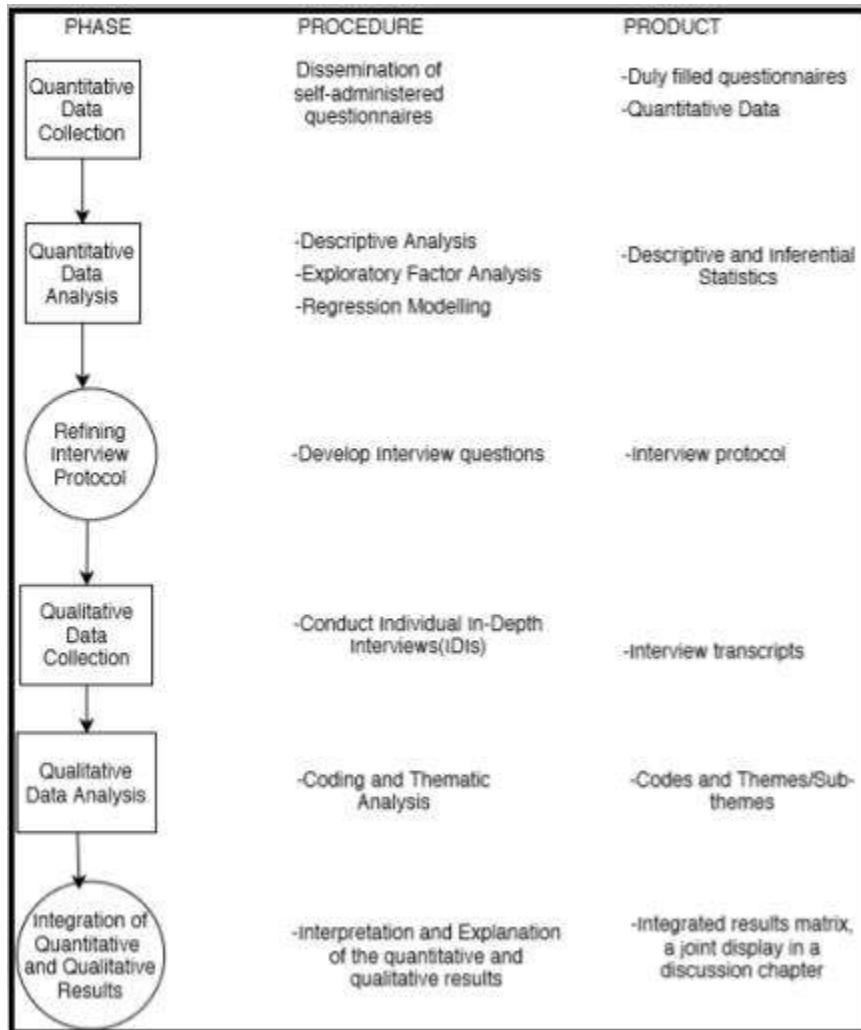


Figure 2: Visual Display for the Explanatory Sequential Study Design Procedure, modified from McCrudden M and McTigue E (44: p.5)

2.1.0. Quantitative component

2.1.1. Study design

The quantitative component was designed as a cross-sectional study, whereby healthcare providers were interviewed about implementation fidelity in relation to adhering to the guideline. A “Cross-sectional design is a “Snapshot”, characterizing the prevalence of a health outcome in a specified population” (47). The study was designed to select the sample population and obtain data to examine the level of implementation fidelity and its determinants at one point in time. The data were then used to inform the qualitative component of the study. In other words, the data were triangulated with qualitative data to increase the validity and reliability of the findings (48,49).

2.1.2. Study site

The study was conducted at all 26 healthcare facilities (Appendix viii) that provide TB care in the Ubungu district, Dar-es-Salaam. Dar-es-Salaam is the capital city of Tanzania. The city has a population of approximately 6 million (i.e., 10% of the country’s population) (50). Dar es Salaam is divided into 5 administrative districts, i.e., Kinondoni, Ilala, Temeke, Ubungu, and Kigamboni. As stated by The National Tuberculosis and Leprosy Program (NTLP) annual report of 2016, estimates were that Dar es Salaam region had the highest TB notification rates in the country at 244 cases per 100,000 compared to the average country notification rate at 129 cases per 100,000 (51).

The study area, Ubungu district, is located in the Western part of the city. According to the 2012 National Census, the district had a population of 845,368 (409,149 were male and 436,219 were female) (52).

2.1.3. Study population

The study selected all healthcare providers from all levels of health facilities, either public or private, in the study area.

2.1.4.0. Sampling

The sampling technique used in the quantitative component of the study was homogeneous convenience sampling, whereby only clinicians who met inclusion and exclusion criteria and were readily available as well as willing to participate in the study at all 26 healthcare facilities were approached for recruitment. Contrary to conventional convenience sampling, homogenous convenience sampling technique intentionally constrains the sampling frame to one or a few socio-demographic backgrounds to reduce sampling bias and confounding related to socio-demographic backgrounds of the target population (54). In this study, the sampling frame was constrained to clinicians only as they are most likely to attend and diagnose suspected cases of TB directly (see figure 3).

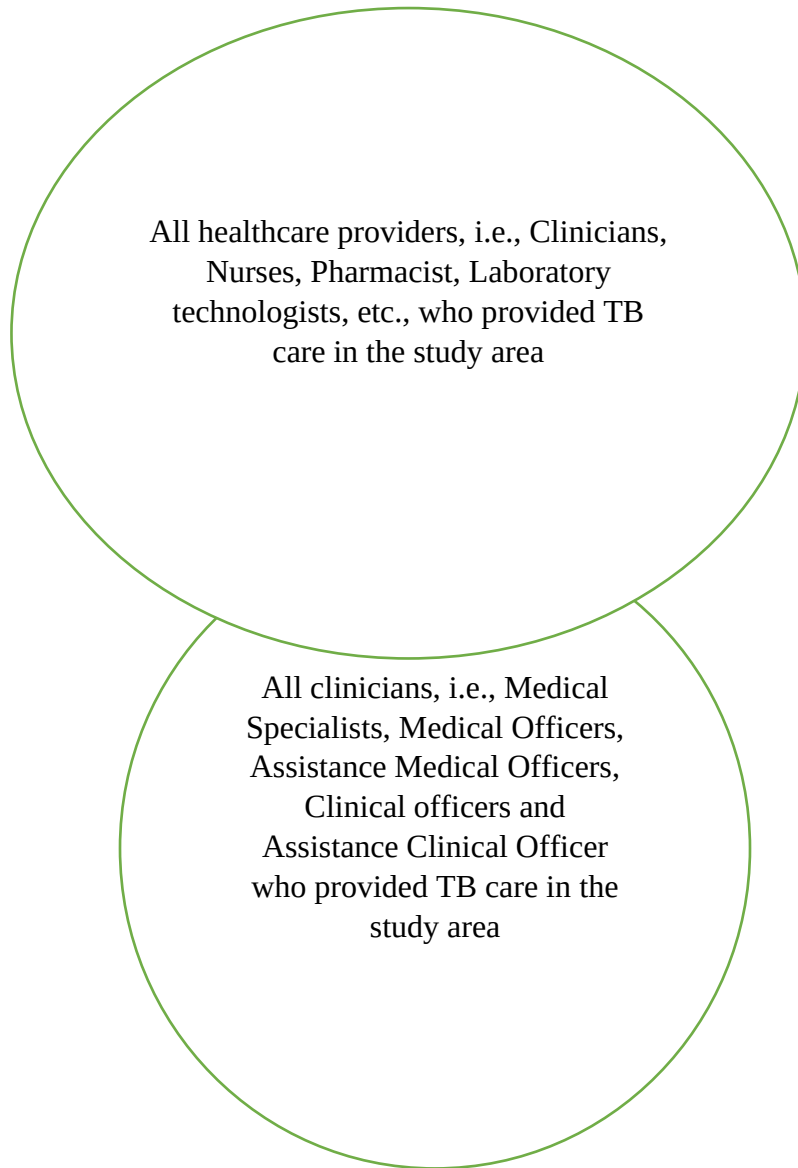


Figure 3: The diagram illustrates how homogeneous convenience sampling was done.

2.1.4.1. Inclusion and exclusion criteria

The study included all adults (aged ≥ 18 years) healthcare providers, i.e., clinicians who were providing TB care at healthcare facilities in the study area and consented to take part in the study. Healthcare providers who provided TB care, but who worked in healthcare facilities without dedicated TB clinics in the study area, were not approached for recruitment.

2.1.5.0. Data collection

2.1.5.1. Data collection tool

A self-administered questionnaire was used to capture socio-demographic characteristics, the level of implementation fidelity and its potential correlates. The questionnaire (see Appendix ii) was designed by the Principal Investigator (PI) using two validated tools, the flowchart and the CFIR Conceptual Framework. A pilot study was not conducted.

The flowchart (see Appendix vii), which presents the steps to follow on the diagnosis of pulmonary TB in children above 6 years and adults, was used to structure questions which tested the level of implementation fidelity.

The CFIR Conceptual Framework (see Appendix v) was used to frame Likert-item/scale/statements/ questions which were used to examine the determinants of implementation fidelity. The Likert-item/scale questions were completed by the healthcare provider on a scale of 1-5, 1 (one) was the lowest and 5 (five) was the highest response. The responses were: either strongly-disagree (point 1), disagree (point 2), neutral (point 3), agree (point 4) or strongly-agree (point 5).

2.1.5.2. Data collection techniques

Self-report data collection techniques were employed through a self-administered questionnaire. Self-report is an indirect observation approach which can be used to measure implementation fidelity and capture self-reported information (55). The questionnaires were administered to all healthcare providers recruited. The Principal Investigator (PI) set up boxes for the anonymous return of self-administered questionnaires to all healthcare facilities. The return rate of the disseminated questionnaires was 98%.

2.1.6.0. Study variables

Figure 4 below illustrates study variables and their relationship.

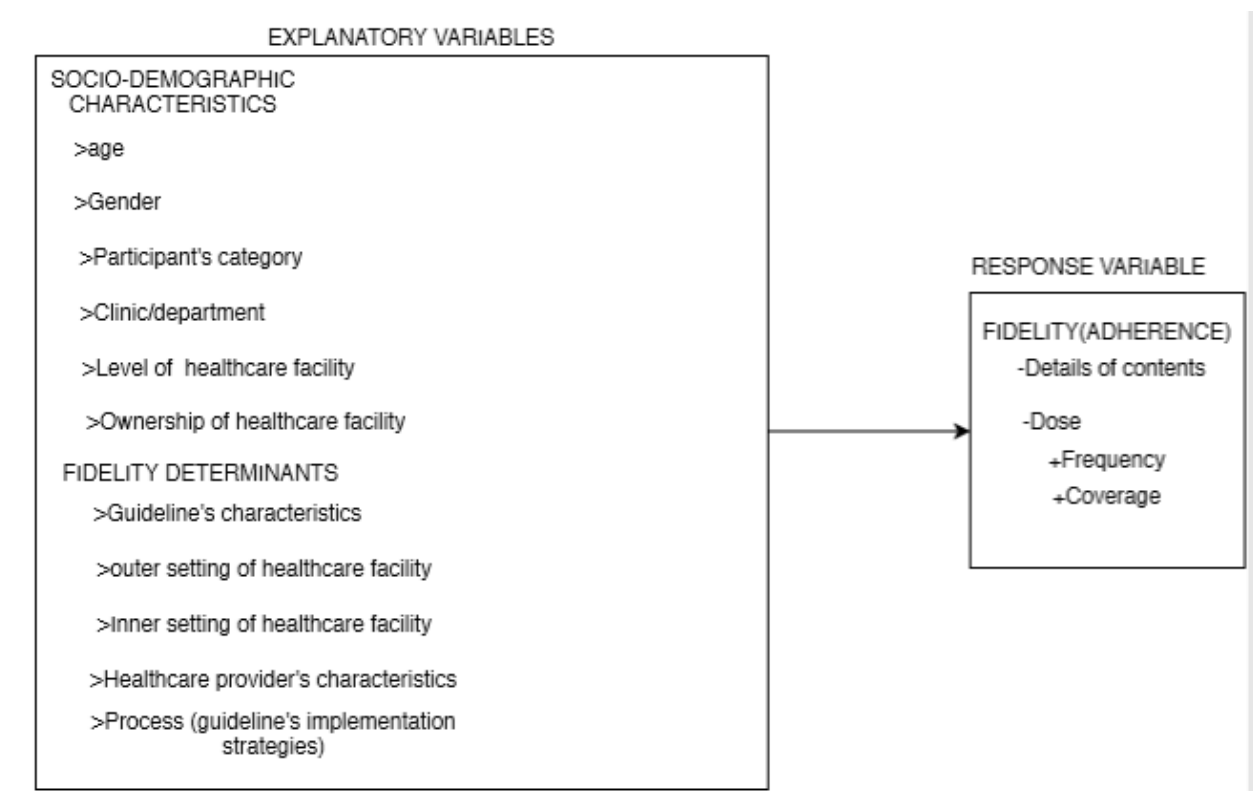


Figure 4: Schematic Diagram for Variables and their Relationship.

2.1.6.1. Explanatory variables

Healthcare providers' socio-demographic characteristics and fidelity correlates were the main explanatory variables used in this study.

Socio-demographic Characteristics.

These were healthcare providers' socio-demographic characteristics such as age, gender, participant's category, clinic/department, level of healthcare facility and ownership of healthcare facility.

Fidelity Determinants.

Fidelity determinants were guideline characteristics, outer setting of healthcare facility, inner setting of healthcare facility, characteristics of healthcare providers and process (guideline's implementation strategies). These fidelity determinants (domains) were thought to influence the level of implementation fidelity as suggested by the CFIR Conceptual Framework (22). (See Appendix v)

2.1.6.2. Response variable.

Fidelity (adherence) was the response variable. (See Table 1 below for explanation)

Table 1: Explanation of response variable.

Response variable	Measurements
Fidelity(Adherence): The term fidelity is broad, made up of two constructs such as details of content and dose of fidelity (1)	• Details of content: Measured by the best correct responses versus incorrect responses to the questions which were used to determine the detail of contents construct. Each correct response was scored 1 and incorrect responses were scored 0. • Dose: It was measured by responses for Frequency and Coverage component of fidelity. ➤ Frequency. Self-reported by healthcare providers on the frequency use/adherence to TB guideline were used to measure frequency. The responses were "Not at all", "Sometimes" "Often", "Very often" and "All the time". "Not at all" and "Sometimes" were collapsed to "No frequency to adherence" while "Often", "Very often" and "All the time" to "Frequency to adherence". ➤ Coverage. Healthcare providers self-reporting presence of even single current TB guideline at a healthcare facility were considered as the presence of coverage. The response was Yes/No scale.

2.1.7.0. Data management and analysis

2.1.7.1 Data management process

Research Electronic Data Capture (REDCap) 7.6.7 - © 2017 Vanderbilt University, a secured, web-based software platform (56) hosted at the Wits School of Public Health was used to create data collection tools such as questionnaires, store and manage quantitative data. Duly and well-filled questionnaires were double entered for each record and compared for correctness. Discrepancies were resolved by going back to source documents.

2.1.7.2. Data analysis

Data from REDCap were exported to Stata version 14.2 (STATA Corp., College Station, Texas 77845 USA) for further cleaning, i.e., variables selection and management and treatment for missing data. Three values from three observations were missing. Mean substitution imputation techniques were used to replace the missing values. The clean data were then used for statistical analysis to answer study questions.

2.1.7.2.1. Descriptive statistics

The descriptive statistics for socio-demographic characteristics and level of implementation fidelity were reported. Continuous variables were summarised as means or medians depending on their distributions. Categorical variables were reported on proportions (%) for cumulative estimates.

2.1.7.2.2. Initial solution(s) for factor analysis

Cronbach's alpha was used to test the internal consistency reliability measurement scale. This technique was employed to determine whether all Likert-scale statements/questions for all constructs of the determinant (domain) on the questionnaire are consistently rated by responders.

A Cronbach's alpha coefficient value of ≥ 0.7 was considered as a benchmark for measurement test scale reliability (57). The Kaiser-Meyer-Olkin (KMO) was used for the Measure of Sampling Adequacy (MSA). MSA values of 0.9, 0.8, 0.7, 0.6 and 0.5 were considered marvellous, meritorious, middling, mediocre and miserable sampling adequacy respectively while MSA values < 0.5 was considered inadequate sampling (58). Many items should have coefficients of ≥ 0.30 to support correlation matrix factorability (59).

2.1.7.2.3. Objective 1: To determine the level of fidelity in relation to the adherence to TB Diagnosis Guidelines in Tanzania among healthcare providers

The summary scores of 0 to 2 for dose, 0 to 17 for frequency and 0 to 19 for the overall level of fidelity in relation to the adherence for each healthcare provider were measured. The mean of the sum of the summary scores of all components of fidelity were used to create continuous scores percentage. Then, the continuous scores percentage for each component and overall fidelity were categorised into high, moderate or low if percentages were $\geq 80\%$, $< 80\%$ but $\geq 50\%$ or $< 50\%$ respectively as previous studies suggested (60,61).

2.1.7.2.4. Objective 2: To determine the factors enabling fidelity in relation to the adherence to TB Diagnosis Guidelines in Dar es Salaam, Tanzania among healthcare providers

Exploratory Factor Analysis (EFA) was conducted to explore the pattern of underlying items and smallest set of summaries of latent factors from the variables (observed items) (62,63). The Kaiser criterion was used to determine and select the number of factors to be retained. The factor(s) with eigenvalue <1.00 were dropped and those with factor loading values of $<|0.60|$ were suppressed (62,63). The oblique (varimax) rotation was performed to minimize the number of items which have high loadings on each factor to simplify factor's interpretation as well to yield uncorrelated factors which later were used for regression modelling.

Univariate and multivariate regression analysis were used to determine the association between extracted factors from EFA and implementation fidelity. Whereby, factors' coefficients from each extracted factor were used to generate factor scores for the corresponding factor, then the scores were used as a continuous independent variable. Likewise, implementation fidelity's continuous scores values were used as a continuous dependent variable in the regression models. The dependent variable was negatively skewed, therefore the cubic transformation was done. Variance Inflation Factors (VIF) was also conducted to check multicollinearity. VIF value, the rule of 10 was used as a cut-off-point for multicollinearity (64). All tests of significance were two-sided tailed and a p-value of <0.05 was considered statistically significant.

2.2.0. Qualitative component

2.2.1. Study design

The study used face to face in-depth individual interviews to collect qualitative data to further explore some of the potential correlates of fidelity. The potentials correlates/questions were formulated from CFIR Conceptual framework (22).

The interviews were guided by a semi-structured interview guide, refined after quantitative data collection and analysis. After quantitative analysis the following constructs were flagged for more depth: Stakeholders' involvement, willingness and readiness to adhere to TB guidelines, Facilitations and strategies to adhere to TB guidelines, Knowledge/information sharing and goals' communication as well as Client/Patients' characteristics.

2.2.2. Study site

The study was conducted in the same study area as the quantitative component, i.e., at all 26 healthcare facilities (Appendix viii), that provide TB care in Ubungo district, Dar es Salaam.

2.2.3. Study population

The same study population as quantitative component, i.e., Healthcare providers from all levels of health facilities, either public or private, in the study area participated in the qualitative component of the study.

2.2.4.0. Sampling

Purposive sampling was used to select key participants for in-depth interviews. The same participants who participated in the quantitative component of the study had the chance to be selected. They were selected across different levels and categories of the healthcare facility such as level of the healthcare facility, type of healthcare facility's ownership and location of the healthcare facility were approached for recruitment in order to achieve maximal variation (65). Interviews were conducted until saturation point was reached, when the data started to yield similar results from participants and served to confirm the emerging themes (66).

2.2.4.1. Inclusion and exclusion criteria

All adult (aged ≥ 18 years) healthcare providers who were providing TB care at healthcare facilities in the study area and consented to take part in the study were included in the study. Healthcare providers who were on leave, unwilling to participate or those who provided TB care, but worked in healthcare facilities without dedicated TB clinics in the study area, were not approached for recruitment.

2.2.5.0. Data collection

Data were collected through a face to face in-depth interview (IDI) at the participants' offices or another convenient location at a time when participants were off duty to ensure patient care was not compromised. The IDIs were conducted in Swahili and/or English (Note: Participants were free to use both languages interchangeably if that was their preference). The semi-structured interview guide was used to guide the IDIs. The guide questions were developed based on the CFIR framework and refined after quantitative results (Appendices ii and iii). Two audio tape recorders (Model type: Sony ICD-PX470 Digital Voice Recorder with USB), one being used as a

backup, were used to record all interviews. All interviews were conducted by the Principal Investigator (PI), Dr VM.

2.2.6.0. Data management process and analysis

2.2.6.1. Data management process

Recorded in-depth interviews were transcribed verbatim by the PI, then translated from Swahili into English in line with the World Health Organization translation procedures (65).

Audio recordings and transcriptions of both versions (Swahili and English) were stored separately in specific folders with passwords. Transcriptions were stored as Microsoft Word documents. Names and other identifiers in all study's documents were removed and were coded differently with pseudonyms. The logbook was used to link and identify their relationship and was kept and stored separately from other documents.

2.2.6.2. Data analysis

English transcriptions were read and re-read so that the PI could gain familiarity. Transcriptions were then transferred to the Qualitative Analysis Package (MAXQDA) for analysis and considered in their entirety for analysis. The codes were merged to create main themes and sub-themes both inductively and deductively. Throughout the analysis, an interpretive description approach (65) was used for constant comparison between and within codes, main themes, and sub-themes to identify similarities and differences. The framework approach for qualitative data analysis was used, an appropriate approach to analysing qualitative data for public health related research. In

the framework approach, there are a number of phases, as outlined by Ritchie and Lewis in 2003.

These are:

1. Familiarising one-self with the transcriptions by reading and re-reading the transcriptions, developing codes and assigning data and themes to the codes.
2. Summarising and synthesising coded data.
3. Developing associations or patterns within concepts and themes and ensuring that participants' statements have been fairly presented.
4. Interpreting the meaning within the themes (67).

To establish trustworthiness of the qualitative study, five techniques were employed. These were:

1. Credibility. Triangulation can be used to check if findings are credible; the current study used explanatory sequential mixed methods to triangulate the findings.
2. Transferability. To demonstrate that findings can be applicable to other contexts and situations, the present study used general validated Implementation Conceptual frameworks (i.e., Carroll *et al.*, Proposed Conceptual Framework for Implementation Fidelity and the Consolidated Framework for Implementation Research (CFIR)) to guide the study.
3. Dependability. The study followed and explained all epidemiological study methods and tools used to collect data to ensure that the study can be repeated by other researchers. The data collection tools were a closed self-administered questionnaire and semi-structured interview.
4. Confirmability. To ensure that the study findings were based on participants' responses and not biased by the researcher's personal motive or interest. In the present study, three

of the English transcriptions were also coded and analysed by an independent research assistant, an experienced qualitative researcher. In the event of any discrepancy, a discussion was held to resolve the discrepancy and reach consensus.

5. Authenticity. To show a range of reality, key participants in this study were identified using purposive sampling and described accurately (68).

2.3.8. Ethical considerations

Ethical clearances were sought from two committees (i.e., Human Research Ethics Committee (Medical) of the University of the Witwatersrand (Protocol # M180139) and the Tanzanian National Health Research Ethical Committee of the National Institute for Medical Research (NIMR) before the commencement of the research. Written participants' information sheets were given to all participants to read and to understand the study. Oral informed consent was obtained, and the informed consent form was given to all participants to sign prior to engagement in the study. For IDIs, all participants were also given audio-recording informed consent forms to sign before an interview was recorded to demonstrate their acceptance of being tape recorded. Participation in the study was completely voluntary. Participants were informed that there was no direct benefit or risk arising from participating in this study. Also, participants were free to share any personal information and, if they were uncomfortable, the interview would be stopped without any discrimination or compromise. To keep confidentiality, the results were presented anonymously, and only research team members had access to the data. The study was conducted in accordance with the Helsinki Declaration (69).

CHAPTER THREE

3.0.0. Results

This chapter presents two sections of the study's results, with quantitative findings being presented first followed by the qualitative findings. Later, in the discussion, the quantitative and qualitative results are interpreted in an integrated results matrix, specifically a joint display.

3.1.0. Quantitative findings

The quantitative section consists of the following sub-sections: 3.1.1. Socio-demographic characteristics, 3.1.2. Level of implementation fidelity, 3.1.3.0. Factor Analysis, 3.1.3.1. Initial description/solution for Factor Analysis and 3.1.3.2. Exploratory as well as 3.1.4. Regression modelling.

3.1.1 Socio-demographic characteristics

One hundred and thirty-eight healthcare providers participated in the cross-sectional (survey) part of this study. There were more males than females in the final sample. There were 76 (54.55%) males and 55 females (45.45%). The median age of the participants was 38.27 (30.04-45.02). Most of the healthcare providers worked in public healthcare facilities 89 (64.49%). The majority were clinical officers 48 (34.78%) and were working in the outpatient department 112 (81.16%) (see Table 2 below).

Table 2: Socio-demographic Characteristics of Healthcare Providers. (N=138).

Characteristic	Responses	N(%)
Gender	Male	76(55.07%)
	Female	62(44.93%)
	Total	138(100.00%)
Age in years (Median Participant's category)	Median (IQR)	38.27(30.04-45.02)
	Assistant Clinical Officer	8 (5.80%)
	Clinical Officer	48(34.78%)
	Assistant Medical Officer	30 (21.74%)
	Medical Officer	42(30.43%)
	Medical Specialist	10 (7.25%)
	Total	138(100.00%)
Clinic/department	Outpatient	112(81.16%)
	Inpatient	8(5.80%)
	TB	7(5.07%)
	CTC	10(7.25%)
	Other	1(0.72)
	Total	138(100.00%)
Level of healthcare facility	Hospital	60 (43.38%)
	Health Centre	38(27.54%)
	Dispensary	40(28.99%)
Type of healthcare facility's ownership	Private	49(35.51%)
	Public	89(64.49%)
	Total	138(100.00%)

3.1.2. Level of implementation fidelity

The coverage and frequency components (constructs) of implementation fidelity on adherence of healthcare providers to TB guidelines were 132 (95.65%) and 125 (90.58%) respectively. The dose construct of implementation was high at 121 (87.68%). While the majority of healthcare providers had medium level implementation fidelity to details of content 86 (62.32%) as well as the overall level of implementation fidelity was medium at 92 (66.67%) (see Table 3 below).

Table 3: Level of Implementation Fidelity of Healthcare Providers.

		Number (Percentage)
Coverage of TB guideline	Yes	132(95.65%)
	No	6(4.35%)
	Total	138(100.00%)
Frequency of the adherence to TB guideline	Yes	125(90.58%)
	No	13(9.42%)
	Total	138(100.00%)
Dose of the adherence to TB guideline (Coverage and Frequency)	Low	17(12.32%)
	High	121(87.68)
	Total	138(100.00%)
Details of contents of the adherence to TB guideline	Low	11(7.97%)
	Medium	86(62.32%)
	High	41(29.71%)
	Total	138(100.00%)
Overall level of fidelity in relation to the adherence to TB guidelines (Coverage, Frequency and Details of contents)	Low	8(5.80%)
	Medium	92(66.67%)
	High	38(27.54)
	Total	138(100.00%)

3.1.3.0. Factor Analysis (FA)

3.1.3.1. Initial description/solution for FA

The means and standard deviations for all variables (items) ranged from 3.29 to 4.34 and 0.50 to 1.17 respectively. The measurement of internal consistency and reliability between Likert-scale responses rated by healthcare providers for all items and overall were above Cronbach's alpha coefficient of 0.90. Also, all items, except one item gx38(MSA=0.41) had MSA acceptable level. Overall MSA of all items was meritorious, i.e., MSA= 0.84 (See Table 4 below). Many items had correlation coefficients of ≥ 0.30 , and there was no multicollinearity between them (see Appendix xiii).

Table 4: Descriptive statistics for Likert-scales of 40 Items (Variables), Overall Internal Consistency and Reliability Measurement Scale (Cronbach's Alpha) and Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy (MSA) (N = 138).

Items	Mean	Standard Deviation	Cronbach's Alpha	KMO-MSA	Items	Mean	Standard Deviation	Cronbach's Alpha	KMO-MSA
<i>qx32</i>	3.81	1.09	0.93	0.64	<i>is72</i>	3.58	1.07	0.93	0.57
<i>qx34</i>	3.86	0.91	0.93	0.54	<i>is73</i>	4.17	0.93	0.93	0.73
<i>qx36</i>	4.13	0.93	0.92	0.90	<i>is75</i>	4.26	0.67	0.92	0.89
<i>qx38</i>	3.29	1.17	0.93	0.41	<i>is77</i>	4.34	0.59	0.92	0.89
<i>qx40</i>	3.97	0.63	0.92	0.60	<i>is81</i>	4.16	0.72	0.92	0.89
<i>os44</i>	3.55	0.94	0.93	0.49	<i>idx83</i>	4.16	0.74	0.92	0.87
<i>os45</i>	3.76	0.89	0.92	0.81	<i>idx84</i>	3.76	1.10	0.93	0.73
<i>os47</i>	4.30	0.70	0.92	0.90	<i>idx87</i>	4.16	0.68	0.92	0.88
<i>os49</i>	4.20	0.63	0.92	0.87	<i>idx90</i>	4.12	0.63	0.92	0.82
<i>os51</i>	4.10	0.71	0.92	0.83	<i>idx92</i>	4.07	0.66	0.92	0.82
<i>os53</i>	4.12	0.92	0.92	0.68	<i>idx94</i>	4.08	0.55	0.92	0.83
<i>os54</i>	4.30	0.72	0.92	0.81	<i>idx96</i>	4.08	0.57	0.92	0.83
<i>is56</i>	3.99	0.76	0.92	0.71	<i>idx97</i>	4.17	0.59	0.92	0.90
<i>is58</i>	4.07	0.74	0.92	0.82	<i>prs99</i>	4.19	0.63	0.92	0.90
<i>is60</i>	4.14	0.66	0.92	0.86	<i>prs101</i>	4.12	0.67	0.9214	0.88
<i>is62</i>	4.09	0.58	0.92	0.92	<i>prs103</i>	4.07	0.71	0.9218	0.83
<i>is64</i>	4.26	0.62	0.92	0.93	<i>prs105</i>	4.13	0.56	0.9232	0.84
<i>is66</i>	4.17	0.59	0.92	0.81	<i>prs107</i>	4.18	0.57	0.9217	0.84
<i>is68</i>	4.16	0.68	0.92	0.90	<i>prs109</i>	4.21	0.50	0.9213	0.92
<i>is70</i>	4.01	0.95	0.92	0.91	<i>prs111</i>	4.24	0.61	0.9212	0.89
					<i>Test scale/Overall</i>			0.92	0.84

Note: See items/variables labelling on Appendix xiv

3.1.3.2. Exploratory Factor Analysis (EFA)

Six factors (latent constructs) were extracted into a model. On unrotated factor pattern matrix, all items were clustered on factor 1, except one item onto factor 2 which was loaded negatively. After rotation, all extracted factors were underlined by at least two items except factor 5 and factor 6. The unique variance values of all items loaded onto extracted factors were below 0.7 (i.e., communality of all items loaded onto extracted factors were below 0.3, communality=1-uniqueness). Factor 1, factor 2, factor 3 and factor 4, which were underlined by at least 2 items, accounted for 72.2 % of the variation (see Table 5 below).

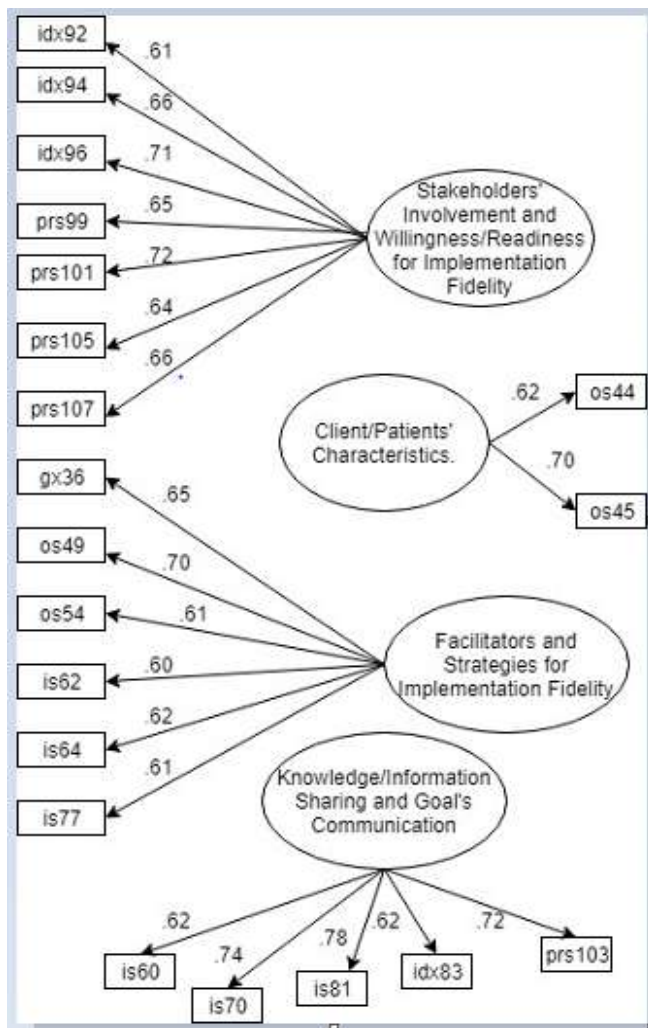
Factor1 was highly loaded by the following items *idx92*, *idx94*, *idx96*, *prs99*, *prs101*, *prs105* and *prs107*. Factor1 explained 49.83% of the variance and was labelled “**Stakeholders’ Involvement and Willingness/Readiness to adhere to TB guidelines/intervention**”. The factor 2 was labelled “**Facilitations and strategies to adhere to TB guidelines/intervention**”, due to high loading values of items *gx36*, *os49*, *os54*, *is62*, *is64* and *is77* onto the factor. The variance explained by this factor was 8.14%. Also, the variance accounted by factor 3 was 7.92% and items *is60*, *is70*, *is81*, *idx83* and *prs103* were highly loaded onto the factor. This factor was labelled “**Knowledge/information sharing and Goals’ communication**”. Likewise, factor 4 was highly loaded by items *os44* and *os45* and 6.40% of the variance was explained by this factor. Factor 4 was namely “**Client/patients’ characteristics**” (see Table 5 and Figure 5).

Table 5: Rotated and Un rotated factor loadings (Factor pattern matrices).

<i>Items</i>	<i>Un rotated factor loadings</i>						<i>Uniqueness</i>
	<i>Factor 1</i>	<i>Factor 2</i>	<i>Factor 3</i>	<i>Factor 4</i>	<i>Factor 5</i>	<i>Factor 6</i>	
<i>gx36</i>	0.60						0.46
<i>os47</i>	0.73						0.42
<i>os49</i>	0.63						0.33
<i>is62</i>	0.62						0.48
<i>is64</i>	0.71						0.42
<i>is70</i>	0.65						0.32
<i>is75</i>	0.66						0.45
<i>is77</i>	0.76						0.34
<i>is81</i>	0.68						0.25
<i>idx83</i>	0.74						0.32
<i>idx87</i>	0.64						0.43
<i>idx94</i>	0.67						0.32
<i>idx96</i>	0.70						0.31
<i>idx97</i>	0.66						0.36
<i>prs99</i>	0.80						0.28
<i>prs101</i>	0.69						0.33
<i>prs103</i>	0.61	-0.61					0.23
<i>prs107</i>	0.69						0.38
<i>prs109</i>	0.76						0.33
<i>prs111</i>	0.70						0.45
<i>Rotated factor loadings</i>							
<i>gx36</i>		0.65					0.46
<i>os44</i>				0.63			0.55
<i>os45</i>				0.70			0.39
<i>os49</i>		0.70					0.33
<i>os54</i>		0.62					0.50
<i>is60</i>			0.62				0.29
<i>is62</i>		0.61					0.48
<i>is64</i>		0.61					0.42
<i>is70</i>			0.74				0.32
<i>is73</i>						0.65	0.42
<i>is77</i>		0.60					0.34
<i>is81</i>			0.78				0.25
<i>idx83</i>			0.62				0.32
<i>idx92</i>	0.61						0.51
<i>idx94</i>	0.66						0.32
<i>idx96</i>	0.71						0.31
<i>prs99</i>	0.65						0.28
<i>prs101</i>	0.72						0.33
<i>prs103</i>			0.72				0.23
<i>prs105</i>	0.61						0.53
<i>prs107</i>	0.66						0.38
<i>% Variance</i>	49.83%	8.14%	7.92%	6.40%	4.63%	4.47%	
<i>Total Variance</i>	49.83%	57.97%	65.89%	72.28%	76.91%	81.38%	

Note: -item *gx38* was dropped, not included for EFA since it had below an acceptable level of MSA, factor with eigenvalue value <1 were suppressed and blanks represent factor loading <|0.6|.

- See items/variables labelling on Appendix xiv.



Note: See items/variables labelling on Appendix xiv

Figure 5: Diagram presentation of the factors (proposed factors names) and their underlined items after EFA.

3.1.4. Regression modelling

In the univariate analysis, the association between extracted latent constructs (factors) and level of implementation fidelity suggest a significant association at $p \leq 0.05$ for factor 1 (**Stakeholders' involvement, willingness and readiness for implementation fidelity**), factor 2 (**Facilitation and strategies of implementation fidelity**) and factor 3 (**Knowledge/information sharing and Goals' communication**), except for factor 4 (**Client/Patients' characteristics**). A multivariable modelling was constructed that adjusted for all the factors show statistically significant, factors still independently associated ($p < 0.05$) with implementation fidelity were factor 1 and 2 as well marginally for factor 3 ($p=0.06$). Variance Inflation Factors (VIF) value was 1.00 for each univariate model and overall model. (See Table 6 below)

Table 6: Univariate and Multivariate analysis for the 4 extracted Factor score values with the level of implementation fidelity.

Factors	Univariate		Multivariate		
	Coefficient (95% CI)	P-value	Coefficient (95% CI)	P-value	VIF
factor1	0.05 (0.01-0.08)	<0.01	0.04 (0.01-0.07)	<0.01	1.00
factor2	0.05 (0.02-0.08)	<0.01	0.05 (0.02-0.08)	<0.01	1.00
factor3	0.03 0.05 (0.00-0.07)	0.05	0.03 (-0.00-0.06)	0.06	1.00
factor4	-0.01 (-0.04-0.03)	0.76			1.00

3.2.0. Qualitative findings

This section of the qualitative results addresses, specifically, objective three which explored the experiences of healthcare providers about fidelity in relation to the adherence to TB Diagnosis Guidelines among healthcare providers, and presents participants' socio-demographic characteristics, for those who were recruited in IDIs, and themes/determinants for each interacting main domain for Implementation Research. The interacting main domains were guideline's characteristics, outer settings, inner settings, healthcare provider's characteristics and process for implementation. Themes and sub-themes were obtained from interviews and subsequent data analysis and they were described below in detail with illustrative quotes from the data. (See Appendix xv-codebook for codes/themes and decision rule)

3.2.1. Participants' socio-demographic characteristics

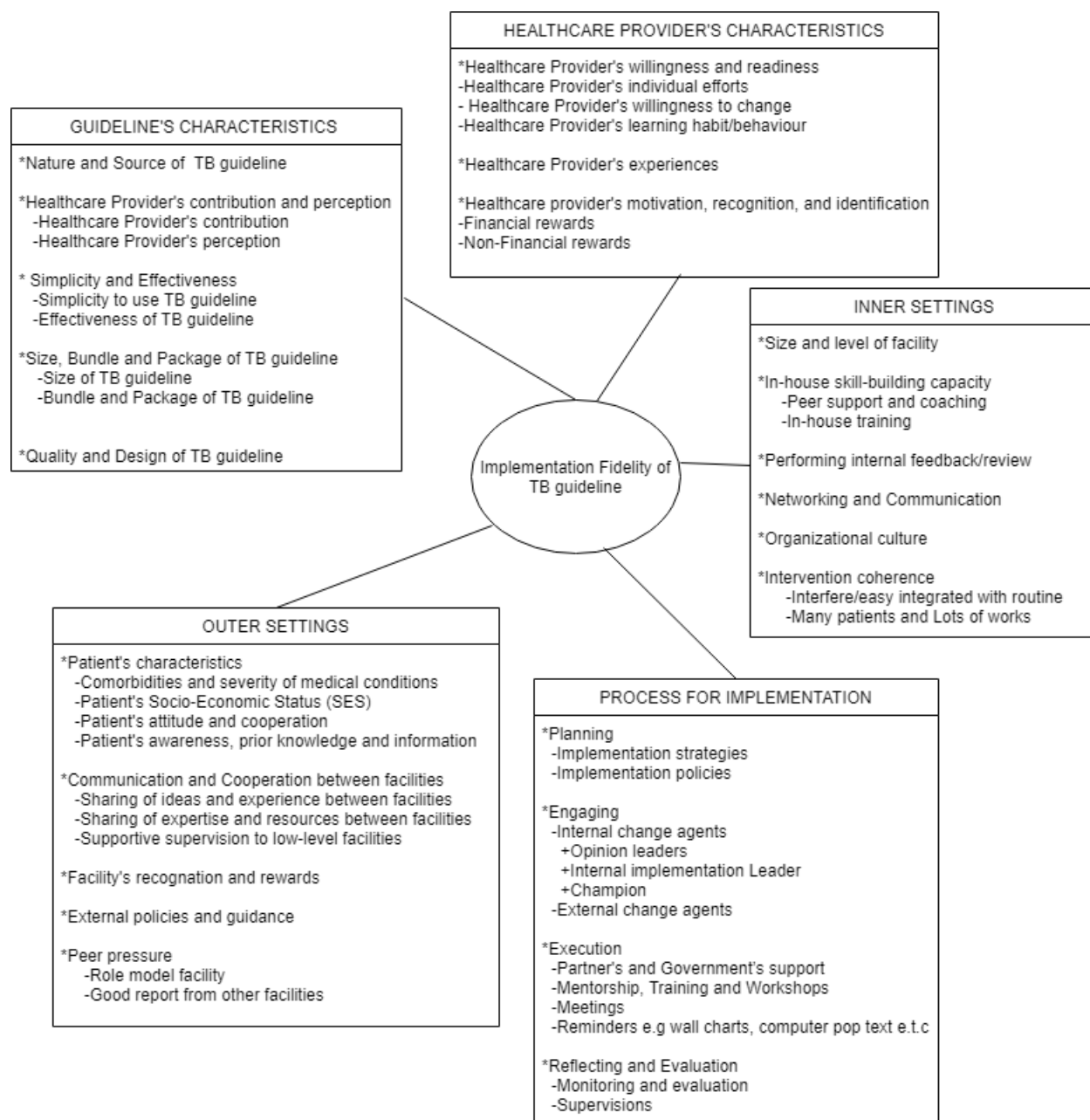
Twelve healthcare providers (six male and six female) participated in individual IDIs from August to November 2018. Participants' ages ranged between 25 and 63 years old and out of twelve, five participants had an educational level of a diploma, three had an advance diploma and four were graduates. There were five participants who were working at a hospital, four at a health centre and three at a dispensary. Seven participants were employed in government hospitals and five were working in private hospitals. The average duration of IDIs was 45 minutes. Each participant's characteristics are presented in Table 7 below.

Table 7: Participants' socio-demographic characteristics.

	Age in years	Gender	Participant's education	level of Healthcare Facility's Participant's Work-on	Healthcare Facility's Ownership Participant's Work-on
Participant#1	27	Male	Diploma	Health Centre	Government
Participant#2	33	Female	Advance Diploma	Dispensary	Private
Participant#3	63	Male	Degree	Hospital	Private
Participant#4	30	Male	Diploma	Health Centre	Government
Participant#5	38	Male	Degree	Hospital	Private
Participant#6	34	Female	Degree	Hospital	Government
Participant#7	45	Female	Advance Diploma	Health Centre	Government
Participant#8	25	Female	Diploma	Dispensary	Government
Participant#9	49	Female	Diploma	Dispensary	Private
Participant#10	44	Female	Advance Diploma	Hospital	Government
Participant#11	54	Male	Diploma	Dispensary	Government
Participant#12	28	Male	Degree	Hospital	Private

3.2.2. Determinants of Implementation Fidelity

Figure 6 below summarises the determinants for implementation fidelity. The determinants were grouped into five interacting main domains for implementation research: guideline's characteristics, outer settings, inner settings, healthcare provider's characteristics and process for implementation.



*Note: * indicates themes, - sub-themes and + sub-sub-themes.*

Figure 6: Summary of the determinants that influence the implementation fidelity of TB guideline among healthcare providers.

GUIDELINE'S CHARACTERISTICS

Nature and source of the guideline. Nature and sources of the guidelines were described by healthcare providers as the influencer of the guideline's adherence. Healthcare providers trust a guideline when the source is known and the facts in the guidelines are evidence-based. They further explained that they trust the current TB management manual/guideline because it recognizes and follows international standards criteria for TB management.

The diagnosis for tuberculosis has now been made simple, I don't so much recognize the previous approach they used to diagnose TB, I just use the current one, I use this one because it is well organized and is researched, evidence-based. So, the research had led to the establishment of this guideline (Participant # 3. Male, Degree, Health Center, Private).

TB guideline is a guide that is given out by the ministry of health, it adheres to World Health Organization's criteria in the identification of an infection to a suspected person, management and treatment of that person (Participant # 12. Male, Degree, Health Center, Private).

Healthcare provider's contributions and perceptions to TB guideline

Healthcare provider's contributions and perceptions of TB guideline: Healthcare provider's contributions. Healthcare providers highlighted that for a guideline to fit the local context and adhere to it, they must have the opportunity to contribute to the guidelines themselves.

So, you may find that, if a healthcare provider gets a chance to participate in the preparation of guideline, particularly TB guideline. It means that it will simple for them to air out their opinions or shortcoming of the guideline. For examples that algorithm to children, you find that it has some challenges (Participant # 1. Male, Diploma, Health Center, Government)

Healthcare provider's perception of TB guidelines

Healthcare providers knew and perceived that a guideline is an important book, manual or document that provides all the information regarding TB management. Healthcare providers mentioned that despite being aware that the guidelines are important they may not always adhere to them.

TB Guideline is the guide or a book which guide TB management. It is a good guide; it shows and directs any provider aaah on how to diagnose TB. it instructs investigations that are recommended for the treatment of TB to the kids and adults in general (Participant # 1. Male, Diploma, Health Center, Government).

Simplicity and Effectiveness of TB guidelines

Simplicity and Effectiveness of TB guidelines: Simplicity to use TB guidelines

It was explained by healthcare providers that a guideline is easy to use and self-explanatory. It is user-friendly as it is easy for healthcare providers to follow it during TB case detection.

If you read it nicely and understand the contents, you will discover that is simple, it is not difficult to use it and it makes it easier for me to diagnose TB (Participant # 4. Male, Diploma, Government).

I think it is easy because there is a wall-post and when you suspect a tuberculosis case in a certain per cent you don't need to go and check the step in the guideline, or the guideline can be misplaced and if it is misplaced then the one on the wall difficult to be misplaced (Participant # 3. Male, Degree, Health Center, Private).

Simplicity and Effectiveness of TB guidelines: The effectiveness of TB guidelines

Healthcare providers further explained that the guidelines are helpful and assist in more accurate TB cases detection because its contents are well organised. Hence, it influences healthcare providers to adhere to it.

I think the guideline is the only better way, without using the guideline is difficult to detect one has TB (Participant # 2. Female, Advance Diploma, Dispensary, Private).

The diagnosis for tuberculosis has now been made simple, I don't so much recognize the previous approach, I just use the current one, I use this one because it is well organized and is researched, evidence-based (Participant # 3. Male, Degree, Health Center, Private).

Size, Bundle, and Package of TB guidelines

Size, Bundle, and Package of TB guidelines: Size of TB guidelines. Furthermore, healthcare providers explained their adherence to TB guidelines was sometimes affected by the size of the guideline. The reason for that is the size of the book can determine how easy it is to read and understand in a specific given time.

Like what I mentioned previously that the guideline manual is big, and it has a lot in it, you can't read the contents just in a single day. So, the easiest way of accessing information and create memories know what is right and what is wrong. (Participant # 4. Male, Diploma, Health Center, Government)

Size, Bundle, and Package of TB guidelines: Bundle and Package of TB guidelines.

However, some of the healthcare providers mentioned that the guideline is so big to read and difficult to consult. Others mentioned that the guideline is portable and well written and were impressed with its appearance. The appearance motivates them to go through the contents which makes it easy to understand the contents.

The challenge I might say is the size of the book. One can look at the size of the guideline and give up just because the way is too big other than a simple chart, but I think it differs from person to person. Another may look and be impressed with the appearance (Participant # 5. Male, Degree, Health Center, Private).

The guideline is portable, well written and simple to understand, its appearance is attractive to go through its contents (Participant # 4. Male, Diploma, Health Center, Government)

Quality and Design of TB guidelines. The design and quality of the guideline's contents were highlighted by healthcare providers as influencing their adherence. They stated that the guideline has good design and quality, therefore, it influences them to be efficient and consistent in their work.

They are fine, I can say they are in good quality. They so standard especially if you compare to our country's environment/setting. It helps, it helps many of us healthcare providers. So, we still don't have any substitute/alternate to it. It saves many of us to be efficient and consistent in our work. But yet it has its challenges and still we see it is working fine. (Participant #1. Male, Diploma, Health Center, Government)

OUTER SETTINGS

Patient's characteristics

Patient's characteristics: Comorbidities and severity of medical conditions. Healthcare providers reported that adherence to the guidelines sometimes was limited by the severity of the patients' condition. Priority would be to attend to a patient with severe, life threatening symptoms before consulting with the guidelines. Adhering to the guidelines would also be compromised if the patient presented with a comorbidity condition that is not TB and requires primary attention.

Sometimes you find that patient's condition is so bad then, you fail to adhere to guideline instead you first do ABC emergency protocol. If he/she was referred to our facility we can't admit her/him, so we need to re-refer the patient to the high level, you don't even bother about patient's TB symptoms even if you have seen them, so you end up not adhering to the guideline? (Participant # 2. Female, Advance Diploma, Dispensary, Government)

Patient's characteristics: Patient's Socio-Economic Status (SES)

On the other hand, healthcare providers highlighted that the financial status of the patient may influence their decision on the patient's management and even the adherence to the guideline. They reported that most of the patients who have low socio-economic status can't afford to pay for some of the investigations requested, therefore it forces healthcare providers to skip some of the steps.

An example you order sputum investigation, you order x-ray but the patient delay to take investigation because he/she can't afford to pay, so that is a challenge (Participant # 9. Female, Diploma, Dispensary, Private).

For instance, in medication, we tell patients to come with their remaining medication during follow up and others say they don't have bus fare (Participant # 10. Female, Advance Diploma, Hospital, Government).

Patient's characteristics: Patient's attitude and cooperation

Furthermore, healthcare providers stated that a patient's attitude and cooperation might influence guideline adherence. They described that sometimes patients decided on how they wanted to be treated. Therefore, they were influenced by the patient to make decisions.

Also, many clinicians don't adhere to the guideline because they order investigation what the patients want to be ordered, they are influenced by patient decision. So, we need to counsel our patients that, they must start with sputum examinations then when results are negative, they can take the X-ray. Most of TB infection can be detected in sputum (Participant # 6. Male, Degree, Hospital, Government).

Patient's characteristics: Patient's awareness, prior knowledge, and information

Patient's awareness, prior knowledge and information about the facility that provides good services and has the necessary equipment to perform all TB tests efficiently were reported to influence and encourage providers in that facility to continue to provide good services, hence adherence to the guidelines.

It helps the providers at the facility to follow the guidelines because you find patients coming from facility X to facility Y with the information that at our centre s/he will get good service in terms of performing TB tests. So that entails how our efforts are spreading the good news to other areas that we perform our duties efficiently with deadlines (Participant # 2. Female, Advance Diploma, Dispensary, Government).

Communication and Cooperation between facilities.

Communication and Cooperation between facilities: Sharing of ideas and experience between facilities.

Sharing of ideas and experience about TB management between different facilities were highlighted by healthcare providers to influence guideline's adherence. They usually meet and remind each other the benefit of adherence in order to improve TB services.

We normally remind each other on adherence to TB guideline whenever we meet in different meetings on new treatment line, or TB treatment and this is one of the ways we use to improve services and keep track of our TB clients (Participant # 11. Male, Diploma, Dispensary, Government).

When we meet others and discussing the guideline, they might say they are doing this and that on TB management in the sense that we should be the same and not otherwise (Participant # 6. Male, Degree, Hospital, Government).

Communication and Cooperation between facilities: Sharing of expertise and resources between facilities. Sharing of expertise and resources were reported that it influenced guideline's adherence. They mentioned that if the facility is unable to perform some of TB investigations or it does not have someone who can read the X-ray results i.e. Radiologist, then it can send a sample for testing or asking someone from a different facility who is more expert on reading X-ray film,

There is investigation called GeneXpert since it is not available, we are forced to send the samples to the nearest hospital in which it takes more than two days for the results to come out (Participant # 4. Male, Diploma, Health Center, Government).

There are other healthcare providers who want to adhere to the guideline, but they don't have a current guideline at their facilities. Sometimes they call us, now is globalization so

someone from Shinyanga can call you and ask eeee treatment of TB is like like what is supposed to do just remind me and if you ask them if they don't have a new guideline, they say they don't have. Then you explain to them about the new guideline and understand each other. Therefore, having a new version of the guideline at the right time is really help (Participant # 2. Female, Advance Diploma, Dispensary, Government).

Communication and Cooperation between facilities: Supportive supervision to low-level facilities. Healthcare providers mentioned TB management supportive supervision to the low-level facilities promote to guidelines adherence. The providers from high-level healthcare facilities called to assist low-level facilities to handle some of the difficult TB cases. Consequently, it influences providers in low-level facilities to adhere to the guideline.

You know we have other small facilities and maybe when a patient went to those facilities and then they fail to manage because it is new to them or they are not sure, they call to ask how to handle the patients (Participant # 2. Female, Advance Diploma, Dispensary, Government).

Facility's recognition and reward

Participants enlightened that facility's recognition and reward influence TB guideline's adherence. It promotes healthcare providers to work hard so that they can perform their duties efficiently and not spoil the goodwill of the facility they have created.

It helps the providers at the facility to follow the guidelines because you find patients coming from facility X to facility Y with the information that at our centre s/he will get good service in terms of performing TB tests. So that entails how our efforts are spreading the good news to other areas that we perform our duties efficiently with deadlines (Participant # 2. Female, Advance Diploma, Dispensary, Government).

External policies and guidance

Healthcare providers explained that good external policies and guidance which direct them in case of any problem influence them to adhere to the guideline. Also, they mentioned that they get the update of any new policy and guidance from TB representative and those updates help them to know what is new in the field then make them easy to adhere to the guideline.

He is a municipal representative at our facility. We called it district since we have TB districts within the administrative district. These representatives help us, and they act as a link on the update regarding the TB guidelines through formal notifications even if the new edition of the guideline isn't yet published. We also present to them those difficult TB case and because they help us to get the solution, yeah, they experienced than us and that is what they are doing every day they must know better than us hahaaa. (Participant # 1. Male, Diploma, Health Center, Government).

Peer pressure.

Peer pressure: Role model facility. Health care providers believed that some facilities are role models to others because of their good performance and experience on providing TB care to patients particularly on adherence to guidelines. That encourages healthcare providers from other facilities to adhere to the guideline.

If the centre has been providing the TB outpatient services for a long time can influence their healthcare providers to adhere to following TB guideline. They attend many cases with TB symptoms and because, they see a lot of TB patients then, they aware how different patients can present differently with TB symptoms. (Participant #4. Male, Diploma, Health Center, Government).

Peer pressure: Good report from other facilities

Sharing experiences of TB management between facilities were other factors mentioned by most of the healthcare providers as important to promote guideline's adherence and TB management in general. They explained that those reports and documents provide rich information on success stories and challenges as well as on how those challenges were resolved.

Because we know others what they are doing, we do share report if there any challenge which needs improvement, so it is very important and helpful to share a report about the adherence (Participant # 2. Female, Advance Diploma, Dispensary, Government).

Mhhhh it influences because through reports we will get more information about other health facilities, the number of TB patients they have attended, success and challenges they

have faced while diagnosing TB patients (Participant # 4. Male, Diploma, Health Center, Government).

INNER SETTINGS

Size and level of the facility. It was mentioned by healthcare providers that size and level of healthcare facility influence adherence to the guideline. They describe that determines the availability of investigations which can be performed to that facility. Therefore, make it easy for them to adhere to the guidelines.

There is no any difficulty to adhere to the guideline, the only challenge is there are some of the investigations we don't perform here (Participant # 4. Male, Diploma, Health Center, Government).

At our facility, there is investigation called GeneXpert, since it is not available, we are forced to send the samples to the nearest hospital, in which it takes more than two days for the results to come out (Participant # 4. Male, Diploma, Health Center, Government).

In-house skill-building capacity.

In-house skill-building capacity: Peer support/coaching and information sharing. It was further reported that proper inner settings such as information sharing through morning reports among staffs as well as peer support/coaching influence healthcare providers to adhere to the guidelines.

During morning meetings there are morning sessions on education about Tuberculosis, ways to follow on diagnosing properly and on how to administer medication, the program is rotational, and participants are health service providers themselves hence making it easier for the health service providers to be familiar with TB and the guidelines (Participant # 9. Female, Diploma, Dispensary, Private).

Through discussion, many issues can be addressed and shared, this includes challenges whereby another healthcare provider can give advice to others from other facilities on how they have overcome the same challenges (Participant # 4. Male, Diploma, Health Center, Government).

In-house skill-building capacity: In-house training. Capacity building through training within the facility to update each other on TB management especially when a new guideline is released, or new content is added in the guideline was a crucial explanation made by the majority of the healthcare providers that influence the adherence of the guideline.

And those training even on-job training, training at the work areas, a provider can teach or explain matters to one another, updating each other (Participant # 1. Male, Diploma, Health Center, Government).

For example, capacity building through training when a new guideline is released. Because don't expect every provider will understand the contents soon after going through

it. Some will read and understand almost everything while others will gain nothing. But if there is capacity building, I think it will help (Participant # 2. Female, Advance Diploma, Dispensary, Government).

Performing internal feedback/review

Performing internal feedback/review within the facility was mentioned by healthcare providers as a good thing because it shapes those who are not performed well to improve next time as well as motivate guideline adherence as they are improving.

We receive reports from each department, and we see which one is behind it does not do well. From the report the staffs we are that department always feel bad but this in another way encourage them to improve and do better next time (Participant # 1. Male, Diploma, Health Center, Government).

Since if previously you were not performing well, and the feedback comes that you are doing better it inspires to bring up more efforts to work hard and continuing to adhere to the guidelines (Participant # 2. Female, Advance Diploma, Dispensary, Government).

Networking and communication

As explained by healthcare providers, networking and communication between staffs and departments within the facility promote guideline adherence. Networking and communication also provide a platform to present challenges to one another and give solutions on how to deal with them.

We have the department of TB which deals with TB/HIV patients and non-HIV patients with TB. So, we cooperate on our services, a doctor from there may come here to deliver service, to speak the truth we really cooperate. If you don't understand something you just go and ask anyone or through TB exchange meeting, we exchange our ideas, we remind each other, you see we have good communication (Participant # 1. Male, Diploma, Health Center, Government)

Organizational culture

Internal organization culture was an aspect highlighted by healthcare providers that improve performance and adherence to the guideline. The facility which has good internal organizational culture bring morale in the workplace.

Aaah because regulation and values/morals are the firm stand to everything. Even before you deliver service, if a facility does not respect morals it will lead to a bad outcome and a bad image to the facility. So, if you respect you find everything going well things and run smooth. (Participant # 1. Male, Diploma, Health Center, Government).

Intervention coherence.

Intervention coherence: Interfere or integrated with routine services. Healthcare providers explained that if adherence to the guideline which is against the moral and value of the facility and

interferes with daily routines is difficult to adhere to it. But they explained that the current guideline doesn't interfere with ethics of the facility, therefore it appropriates to adhere to it.

The guideline which interferes with ethics, yeah it can influence provider not to adhere to the guideline since it is against the morals and values of the facility and the providers. But for this TB, to speak the truth it doesn't interfere. It is appropriate to adhere to it ((Participant # 6. Male, Degree, Hospital, Government)).

Intervention coherence: Many patients and lots of work. Contrary, even though TB guideline doesn't interfere with the daily routine. However, a long queue of patient waiting for service, influence most of the healthcare providers do not adhere to the guideline.

We adhere to it, but not all the time because of the long queue of the patients outside waiting for the service. So, if you try to adhere to it will take a long time for one patient and others will start to complain that I'm taking a long time just for a single patient(Participant # 2. Female, Advance Diploma, Dispensary, Government).

HEALTHCARE PROVIDER'S CHARACTERISTICS

Healthcare provider's characteristics: Healthcare provider's Level of education, Knowledge, and Belief.

Healthcare providers' bad belief and ignorance about TB guideline was reported by healthcare providers as the factor that may lead to poor adherence to the guideline. It was explained that some providers are unaware of the guideline's content, they don't know how to reference when they are managing TB suspect patient.

Some providers, they may decide not to adhere to it, they might not adhere to it because they don't know it, because even other diseases have guidelines, references, that if you want to treat a certain disease treat it this way, so tuberculosis is one of those diseases which needs the use of the guideline when performing diagnosis, so there is no way to avoid the guideline, if someone decides not to use it is because of his/her own ignorance (Participant # 3. Male, Degree, Hospital, Government).

Knowledge or education level influences understanding. It might influence because, in the health service industry, the level of education of the healthcare provider influences the quality of the service. You need to have more understanding, maybe TB and something else that happen to the patient. The patient may come with coughing only, but when you don't know then you are not sure that you can't think if there is something called TB. Therefore, there is when knowledge is needed (Participant # 5. Male, Degree, Hospital, Private).

Healthcare provider's characteristics: Healthcare provider's willingness and readiness: Healthcare provider's individual efforts. It was further reported that healthcare providers' willingness and readiness such as an individual's effort and work for others have a great chance to influence adherence to the guideline during TB diagnosis.

Other personal attitudes of humanity that means having a sense of being responsible or working for the betterment of others, it influences healthcare providers to adhere to the guideline as recommended for Tb patient to be diagnosed well (Participant # 4. Male, Diploma, Health Center, Government).

Personal behaviour for someone to adhere to the guideline. First, it is someone's effort and readiness. But the third one is a reading habit since the guideline is big if one does not have it, it will be the opposite (Participant # 1. Male, Diploma, Health Center, Government).

Healthcare provider's characteristics: Healthcare provider's willingness and readiness:

Healthcare provider's willingness to change. It is generally based on the attributes of a healthcare provider towards a better change on TB management particularly TB guideline's adherence and used as a reference was explained to influence healthcare providers to adhere to it.

Because, if I am in stage of change, for instance, I attended three patients then I see the weakness to adhere to guideline, and because, I am willing to change, therefore when I will be attending the 9th patient, I will be better compared to the 1st three patients I attended from the start. Yes.. (Participant # 8. Female, Diploma, Dispensary, Government)

Healthcare provider's characteristics: Healthcare provider's willingness and readiness:

Healthcare provider's learning habit/behaviour. Healthcare's learning habit was described by healthcare providers that influence providers to adhere to the guideline since it promotes and improves understanding.

Personal behaviour for someone to adhere to the guideline. First, it is someone's effort and readiness. But the second one is a reading habit since the guideline is big if one does not have it and have time to read, it will be the opposite (Participant # 1. Male, Diploma, Health Center, Government).

Healthcare provider's self-efficacy and experiences

Healthcare provider's self-efficacy and experience on TB management were mentioned by healthcare providers to be an important factor that influence guideline's adherence. Although, they said that self-efficacy and experiences must be built-up from current knowledge and evidence to influence adherence.

Yeah, if his/her self-efficacy, the experience was built-up on adherence to the guideline, then s/he will continue to adhere to it. That mean, s/he has enough knowledge concerning TB and the guidelines. But also, the same time can be positive or negative (Participant # 6. Male, Degree, Hospital, Government).

Working experience without evidence-based medicine was said to be challenging Some providers want to work based on their old knowledge and experience while the fact is that TB guidelines keep on changing and updating.

Since the guidelines keep changing and from time to time, you find that your work experience is of the ninety (90th) hehehh and now there is a current guideline, but you still want to use your old experience. Therefore, the old working experience becomes a

challenge you do not read often but rather using an old experience can help to adhere to the current guideline (Participant # 1. Male, Diploma, Health Center, Government).

Healthcare provider's motivation, recognition, and identification.

Healthcare provider's motivation, recognition, and identification: Financial rewards.

Healthcare providers mentioned that the facility's recognition, rewards, and incentives influence guidelines adherence. They mention that the financial rewards assist them to buy and drink milk to prevent them from acquiring TB infection.

But as you know when others see they come without motivation money, they lose morally, because there is no money, then if we don't get money on time, the money has not received, where is it(laughs are heard) you will hear people say "there is no anything even to buy milk, they are just coughing in front of us every day" this breaks my heart"(Participant # 3. Male, Degree, Hospital, Government).

It means in situations where a healthcare provider will feel easy on adhering to the guideline, by remembering the allowance he/she will get afterward by adhere to the guidelines (Participant # 4. Male, Diploma, Health Center, Government).

Healthcare provider's motivation, recognition, and identification: Non-financial rewards.

However, they also mentioned that not only money but non-monetary motivation such as giving them the certificate of recognition and promotion bring more motives for providers to adhere to the guidelines

Yes, I think it influences, I think everyone would like to see promotion, I think even you would like to be promoted (Participant # 3. Male, Degree, Hospital, Government).

Because they reward us by giving certificates. Those certificates can be useful for the future. When you want to apply for a job in international NGO's those can be added advantage. It will be eased to shift to private institutions (Participant # 8. Female, Diploma, Dispensary, Government).

PROCESS FOR IMPLEMENTATION

Planning.

Planning: Implementation strategies. The process for implementations such as prior well-planned implementation strategies were set up by TB programme were reported by informants to be a very good approach to making sure that there is adherence to the guidelines. Some of the strategies which were employed were planned frequently TB task-force activities and provision of intervention's materials

TB guideline, [coughing] as well I can tell you aaaaah is the guide we have been given by the Ministry of health naaaa version we have now is 2015 version, the last reviewed. When we provide tuberculosis care we suppose to follow it, so, now being there and use not use it, is more of a person's behaviour but we have the guideline and the one we have is the last version, 2015 version. (Participant # 6. Male, Degree, Hospital, Government)

In our TB exchange meetings, we receive reports from each department, and we see which one is behind it doesn't do good. From the reports, the staffs from departments which are behind always feel bad but this in another way encourage them to improve and do better next time (Participant # 1. Male, Diploma, Health Center, Government).

Planning: Implementation policies. Healthcare providers suggested that policies themselves couldn't work out better to influence guideline adherence. Instructed that there must be some sort of monitoring, strong follow up and supervision to promote guideline adherence as intended.

The policy is there for its purpose but there must be some sort of monitoring. Now if monitoring exists, then the service provider will have to adhere, because of the regular monitoring (Participant # 5. Male, Degree, Hospital, Private).

Policies But for policies to be implemented as intended, strong follow up and supervision is needed. By not doing that you can't be assured that providers adhere to them (Participant # 8. Female, Diploma, Dispensary, Government).

Engaging.

Internal change agents.

Engaging: Internal change agents: Opinion leaders. Internal change leaders for such as opinion leaders who encourage, promote and engage healthcare providers to adhere to the guideline were described as one of the factors that influence adherence to the guideline.

For example, if you have a leader who is serious about it, He is encouraging and build morale for the workers to do well their job. Consequently, this is attracting workers to perform well their duties then adhere to the guidelines (Participant #2. Female, Advance Diploma, Dispensary, Private).

First, we need to call a meeting to all facility in-charges because are the ones with power. If we start by training and teach them, then it will be easy to disseminate the information since they will to go back and teach their junior staffs as well. But we also supposed to make follow up and sensitized them to see if they really adhere on what we trained and see if junior staffs to the same (Participant # 6. Male, Degree, Hospital, Government).

Engaging: Internal change agents: Internal implementation Leader. In line with internal change leaders, internal implementation leaders who formally or informally appointed to facilitate the implementation of the TB programme was clarified to contribute healthcare providers to adhere to the guideline.

The one we call TB focal person and is the one who passes to check and insist providers to screen patients. He solves our challenges and sometimes he reports to the higher authority (Participant # 6. Male, Degree, Hospital, Government).

Engaging: Internal change agents: Champion

Healthcare providers described that adherence to the guideline is influenced mostly by a person who is desired and lead implementation to positive outcomes. This person must have enthusiasm and credibility rather than only a power.

I am new but one of the co-workers, who was working here got a reward for adhering to the guideline as required last month (Participant # 8. Female, Diploma, Dispensary, Government).

Engaging: External change agents

Healthcare providers highlighted that external change agents such external supervisor were important influencers to guideline's adherence They assist internal leaders to identify gaps which were not seen and sometimes is more difficult for them to pick up.

It is because he comes like an external auditor, an external supervisor who look at what we are doing. He assesses the guideline, he is the one selected to supervise our facility. He helps us identify gaps more than the internal TB in-charge. Those gaps sometimes are very difficult even for our leaders to identify them, then from there we do QI and we move on (Participant # 1. Male, Diploma, Health Center, Government).

Execution.

Execution: Partner's and Government's support. Healthcare providers explained that partners who support TB activities by giving aid to projects, as well as government sustenance, largely influence proper TB management hence the adherence to the guideline.

Internally there is a regular follow-up but I say there are people coming to do some interview in the sense of knowing whether the procedure is followed or the guideline is

adhered to, so one may come, persons from the Councils or the NGOs that support TB matters wanting to know, do we adhere to the guideline as required (Participant # 5. Male, Degree, Hospital, Private).

Execution: Mentorship and Workshops. It was mentioned by healthcare providers that mentorship, training and workshops which equipped them with current knowledge of TB management were so important determinants that influence healthcare providers to adhere to the guideline.

Eee, we do training, mentorships which help us to remember how to identify the symptoms of Tuberculosis. For example, in the old guidelines were discovered that, for children to use what we call algorithm, it was difficult, since children do produce sputum. Therefore, nowadays we use this step chart, we call a paediatric step chart to diagnose children with TB. So, we have different charts for the diagnosis of TB (Participant # 10. Female, Advance Diploma, Hospital, Government).

More emphasis that, everyone from OPD, if it is a cleaner, every clinician should go to these TB seminars so that they should have knowledge about it. Because if only one has attended the seminar at the end of the day it will be the responsibility of the one who attended the seminar (Participant # 7. Female, Advance Diploma, Health Center, Government).

Yes, it will, as there will be close supervision among the healthcare providers through one to one discussion (if he is adhering to the guideline or not and why) and seminars on how to adhere to the guideline properly and discussion on different challenges which are faced (Participant # 4. Male, Diploma, Health Center, Government).

Execution: Meetings. TB exchange meetings and other meetings such as morning meetings which discuss different matters regarding TB management, there were explained by healthcare providers that they have a positive effect and promote guideline adherence. In the meetings, they discuss challenges and if there was an issue and it needs guideline reference they do so, therefore will be easy for them to remember next time.

We do have our own weekly program whereby we have a session of questions and answers, where it has been forgotten we refer to the guideline and more explanations are provided to both Nurses and Doctors (Participant # 9. Female, Diploma, Dispensary, Private).

TB exchange meetings. If there is any challenge and any issue we discuss in the meeting. So, it helps to adhere to the guideline in some way (Participant # 1. Male, Diploma, Health Center, Government).

Execution: Reminders e.g. wall charts, computer pop text etc.

On the other hand, health care providers described a need to have a TB chart posted on the wall although they have a guideline on their table. They enlighten that, is important to have a chart on the wall to remind them and for a quick look if they have forgotten something.

I think people see because we already have the book there is no need to attach the guidelines in the wall, I didn't have that idea but since you brought it up I see its more efficient and fast when you don't remember you can easily turn and see them in the wall, I think it is important to have them both on the wall and in the book (Participant # 3. Male, Degree, Hospital, Government).

At the time when there is no patient, you can go through the chart on the wall and revisit the steps hence making it easier to remember (Participant # 4. Male, Diploma, Health Center, Government).

Reflecting and Evaluation

Reflecting and Evaluation: Monitoring and evaluation. Reflecting, monitoring and evaluation are the strategies which were explained by healthcare provider as the important influencer to guideline's adherence. The feedback they got from regular monitoring and evaluation remind and keep healthcare providers to be in line with TB management protocols.

The policy is there for its purpose but there must be some sort of monitoring. Now if monitoring exists, then the service provider will have to adhere, because of the regular monitoring (Participant # 5. Male, Degree, Hospital, Private).

Reflecting and Evaluation: Supervisions. It was described that regular and continuous supervisions make healthcare providers adhere to the guideline with the worry that the supervisors can visit anytime to check the progress. Although, it is important, they mentioned that not necessarily promote healthcare providers to adhere to the guideline since others don't like to be supervised.

Policies But for policies to be implemented as intended, strong follow up and supervision is needed. By not doing that you can't be assured that providers adhere to them (Participant # 8. Female, Diploma, Dispensary, Government).

Because there are continuous supervisions from mentors from district particularly these TB mentors. They pass to all the centers which are dealing with TB to see how TB services are delivered in general. They assist us to inform about any recent updates on the guidelines. But also, they conduct monthly meetings (Participant # 3. Male, Degree, Hospital, Government).

CHAPTER FOUR

4.0. Discussion.

The discussion chapter comprises the following sections: 4.1. discussion overview, 4.2. level of implementation fidelity, 4.3. determinants of implementation fidelity, and 4.4. limitation and strength of the study.

4.1. Discussion overview.

The study demonstrated the use of an explanatory sequential mixed method to examine implementation fidelity of healthcare providers in relation to adhering to TB guidelines and its determinants along with exploring in-depth the fidelity determinants under the focus. The study findings were analysed according to the research objectives. The findings were summarised, compared and contrasted with previous and current knowledge and references. Furthermore, fidelity determinants which were identified from the qualitative component of the study were matched with quantitative findings into an integrated results matrix (See Appendix xvi), specifically a joint display for discussion. The same approach of mixing and integrating qualitative findings into quantitative findings in a joint display in a discussion chapter was too employed and reported by different authors and researchers in their publication (44,46,70)

4.2. Implementation fidelity.

The study findings suggested that implementation fidelity in relation to adhering to TB guidelines among healthcare providers was falling under the moderate category at 92(66.67%) as per previous studies of implementation cut-off values suggested (60,61). The moderate level of implementation fidelity found in the present study concurred with a study conducted by Wang and colleagues.

Their study examined the degree of implementation of dose and adherence to core activities of national HIV/AIDS prevention programme among teachers in the Bahamas. The researchers found that most of teachers demonstrated a moderate level of implementation at 52.8% to the dose and fidelity on those core activities. The study also found that the majority of participants who were in the low fidelity level group had limited prior exposure to the programme's materials and did not attend completely all training and workshops concerning the programme(60).The correlation between prior exposure and level of implementation was also reported by Wilson and colleagues who reviewed 221school-based prevention programmes targeting aggressive behaviours. They revealed that participants who were in a intervention group (good implemented programmes) had high level of implementation compared to a control group (poorly implemented programmes)(71).

Moreover, a meta-analysis) conducted by Durlak and DuPre suggested that, it is uncommon for the programmes to be implemented at 100% as originally intended especially in a real-life setting. Implementers tend to modify some of the intervention components to suit the context (72). The modifications sometimes yield positive outcomes but subsequently low the level of implementation fidelity (72–74).

4.3. Determinants of implementation fidelity.

In our quantitative component of study, the following four important determinants were identified as the important influencer to adherence to TB guideline after Exploratory Factor Analysis (EFA): Stakeholders' involvement, willingness and readiness to adhere to TB guidelines/intervention;

Facilitations and strategies to adhere to TB guidelines/intervention; Knowledge/information sharing and goals' communication; Client/patients' characteristics.

However, only two fidelity determinants i.e. Stakeholders' involvement, willingness and readiness, and Facilitation and strategies to adhere to TB guidelines/intervention have shown statistically significant ($p \leq 0.05$) with implementation fidelity and marginally ($p=0.06$) for Knowledge/information sharing and goals' communication on multivariable regression modelling.

The important fidelity determinants identified on the quantitative components in the present study were compared individually with qualitative findings of the study as well as with previous and current references and knowledge for discussion below:

i. **Stakeholders' involvement, willingness and readiness to adhere to TB guidelines/intervention.**

Previous literature suggests that the readiness and willingness of stakeholders to participate fully in any intervention, usually yield the good intervention's outcomes (29,34–36). Also, this was supported by the following themes/sub-themes emerged from IDIs; healthcare provider's willingness and readiness (i.e. healthcare provider's individual efforts and healthcare provider's willingness to change), internal change agents (i.e. internal implementation leader engagement and champion engagement), external change agents as well as government and partners support/funds. Similarly, from previous studies healthcare provider's capability, willingness and readiness for intervention were revealed to influence intervention to be implemented as planned. For instance, the healthcare providers who perceived wrongly and wastage of time to follow all steps as instructed by clinical guidelines and at the same time they don't believe the sources of the

guidelines are more likely cannot adhere to the guidelines(34–36). These findings are corroborated by Cooke and colleagues as well as Durlak and colleagues who in their studies reported that providers who were aware of the benefits of the intervention and feel more confident in their ability (i.e. self-efficacy) to do what is expected, they were more likely to implement the intervention with fidelity (72,75). Moreover, politics, policies and funds from stakeholders local and international NGOs, and governments were reported to facilitate the implementation of interventions (22,23). Furthermore, it reported that national social policies play a role in institutionalizing new procedures and practices to support those donor-funded programmes to attain intended goals (72). Therefore, fully stakeholder's involvement from different categories and levels as well as their willingness and readiness are the central part for intervention to be implemented at high fidelity.

ii. Facilitations and strategies to adhere to TB guidelines/intervention.

Similarly, TB guidelines or any clinical guideline and intervention to be implemented successfully, it needs good implementation strategies as well as facilitation to enable implementers to adhere fully to the intervention. On qualitative interviews of the present study, the following were highlighted and explained to influence implementation fidelity; healthcare provider's perception and contribution to the guideline's preparation, peer pressure (i.e. role model facility and good report from other facilities), planning (i.e. implementation policies), execution (i.e. mentorship, workshops, meetings and reminders e.g. wall charts, computer pop text etc. to execute adherence to TB guidelines/intervention), reflecting and evaluation (i.e. monitoring and evaluation, and supervisions) and internal feedback/reviews. The present study's findings also coincided with other previous studies whereby, issues like regular training, regular auditing and feedbacks, diagnosis algorithms and reminders e.g. wall posters, pop-up screen message as well as facility setting

contexts such as peer's support and adequate resources were explained to influence implementation fidelity (25,29,32,33). But not only that but also found to create personal eagerness and friendly environment hence, good intrapersonal skills and interaction among staffs(25,29–31).

In addition, Cattamanchi *et al...*, Shah *et al...*, and Suleiman *et al...*, reported that implementers who were not involved in guidelines preparation and/or do not appreciate the sources of the guidelines are more likely cannot adhere to the guidelines(34–36). These are useful findings to reflect on our results.

iii. **Knowledge/information sharing and Goals' communication.**

In this study, both the EFA and IDIs suggest that healthcare provider's level of education and belief on the importance of the adherence to TB guidelines as well as goals' communication through skill-building training/workshops and peer's support/coaching were found to be the important influencers for good implementation fidelity. Equally, in literature, example Francke *et al...*, and Harrison and colleagues reported the existing relationship between adherence to clinical guidelines and implementers' knowledge on particular innovation (25,29). They further added that, not only the possession of enough knowledge but also familiarity with the guidelines' contents increases the chance of the adherence (25,29). However, Durlak and colleagues as well as Fixsen and colleagues supported that but, contrary explained that knowledge and technical assistance like training which aims to improve fidelity's values sometimes don't produce stronger implementation outcomes (23,72). Moreover, researchers reported that lack of programme fidelity's value due to bad implementer's attitudes and/or behaviours always of the programme bring undesirable impact to the programme (34–36).

iv. Client/Patients' characteristics.

Client/patient's characteristic was extracted from EFA as one of the latent item/factors that influences adherence to TB guidelines although the fidelity was found not to be statistically significant associated with implementation fidelity in regression modelling. But, the following themes/sub-themes: patient's Socio-Economic Status (SES); patient's attitude/behaviour and cooperation; patient's knowledge and level of education; and comorbidities and severity of the patient's medical conditions were repeatedly mentioned and described during IDIs by participants that influence the adherence TB guidelines. The findings concur with the reviewed done by Carroll and colleagues who found that adherence to healthcare clinical guidelines adherences was influenced by the patient's culture, preference and financial status (1). Likewise, Kitson and colleagues found the same and added that patient's multiple medical conditions and/or co-morbidities diseases sometimes influence healthcare provider to forget to adhere to the clinical guidelines (1,2). Also, previous literature suggests that intervention's coverage becomes poor, when recipients refuse to cooperate when they perceived that intervention is irrelevant to them (25,29–31).

4.4. Limitations and Strength of the study.

Information bias (Recalling and Reporting): In the present study, level of implementation fidelity, as well as the fidelity determinants which were reported, relied on participants' self-report and recall memory. To minimize that, self-administered closed-ended questionnaire and semi-structured interview guide were used to collect quantitative and qualitative data respectively.

Information bias (Refusal): Information bias was another weakness which was anticipated in this study, to overcome that the benefits of the study were explained to the participants during data collection. No participant directly refused to participate in the study. 98% of self-administered questionnaires for the quantitative component of the study were returned for analysis.

Selection bias: Some of the healthcare providers who were selected to participate in IDIs perhaps were not a good representative of the study population. To minimize that, selection of the key participants was well planned and purposive sampling technique employed as well as interviews were conducted until the saturation point was attained. For the quantitative component of the study, homogeneous convenience sampling technique was used so as to reduce sampling's bias related to socio-demographic backgrounds of the target population (54).

Moreover, the use of integrated mixed method designed to triangulate quantitative and qualitative data in this study increase the validity and reliability of the findings.

CHAPTER FIVE

5.0 Conclusion and Recommendation.

This chapter summarized the study findings as well as provided recommendation in a context to this study.

5.1. Conclusion.

There was moderate implementation fidelity in relation to adhering to TB guidelines among healthcare providers. The reported implementation fidelity in this study was only for TB detection (diagnosis) component. The complex intervention like TB intervention consists of several core components of the intervention and evaluating the impact of each component individually or all at once poses a challenge because they act both independently and inter-dependently. So, due to these factors, the present study concluded that implementation fidelity in relation to adhering to TB guidelines among healthcare providers was moderate even though the reported implementation fidelity in study was only for TB detection (diagnosis) component.

Additionally, the following fidelity determinants: (i) **“Stakeholders’ Involvement and Willingness/ Readiness to adhere to TB guidelines/intervention”**, and (ii) **“Facilitations and strategies to adhere to TB guidelines/intervention”** were found statistically significant influence implementation fidelity and marginally for (iii) **“Knowledge/information sharing and Goals’ communication”** on multivariate regression model. Also, their significances were braced by themes/sub-themes and quotations emerged from IDS.

5.2. Recommendations.

I recommend future implementation study (ies) which will employ direct observational data collection techniques and/or tracking and retrieving data from programme's documents.

REFERENCES

1. Carroll C, Patterson M, Wood S, Booth A, Rick J, Balain S. A conceptual framework for implementation fidelity. *Implement Sci* [Internet]. 2007;2:40. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/18053122>
2. Kitson AL, Rycroft-Malone J, Harvey G, McCormack B, Seers K, Titchen A. Evaluating the successful implementation of evidence into practice using the PARiHS framework: theoretical and practical challenges. *Implement Sci* [Internet]. 2008;3(1):1. Available from: <http://implementationscience.biomedcentral.com/articles/10.1186/1748-5908-3-1>
3. Kizza FN, List J, Nkwata AK, Okwera A, Ezeamama AE, Whalen CC, et al. Prevalence of latent tuberculosis infection and associated risk factors in an urban African setting. *BMC Infect Dis* [Internet]. 2015;15(1):165. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4392742/pdf/12879_2015_Article_904.pdf
4. World health Organization. Global Tuberculosis Report 2016 [Internet]. Geneva; 2016. Available from: <http://apps.who.int/iris/bitstream/10665/250441/1/9789241565394-eng.pdf?ua=1>
5. World health Organization. Global Tuberculosis Report 2019 [Internet]. Geneva; 2019. Available from: <https://apps.who.int/iris/bitstream/handle/10665/329368/9789241565714-eng.pdf?ua=1>
6. Zhang J, Kern-allely S, Yu T, Price RK. HIV and tuberculosis co-infection in East Asia and the Pacific from 1990 to 2017 : results from the Global Burden of Disease Study 2017. *J Thorac Dis* [Internet]. 2019;11(9):3822–35. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6790465/pdf/jtd-11-09-3822.pdf>
7. World health Organization. Global Tuberculosis Report 2017 [Internet]. Geneva; 2017. Available from: <https://apps.who.int/medicinedocs/documents/s23360en/s23360en.pdf>
8. World health Organization. Global Tuberculosis Report 2018 [Internet]. Geneva; 2018. Available from: <https://apps.who.int/medicinedocs/documents/s23553en/s23553en.pdf>

9. Emerson C, Ndakidemi E, Ngowi B, Medley A, Ng B, Godwin M, et al. Caregiver perspectives on TB case-finding and HIV clinical services for children diagnosed with TB in Tanzania. *AIDS Care* [Internet]. 2019;0(0):1–5. Available from: <https://doi.org/10.1080/09540121.2019.1668520>
10. Saito S, Mpofu P, Carter EJ, Diero L, Wools-Kaloustian KK, Yiannoutsos CT, et al. Implementation and Operational Research: Declining Tuberculosis Incidence Among People Receiving HIV Care and Treatment Services in East Africa, 2007-2012. *J Acquir Immune Defic Syndr* [Internet]. 2016 Apr 1;71(4):e96–106. Available from: <https://pubmed.ncbi.nlm.nih.gov/26910387>
11. Majigo M, Somi G, Joachim A, Manyahi J, Nondi J, Sambu V, et al. Decline in the incidence of tuberculosis among HIV-infected patients enrolled in HIV care, treatment and support programme from 2011 to 2014 in Mainland Tanzania. *Res Sq* [Internet]. 2020 Mar 18;1–16. Available from: https://www.researchgate.net/publication/340186078_Decline_in_the_incidence_of_tuberculosis_among_HIV-infected_patients_enrolled_in_HIV_care_treatment_and_support_programme_from_2011_to_2014_in_Mainland_Tanzania
12. Said K, Verver S, Kalingonji A, Lwilla F, Mkopi A, Charalambous S, et al. Tuberculosis among HIV-infected population: incidence and risk factors in rural Tanzania. *Afr Health Sci* [Internet]. 2017 Mar;17(1):208–15. Available from: <https://pubmed.ncbi.nlm.nih.gov/29026395>
13. Mollel EW, Maokola W, Todd J, Msuya SE, Mahande MJ. Incidence Rates for Tuberculosis Among HIV Infected Patients in Northern Tanzania. *Front public Heal* [Internet]. 2019 Oct 24;7:306. Available from: <https://pubmed.ncbi.nlm.nih.gov/31709218>
14. National Tuberculosis and Leprosy Programme. Manual for The Management of Tuberculosis and Leprosy, Tanzania [Internet]. six edition. 2013 [cited 2017 Jul 24]. Available from: <https://drive.google.com/file/d/0By0MeTLkdAyFSDVXNnRYNVE0M00/view>
15. Colvin C, Mugyabuso J, Munuo G, Lyimo J, Oren E, Mkomwa Z. Evaluation of

- community-based interventions to improve TB case detection in a rural district of Tanzania. *Glob Heal Sci Pract* [Internet]. 2015;2(2):219–25. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4168621/pdf/219.pdf>
16. Nations U, Goals MD, Goals SD, Assembly WH, States M, Strategy ETB. The End TB Strategy [Internet]. Geneva; 2015. Available from: https://www.who.int/tb/End_TB_brochure.pdf
 17. Duarte R, Lonnroth K, Carvalho C, Lima F, Carvalho ACC, Munoz-Torrico M, et al. Tuberculosis , social determinants and co-morbidities (including HIV). *Pulmonology* [Internet]. 2018;24(2):115–9. Available from: <https://www.sciencedirect.com/science/article/pii/S2173511517301641?via%3Dihub>
 18. Hilal FA, Herrero MB, Maciel EMG de S, Braga JU. Social determinants of pulmonary tuberculosis in Argentina. *Rev Bras Epidemiol* [Internet]. 2019 Mar;22(Mar 14):e190003. Available from: https://pubmed.ncbi.nlm.nih.gov/30892466/?from_term=social+determinants+TB+&from_pos=3
 19. Sreeramareddy CT, Panduru K V., Menten J, Van den Ende J. Time delays in diagnosis of pulmonary tuberculosis: A systematic review of literature. *BMC Infect Dis* [Internet]. 2009;9:1–10. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2702369/pdf/1471-2334-9-91.pdf>
 20. The Global Fund. Using Quality Improvement Approaches to Increase TB case Detection: Program Quality and Efficiency Case Study, Tanzania [Internet]. Geneva; 2018. Available from: https://www.theglobalfund.org/media/8272/core_pqe-in-tanzania_casestudy_en.pdf?u=637166001540000000
 21. Mhimbira FA, Cuevas LE, Dacombe R, Mkopi A, Sinclair D. Interventions to increase tuberculosis case detection at primary healthcare or community-level services. *Cochrane database Syst Rev* [Internet]. 2017 Nov 28;11(11):CD011432-CD011432. Available from: <https://pubmed.ncbi.nlm.nih.gov/29182800>
 22. Damschroder LJ, Aron DC, Keith RE, Kirsh SR, Alexander JA, Lowery JC. Fostering

- implementation of health services research findings into practice: a consolidated framework for advancing implementation science. *Implement Sci* [Internet]. 2009;4(1):50. Available from: <http://implementationscience.biomedcentral.com/articles/10.1186/1748-5908-4-50>
23. Fixen DL, Naoom SF, Friedman RM, Wallace F. *Implementation Research: A Synthesis of the Literature* [Internet]. South Florida; 2005. Available from: <https://nirn.fpg.unc.edu/sites/nirn.fpg.unc.edu/files/resources/NIRN-MonographFull-01-2005.pdf>
 24. Dusenbury L, Brannigan R, Falco M, Hansen WB. A review of research on fidelity of implementation: Implications for drug abuse prevention in school settings. *Heal Educ Res* [Internet]. 2003;18(2):237–56. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/12729182>
 25. Francke AL, Smit MC, de Veer AJE, Mistiaen P. Factors influencing the implementation of clinical guidelines for health care professionals: A systematic meta-review. *BMC Med Inform Decis Mak* [Internet]. 2008;8(1):38. Available from: <http://dx.doi.org/10.1186/1472-6947-8-38>
 26. Getahun H, Matteelli A, Abubakar I, Aziz MA, Baddeley A, Barreira D, et al. Management of latent *Mycobacterium tuberculosis* infection: WHO guidelines for low tuberculosis burden countries. *Eur Respir J* [Internet]. 2015/09/24. 2015 Dec;46(6):1563–76. Available from: <https://pubmed.ncbi.nlm.nih.gov/26405286>
 27. World health Organization. WHO recommendations on antenatal care for a positive pregnancy experience [Internet]. Geneva; 2016. Available from: https://www.who.int/reproductivehealth/publications/maternal_perinatal_health/anc-positive-pregnancy-experience/en/
 28. Odjidja EN, Gatasi G, Duric P. Delivery of integrated infectious disease control services under the new antenatal care guidelines: a service availability and readiness assessment of health facilities in Tanzania. *BMC Health Serv Res* [Internet]. 2019 Mar 11;19(1):153. Available from: <https://pubmed.ncbi.nlm.nih.gov/30866924>

29. Harrison MB, Légaré F, Graham ID, Fervers B. Adapting clinical practice guidelines to local context and assessing barriers to their use. *Cmaj* [Internet]. 2010;182(2). Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2817341/pdf/1820e78.pdf>
30. Feder G, Eccles M, Grol R, Griffiths C, Grimshaw J. Clinical guidelines: Using clinical guidelines. *Bmj* [Internet]. 1999;318(7185):728–30. Available from: <http://aplicacionesbiblioteca.udea.edu.co:2617/content/318/7185/728.abstract>
31. Burgers JS, Grol RPTM, Zaat JOM, Spies TH, van der Bij AK, Mokkink HGA. Characteristics of effective clinical guidelines for general practice. *Br J Gen Pract* [Internet]. 2003;53(486):15–9. Available from: <http://www.pubmedcentral.nih.gov/articlerender.fcgi?artid=1314503&tool=pmcentrez&rendertype=abstract>
32. Dean A, Davis DA, Taylor-Vaisey A, Dean A, Davis DA, Taylor-Vaisey A. Translating guidelines into practice: A systematic review of theoretic concepts, practical experience and research evidence in the adoption of clinical practice guidelines. *Can Med Assoc J* [Internet]. 1997;157(4):408–16. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC1227916/pdf/cmaj_157_4_408.pdf
33. Meijers JMM, Janssen MAP, Cummings GG, Wallin L, Estabrooks CA, Y.G. Halfens R. Assessing the relationships between contextual factors and research utilization in nursing: Systematic literature review. *J Adv Nurs* [Internet]. 2006;55(5):622–35. Available from: https://www.academia.edu/625810/Assessing_the_relationships_between_contextual_factors_and_research_utilization_in_nursing_systematic_literature_review
34. Cattamanchi A, Miller CR, Tapley A, Haguma P, Ochom E, Ackerman S, et al. Health worker perspectives on barriers to delivery of routine tuberculosis diagnostic evaluation services in Uganda: a qualitative study to guide clinic-based interventions. *BMC Heal Serv Res* [Internet]. 2015;15:10. Available from: <http://www.ncbi.nlm.nih.gov/pubmed/25609495> <http://www.biomedcentral.com/content/pdf/s12913-014-0668-0.pdf>
35. Shah SK, Sadiq H, Khalil M, Noor A, Rasheed G, Shah SM, et al. Do private doctors follow national guidelines for managing pulmonary tuberculosis in Pakistan? *East*

- Mediterr Heal J [Internet]. 2003;9(4):776–88. Available from:
http://applications.emro.who.int/emhj/0904/9_4_2003_776_788.pdf
36. Suleiman BA, Houssein AI, Mehta F, Hinderaker SG. Do doctors in north-western Somalia follow the national guidelines for tuberculosis management? East Mediterr Heal J [Internet]. 2003;9(4):789–95. Available from:
https://apps.who.int/iris/bitstream/handle/10665/119332/9_4_2003_789_795.pdf?sequence=1&isAllowed=y
 37. Tamir K, Wasie B, Azage M. Tuberculosis infection control practices and associated factors among health care workers in health centers of West Gojjam zone, Northwest Ethiopia: a cross-sectional study. BMC Health Serv Res [Internet]. 2016 Aug;16(a):359. Available from:
https://pubmed.ncbi.nlm.nih.gov/27503430/?from_term=health+care+worker+guidelines+TB&from_pos=8
 38. Senkoro M, Mfinanga S, Egwaga S, Mtandu R, Kamara D V., Basra D, et al. Prevalence of pulmonary tuberculosis in adult population of Tanzania: A national survey, 2012. Int J Tuberc Lung Dis [Internet]. 2016;20(8):1014–21. Available from:
<http://docserver.ingentaconnect.com/deliver/connect/iatld/10273719/v20n8/s7.pdf?expires=1584957376&id=0000&titleid=3764&checksum=A52B1922A413581AD786C5A46F9567D4>
 39. Verhagen LM, Kapinga R, Van Rosmalen-Nooijens KAWL. Factors underlying diagnostic delay in tuberculosis patients in a rural area in Tanzania: A qualitative approach. Infection [Internet]. 2010;38(6):433–46. Available from:
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3003144/pdf/15010_2010_Article_51.pdf
 40. Marks GB, Nguyen N V, Nguyen PTB, Nguyen T-A, Nguyen HB, Tran KH, et al. Community-wide Screening for Tuberculosis in a High-Prevalence Setting. N Engl J Med [Internet]. 2019;381(14):1347–57. Available from:
<https://www.nejm.org/doi/pdf/10.1056/NEJMoa1902129?articleTools=true>
 41. Adams L V, Olotu R, Talbot EA, Cronin BJ, Christopher R, Mkomwa Z. Ending neglect: providing effective childhood tuberculosis training for health care workers in Tanzania.

- Public Heal action [Internet]. 2014;4(4):233–7. Available from:
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4533512/pdf/i2220-8372-4-4-233.pdf>
42. Ngadaya ES, Mfinanga GS, Wandwalo ER, Morkve O. Delay in Tuberculosis case detection in Pwani region, Tanzania. a cross sectional study. BMC Health Serv Res [Internet]. 2009;9(1):196. Available from:
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2774679/pdf/1472-6963-9-196.pdf>
 43. Bradley F, Wiles R, Kinmonth A-L, Mant D, Gantley M. Development and evaluation of complex interventions in health services research: case study of the Southampton heart integrated care project (SHIP). Bmj [Internet]. 1999;318(7185):711–5. Available from:
<http://www.bmj.com/cgi/doi/10.1136/bmj.318.7185.711>
 44. Creswell JW, Clark P VL. Designing and Conducting Mixed Methods Research. 2nd ed. Los Angeles: Sage Publications; 2011.
 45. Barbour RS. The Case for Combining Qualitative and Quantitative Approaches in Health Services Research. J Health Serv Res Policy [Internet]. 1999 Jan 1;4(1):39–43. Available from: <https://doi.org/10.1177/135581969900400110>
 46. Mccrudden M, Mctigue E. Implementing Integration in an Explanatory Sequential Mixed Methods Study Implementing Integration in an Explanatory Sequential Mixed Methods Study of Belief Bias About Climate Change With High School Students. J Mix Methods Res [Internet]. 2018;(March):1–20. Available from:
<https://journals.sagepub.com/doi/abs/10.1177/1558689818762576?journalCode=mmra#>
 47. Alexander LK, Lopes B, Ricchetti-masterson K, Yeatts KB. Cross - sectional Studies Second Edition Authors : PA G E 2 Example : ERIC at the UNC CH Department of Epidemiology Medical Center.
 48. O’Cathain A, Murphy E, Nicholl J. Three techniques for integrating data in mixed methods studies. BMJ [Internet]. 2010 Sep 17;341:c4587. Available from:
<http://www.bmj.com/content/341/bmj.c4587.abstract>
 49. Tonkin-crane S, Anthierens S, Hood K, Yardley L, Cals JWL, Francis NA, et al. Discrepancies between qualitative and quantitative evaluation of randomised controlled

- trial results : achieving clarity through mixed methods triangulation. *Implement Sci* [Internet]. 2016;1–8. Available from: <http://dx.doi.org/10.1186/s13012-016-0436-0>
50. National Bureau of Statistics(NBS) and, Statistician(OCGS) ZO of CG. The 2012 Population and Housing Census: Basic Demographic and Socio- Economic Profile; Key Findings [Internet]. Dar-es-Salaam; 2014. Available from: http://nbs.go.tz/nbs/takwimu/census2012/Basic_Demographic_and_Socio-Economic_Profile_PopularVersion-KeyFindings_2012_PHC_EnglishVersion.pdf
 51. Ministry of Health and Social Welfare. National Tuberculosis and Leprosy Programme Annual Report 2014 [Internet]. Dar-es-Salaam; 2014. Available from: http://ntlp.go.tz/index.php?option=com_phocadownload&view=category&id=1:final-version
 52. Ubungu Municipal. Municipal profile 2016 [Internet]. Dar-es-Salaam; 2016. Available from: <http://www.ubungomc.go.tz/storage/app/uploads/public/5a8/fb2/621/5a8fb26213e00969820372.pdf>
 53. Mboera LE, Rumisha SF, Lyimo EP, Chiduo MG, Mangu CD, Mremi IR, et al. Cause-specific mortality patterns among hospital deaths in Tanzania , 2006-2015. *PLoS One* [Internet]. 2018;13(10):2006–15. Available from: https://www.researchgate.net/publication/328648496_Cause-specific_mortality_patterns_among_hospital_deaths_in_Tanzania_2006-2015/link/5bda7979299bf1124fb19399/download
 54. Jager J, Putnick DL, Bornstein MH. More than Just Convenient: The Scientific Merits of Homogeneous Convenience Samples. *Monogr Soc Res Child Dev* [Internet]. 2017 Jun;82(2):13–30. Available from: <https://pubmed.ncbi.nlm.nih.gov/28475254>
 55. James Bell Associates. Evaluation Brief: Measuring Implementation Fidelity. 2009;(October):1–6. Available from: [http://www.jbassoc.com/ReportsPublications/Evaluation Brief - Measuring Implementation Fidelity_Octob....pdf](http://www.jbassoc.com/ReportsPublications/Evaluation_Brief_-_Measuring_Implementation_Fidelity_Octob....pdf)

56. Harris PA, Taylor R, Thielke R, Payne J, Gonzalez N, Conde JG. Research electronic data capture (REDCap)— A metadata-driven methodology and workflow process for providing translational research informatics support. *J Biomed Inform* [Internet]. 2009;42(2):377–81. Available from: <http://dx.doi.org/10.1016/j.jbi.2008.08.010>
57. Tavakol M, Dennick R. Making sense of Cronbach ' s alpha. *Int J Med Educ* [Internet]. 2011;2:53–5. Available from: <https://www.ijme.net/archive/2/cronbachs-alpha.pdf>
58. Kaiser HF. An index of factorial simplicity. *Psychometrika* [Internet]. 1974;39(1):31–6. Available from: <https://link.springer.com/content/pdf/10.1007%2FBF02291575.pdf>
59. Williams B, Onsman A, Brown T. Exploratory factor analysis: A five-step guide for novices. *J Emerg Prim Heal Care* [Internet]. 2010;8(3):1–13. Available from: <https://ajp.paramedics.org/index.php/ajp/article/viewFile/93/90>
60. Wang B, Stanton B, Deveau L, Poitier M, Lunn S, Koci V, et al. Factors influencing implementation dose and fidelity thereof and related student outcomes of an evidence-based national HIV prevention program. *Implement Sci* [Internet]. 2015;10(1):1–13. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4409749/pdf/13012_2015_Article_236.pdf
61. Compaoré R, Yameogo MWE, Millogo T, Tougri H, Kouanda S. Evaluation of the implementation fidelity of the seasonal malaria chemoprevention intervention in Kaya health district, Burkina Faso. *PLoS One* [Internet]. 2017;12(11):1–18. Available from: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5706718/pdf/pone.0187460.pdf>
62. Costello AB, Osborne JW. Best Practices in Exploratory Factor Analysis : Four Recommendations for Getting the Most From Your Analysis. *Assessment, Res Eval* [Internet]. 2005;10(7):1–9. Available from: <https://pareonline.net/pdf/v10n7.pdf>
63. Thompson B, Daniel L. Factor analytic evidence for the construct validity of scores: A historical overview and some guidelines. *Educ Psychol Meas* [Internet]. 1996;56(2):197–208. Available from: <https://journals.sagepub.com/doi/pdf/10.1177/0013164496056002001>

64. Brien RMO. A Caution Regarding Rules of Thumb for Variance Inflation Factors. *Qual Quant* [Internet]. 2007;41:673–90. Available from:
<https://link.springer.com/content/pdf/10.1007%2Fs11135-006-9018-6.pdf>
65. Fusch PI, Ness LR. Are We There Yet ? Data Saturation in Qualitative Research. *Qual Rep* [Internet]. 2015;20(9):1408–16. Available from: <http://tqr.nova.edu/wp-content/uploads/2015/09/fusch1.pdf>
66. Weller SC, Vickers B, Bernard HR, Blackburn AM, Borgatti S, Gravlee CC, et al. Open-ended interview questions and saturation. *PLoS One* [Internet]. 2018;13(6):1–18. Available from:
<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6010234/pdf/pone.0198606.pdf>
67. Smith J, Firth J. Qualitative data analysis: application of the framework approach. *Nurse Res* [Internet]. 2011;18(2):52–62. Available from: <http://eprints.hud.ac.uk/id/eprint/18884/>
68. Elo S, Kääriäinen M, Kanste O, Pölkki T, Utriainen K, Kyngäs H. Qualitative Content Analysis: A Focus on Trustworthiness. *SAGE Open* [Internet]. 2014 Jan 1;4(1):2158244014522633. Available from: <https://doi.org/10.1177/2158244014522633>
69. World Medical Association (WMA). World Medical Association Declaration of Helsinki Ethical Principles for Medical Research Involving Human Subjects. *JAMA* [Internet]. 2013;310(20):2191–3. Available from: <http://www.cairn.info/revue-journal-international-de-bioethique-2004-1-page-124.htm>
70. Greamer EG. An Introduction to Fully Integrated Mixed Methods Research [Internet]. Weber-Stenis O, Livingston E, editors. Virginis: SAGE Publications; 2018. 79-139 p. Available from:
https://www.researchgate.net/publication/325129778_Media_Review_An_Introduction_to_Fully_Integrated_Mixed_Methods_ResearchCreamerE_G_2018_An_Introduction_to_Fully_Integrated_Mixed_Methods_Research_Thousand_Oaks_CA_Sage
71. Wilson S, Lipsey M, Derzon J. The Effects of School-Based Intervention Programs on Aggressive Behavior : A. *J Consult Clin Psychol* [Internet]. 2003;71(1):136–49. Available from:

- https://scholar.google.com/scholar_lookup?journal=J+Consult+Clin+Psychol&title=The+effects+of+school-based+intervention+programs+on+aggressive+and+disruptive+behavior:+a+meta-analysis&author=SJ+Wilson&author=MW+Lipsey&author=JH+Derzon&volume=71&publication_year=2003&pages=136-49&pmid=12602434&
72. Durlak JA, Dupre EP. Implementation Matters : A Review of Research on the Influence of Implementation on Program Outcomes and the Factors Affecting Implementation. *Am J Community Psychol* [Internet]. 2008;41:327–50. Available from: <https://www.ncbi.nlm.nih.gov/pubmed/18322790>
 73. Moore GF, Audrey S, Barker M, Bond L, Bonell C, Hardeman W, et al. Process evaluation of complex interventions : Medical Research Council guidance. *Bmj* [Internet]. 2015;350(h1258):1–7. Available from: <https://www.bmj.com/content/bmj/350/bmj.h1258.full.pdf>
 74. Bast LS, Due P, Bendtsen P, Ringgard L, Wohllebe L, Damsgaard MT, et al. High impact of implementation on school- based smoking prevention : the X : IT study — a cluster-randomized smoking prevention trial. *Implement Sci* [Internet]. 2016;11(125):1–14. Available from: <http://dx.doi.org/10.1186/s13012-016-0490-7>
 75. Cooke M. The dissemination of a smoking cessation program : predictors of program awareness , adoption and maintance. *Health Promot Int* [Internet]. 2000;15(2):113–24. Available from: <https://www.semanticscholar.org/paper/The-dissemination-of-a-smoking-cessation-program%3A-Cooke/d79d3b0daf2c6a966cf69898b5b6dc8deb4cbdb9>

APPENDICES

Appendix i: Plagiarism Declaration Report



PLAGIARISM DECLARATION TO BE SIGNED BY ALL HIGHER DEGREE STUDENTS

SENATE PLAGIARISM POLICY: APPENDIX ONE

I, Vangilisasi Msola (Student number: 1731557) am a student

registered for the degree of MSc Epidemiology-Implementation Science _ in the academic year 2017 _

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.

Signature: V. Msola Date: 20/04/2020

Appendix ii: Questionnaire

Confidential

TB Diagnosis Guideline
Page 1 of 19

QUESTIONNAIRE

1. Record ID

2. Facility ID

3. Date of Interview

Part A: SOCIO-DEMOGRAPHIC CHARACTERISTICS

4. Date of Birth

5. Gender

- ☐ Male
☐ Female

6. Level of Education

- ☐ Certificate
☐ Diploma
☐ Advance Diploma
☐ Degree
☐ Postgraduate Degree
☐ Others (Mention)

7. Level of your Healthcare Facility

- ☐ Hospital
☐ Healthcare Center
☐ Dispensary
☐ Community Healthcare Center
☐ Other(Mention)

8. Clinic/Department currently you are working with

- ☐ Outpatient Clinic/Department
☐ Inpatient Clinic/Department
☐ TB Clinic
☐ CTC Clinic
☐ Other(Mention)

9. Participant's Cadre

- ☐ Assistant Clinical Officer
☐ Clinical Officer
☐ Assistant Medical officer
☐ Medical Officer
☐ Specialist
☐ Others (Mention)

Part B: ADHERENCE; content and dose (Coverage, frequency and duration)

Dose

10. Is TB Diagnosis Guideline available at your healthcare facility?

- ☐ Yes
☐ No

Not at all Sometime Often Very often All the time

11. How often do you use and adhere to TB Diagnosis Guideline when seeing a patient you suspecting has TB? ☐ ☐ ☐ ☐ ☐

12. Do you have a TB screening questionnaire on your desk or in the examination room? ☐ Yes ☐ No

13. If YES, how often do you use a TB screening questionnaire and adhere to asses TB suspect patient? ☐ Not at all ☐ Sometime ☐ Often ☐ Very often ☐ All the time

Details of Content

1st Visit

14. What are the signs/ symptoms of TB infection? (Select Multiple Best Answers)

- ☐ Fever for more than 2 weeks
- ☐ Coughing for more than 2 weeks
- ☐ Excessive sweat at night for more than 2 weeks
- ☐ Coughing up bloodstained sputum
- ☐ Noticed Weight loss or 3 kg weight loss in a month

15. How many recommended Acid-Fast Bacillus (AFB) sputum samples for smear microscopic examination do you suppose to order to TB suspect patient? (Select Single Best Answer)

- ☐ 1(One)
- ☐ 2(Two)
- ☐ 3(Three)
- ☐ 4(Four)
- ☐ 5(Five)

16. At what time do AFB sputum samples for smear microscopic examination must be taken from the suspect TB patient? (Select Single Best Answer)

- ☐ Evening, Midnight and Morning
- ☐ Night and Morning
- ☐ Spot and Evening
- ☐ Spot and Morning
- ☐ Evening and Midnight

17. If HIV status is not known, is Provider-Initiated HIV Testing and Counselling (PITC) must be offered? ☐ Yes ☐ No

2nd Visit

18. What do you do on the 2nd visit if any of the 1st visit AFB sputum samples for smear microscopic examination result(s) come out positive? (Select Single Best Answer)

- ☐ Wait for all samples to be positive
- ☐ Start TB treatment
- ☐ Order other investigation for confirmation
- ☐ All the above
- ☐ None of the above

19. What do you do on the 2nd visit If 1st visit AFB sputum sample for smear microscopic examination result(s) come out negative and patient is HIV positive? (Select Single Best Answer)

- ☐ Reassess the patient clinically and re-order AFB sputum sample
- ☐ Reassess the patient clinically and not request CXR
- ☐ Reassess the patient clinically and request CXR
- ☐ Repeat HIV test
- ☐ None of the above

20. What do you do on the 2nd visit if 1st visit AFB sputum sample for smear microscopic examination result(s) come out negative and a patient is HIV negative or refuse PITC (HIV test)? (Single Best Answer)

- ☐ Reassess the patient clinically and not repeat AFB sputum
- ☐ Reassess the patient clinically and not order CXR
- ☐ Reassess the patient clinically and not give broad-spectrum antibiotic
- ☐ Reassess the patient clinically, provides broad-spectrum antibiotic and reassess after 7 days
- ☐ None of the above

3rd Visit

21. What do you do on the 3rd visit if 1st visit AFB sputum sample result(s) was/were negative, the patient is HIV positive and ordered CXR finding is pulmonary TB suggestive? (Select Single Best Answer)

- ☐ Wait for spontaneous improvement
- ☐ TB is likely, then start TB treatment
- ☐ Give broad-spectrum antibiotic
- ☐ All the above
- ☐ None of the above

22. What do you do on the 3rd visit if 1st visit AFB sputum sample result(s) was(were) negative, the patient is HIV positive and ordered CXR finding is not pulmonary TB suggestive? (Single Best Answer)

- ☐ Wait to repeat CXR
- ☐ Start TB treatment
- ☐ Provide Broad Spectrum Antibiotics and reassess after 7 days.
- ☐ All the above
- ☐ None of the above

23. What do you do on the 3rd visit if;
- 1st visit AFB sputum sample result(s) was negative
- the patient is HIV negative (or refuse to test), and
- the patient is not improving after given broad-spectrum antibiotics on the 2nd visit? (Single Best Answer)

- ☐ Reassess the patient clinically
- ☐ Repeat AFB sputum test
- ☐ Request CXR
- ☐ All the above
- ☐ None of the above

24. What do you do on the 3rd visit if;
- 1st visit AFB sputum sample result(s) was negative
- the patient is HIV negative (or refuse to test), and
- the patient improved after given broad-spectrum antibiotics on the 2nd visit? (Single Best Answer)

- ☐ TB is unlikely
- ☐ Repeat AFB sputum test
- ☐ Request CXR
- ☐ All the above
- ☐ None of the above

4th Visit

25. What do you do on the 4th visit if;
- 1st visit AFB sputum sample result(s) was(were) negative,
- the patient is HIV Positive
- 2nd visit CXR not suggesting pulmonary TB and
- no improvement after 7 days after given Broad Spectrum Antibiotics on the 3rd visit? (Select Single Best Answer)

- ☐ Wait to repeat CXR
- ☐ Start TB treatment
- ☐ Reassess clinically and repeat sputum for AFB
- ☐ TB is unlikely; reassess for other condition(s)
- ☐ All the above

26. What do you do on the 4th visit if;
 - 1st visit AFB sputum sample result(s) was(were) negative,
 - the patient is HIV Positive
 - 2nd visit CXR not suggesting pulmonary TB and
 - the patient improved after 7 days after given Broad Spectrum Antibiotics on the 3rd visit? (Select Single Best Answer)

- ☐ Wait to repeat CXR
- ☐ Start TB treatment
- ☐ Reassess clinically and repeat sputum for AFB
- ☐ TB is unlikely
- ☐ All the above

27. What do you do on the 4th visit if;
 - 1st visit AFB sputum sample result(s) was(were) negative
 - the patient is HIV negative (or refuse to test), and
 - no improvement in 7 days after given Broad Spectrum Antibiotics on the 2nd visit as well as
 - repeated sputum test and/or requested CXR on 3rd visit have shown the sign(s) of TB? (Select Single Best Answer)

- ☐ Wait to repeat CXR again
- ☐ TB is likely, then start TB treatment
- ☐ Reassess clinically and repeat sputum for AFB again
- ☐ TB is unlikely; reassess for other condition(s)
- ☐ All the above

28. What do you do on the 4th visit if;
 - 1st visit AFB sputum sample result(s) was(were) negative
 - the patient is HIV negative (or refuse to test), and
 - no improvement in 7 days after given Broad Spectrum Antibiotics on the 2nd visit as well as
 - repeated sputum test and/or requested CXR on 3rd visit not shown the sign(s) of TB? (Select Single Best Answer)

- ☐ Start TB treatment
- ☐ Wait to repeat CXR
- ☐ Order other investigation for confirmation
- ☐ TB is unlikely; reassess for other condition(s)
- ☐ All the above

5th Visit

29. What do you do on the 5th visit if;
 - 1st visit AFB sputum sample result(s) was(were) negative,
 - the patient is HIV Positive,
 - 2nd visit CXR was not suggesting pulmonary TB,
 - no improvement after 7 days after given Broad Spectrum Antibiotics on the 3rd visit,
 - Also, after the patient was reassessed clinically and sputum for AFB were repeated and the result(s) found that TB is unlikely on the 4th visit? (Select Single Best Answer)

- ☐ Wait to repeat CXR
- ☐ Start TB treatment
- ☐ Reassess clinically and repeat sputum for AFB
- ☐ TB is unlikely; reassess for other condition(s)
- ☐ All the above

30. What do you do on the 5th visit if;
 - 1st visit AFB sputum sample result(s) was(were) negative,
 - the patient is HIV Positive,
 - 2nd visit CXR not suggesting pulmonary TB,
 - no improvement after 7 days after given Broad Spectrum Antibiotics on the 3rd visit,
 - Also, after the patient was reassessed clinically and sputum for AFB were repeated and the result(s) found that TB is likely on the 4th visit? (Select Single Best Answer)

- ☐ Wait to repeat CXR
☐ Start TB treatment
☐ Reassess clinically and repeat sputum for AFB
☐ TB is unlikely; reassess for other condition(s)
☐ All the above

Part C: DETERMINANTS

GUIDELINE'S CHARACTERISTICS

Intervention Source

31. Did you or any staff at your healthcare facility participate in the development of the TB Diagnosis guideline?

- ☐ Yes
☐ No

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
32. Do you agree that the participation in the development of the TB guideline influence the adherence to it because you feel like you own it?	☐	☐	☐	☐	☐

Evidence Strength & Quality

	Very poor	Poor	Fair	Good	Very good
33. How do you grade the quality and validity of the contents of the TB Diagnosis Guideline?	☐	☐	☐	☐	☐
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
34. Do you agree that the perception of the quality and validity of the contents of the TB Diagnosis Guideline influence it's adherence?	☐	☐	☐	☐	☐

Relative advantage

35. There is any better alternative solution of not using TB Diagnosis Guideline to guide TB diagnosis against using it? ☐ Yes ☐ No

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
36. Do you agree that adherence to TB Diagnosis guideline has a greater advantage compared to the use of another tool(s)?	☐	☐	☐	☐	☐

Complexity

	Very complex	Somewhat complex	Neither	Somewhat simple	Very Simple
37. How do you grade the complexity of TB Diagnosis Guideline?	☐	☐	☐	☐	☐

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
38. Do you agree that the complexity of the TB Diagnosis guideline influences the adherence to it?	☐	☐	☐	☐	☐

Design Quality and Packaging

	Very poor	Poor	Fair	Good	Very good
39. How do you perceive in how the TB Diagnosis guideline is bundled, presented, and assembled?	☐	☐	☐	☐	☐

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
40. Do you agree that on how the TB Diagnosis guideline is bundled, presented, and assembled influence the adherence to it?	☐	☐	☐	☐	☐

OUTER SETTING**Patient Needs & Resources**

41. Is your healthcare facility having unit or individual who is responsible to assist the patients who are in need? ☐ Yes ☐ No

42. What are common Patients' needs /behaviour that influence the adherence to the TB Diagnosis guideline? (Select All Possible Options)

- ☐ Financial insufficient (status)
☐ Cultural beliefs/values
☐ Patient's level of education/exposure
☐ Co-morbidity (have other condition apart of TB)
☐ Others (mention)

pt_nd_other

	Too low	Low	Normal	High	Too high
43. What level the patients' needs (other than diseases) and behaviour influence you to the adhere to TB Diagnosis Guideline?	☐	☐	☐	☐	☐
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
44. Do you agree that patients' needs (other than diseases) and behaviour influence the adherence to TB Diagnosis guideline?	☐	☐	☐	☐	☐
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
45. Do you agree that assisting patients' needs and resources influence the adherence to TB Diagnosis guideline?	☐	☐	☐	☐	☐
	Strongly disagree	Disagree	Neutral	Agree	Strongly agree

Cosmopolitanism

46. Is your healthcare facility communicating and networking with other healthcare facilities?

- ☐ Yes
☐ No

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
47. Do you agree that networking with other healthcare (ies) or external organization(s) influence the adherence to TB Diagnosis Guideline?	☐	☐	☐	☐	☐

Peer Pressure

48. Do you receive a report(s) from other healthcare facilities (ies) on how they adhere to TB Diagnosis Guideline?

- ☐ Yes
☐ No

49. Do you agree that receive a good report on adherence from other healthcare facilities on how they adhere to TB Diagnosis Guideline influence/motivate the adherence to it?

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
☒	☐	☐	☐	☐

External Policy & Incentives

50. Do you have any regulation from governmental or other central entity which governs the adherence to TB Diagnosis Guideline at your Healthcare Facility?

☐ Yes
☐ No

51. Do you agree that regulations from governmental or other central entity, influence the adherence to TB Diagnosis Guideline?

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
☐	☐	☐	☐	☐

52. Do you get any incentive (e.g Pay-for-Performance) when you adhere correctly to TB Diagnosis Guideline?

☐ Yes
☐ No

53. Do you agree that if healthcare facility receive incentive (e.g Pay-for-Performance) influence the adherence to TB Diagnosis Guideline?

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
☐	☐	☐	☐	☐

54. Do you agree that public or benchmark of reporting of good adherence to TB Diagnosis Guideline from other facilities (ies) influence/motivate the adherence to TB Diagnosis Guideline?

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
☐	☐	☐	☐	☐

INNER SETTING**Structural Characteristics**

	Very poor	Poor	Fair	Good	Very Good
55. How do you grade your healthcare facility in term of social architecture (interaction), maturity, age or/and its size on adherence to TB Diagnosis Guideline?	☐	☐	☐	☐	☐

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
56. Do you agree that the level of the social architecture, age, maturity, and size of an organization/healthcare facility, influence the adherence to TB Diagnosis guideline?	☐	☐	☐	☐	☐

Networks & Communications

	Very poor	Poor	Fair	Good	Very good
57. How is your social communication and networks, both formal and informal among staffs in your healthcare facility?	☐	☐	☐	☐	☐

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
58. Do you agree that good social communications and networks on both formal and informal among staffs in your healthcare facility influence the adherence to TB Diagnosis guideline?	☐	☐	☐	☐	☐

Culture

59. Is your healthcare facility has embraced good norms, values and basic assumptions towards good practice particularly the adherence to TB Diagnosis guideline?	☐ Yes
	☐ No

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
60. Do you agree that embracing good norms, values and basic assumptions towards good practice at healthcare facility particularly the adherence to TB Diagnosis guideline, influence the adherence to TB Diagnosis guideline?	☒	☐	☐	☐	☐

Implementation Climate: Tension for Change

	Not at all	Sometime	Often	Very often	All the time
61. How often are you given the regular feedback about the misdiagnosis due to not adhere to the guideline at your healthcare facility and fill the current situation is intolerable or needing change?	☐	☐	☐	☐	☐

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
62. Do agree that if you are given regular feedback about misdiagnosis due to not adhere to TB Diagnosis guideline in your healthcare facility and fill the current situation is intolerable or needing to change influence the adherence to guideline?	☐	☐	☐	☐	☐

Implementation Climate: Compatibility

	Not at all	Sometime	Often	Very often	All the time
63. How does the adherence to TB Diagnosis guideline interfere with your norms, value, risky and daily workflow while attending to the patients in your healthcare facility?	☐	☐	☐	☐	☐

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
64. Do you agree that the adherence to TB Diagnosis Guideline which causes to interfere with your norms and value as well as risk the daily workflow of attending patients and system in the healthcare facilities, does influence its adherence?	☒	☐	☐	☐	☐

Implementation Climate: Relative Priority

65. The adherence to the TB Diagnosis Guideline has relative priority (important) at your healthcare facilities than not adhere to it?

☐ Yes
☐ No

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
66. Do you agree that the adherence to TB Diagnosis guideline has relative priority (important) at your healthcare facility than not adhere to it?	☐	☐	☐	☐	☐

Implementation Climate: Organizational Incentives & Rewards

67. Do your healthcare facility received goal-sharing award, performance review, promotion, salary raises or/and respect for good performance specific to the adherence to TB Diagnosis guideline?

☐ Yes
☐ No

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
68. Do you agree that receiving goal-sharing awards, performance review, promotion, salary raises or/and respect for good performance specific to the adherence to TB Diagnosis guideline may influence its adherence?	☐	☐	☐	☐	☐

Implementation Climate: Goals and Feedback

	Not at all	Sometime	Often	Very often	All the time
69. Do you given feedback about adherence and discuss the goal of TB Diagnosis Guideline with your leader?	☐	☐	☐	☐	☐

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
70. Do you agree that given feedback about adherence and discussing the goal of TB Diagnosis Guideline with your leader, influence its adherence?	☒	☐	☐	☐	☐

Implementation Climate: Learning Climate

	Not at all	Sometime	Often	Very often	All the time
71. How often your leaders express their own fallibility and need for team members' assistance and input when there is poor adherence to the TB Diagnosis guideline?	☐	☐	☐	☐	☐

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
72. Do you agree that when leaders express their own fallibility on poor adherence to the TB Diagnosis guideline and need for team member assistance and input influence TB Diagnosis guideline adherence?	☐	☐	☐	☐	☐

	☐	☐	☐	☐	☐
73. Do you agree that motivating team member to feel that they are essential, valued, and knowledgeable partners, influence the adherence to TB Diagnosis guideline?					

Readiness for Implementation**Readiness for Implementation: Leadership Engagement**

	Not at all	Sometime	Often	Very often	All the time
74. Do your leader(s) committed, involved, and accountable for good adherence to TB Diagnosis guideline?	☐	☐	☐	☐	☐

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
75. Do you agree that when leaders are committed, involved, and accountable for TB Diagnosis Guideline, influence its adherence?	☒	☐	☐	☐	☐

Readiness for Implementation: Available Resources

76. Do you have enough available good resources and equipment(s) dedicated to TB management particularly to facilitate the adherence of the TB Diagnosis Guideline at your healthcare facility?

☐ Yes
☐ No

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
77. Do you agree that availability of the good resource (eg. money, physical space, time and training) and equipment dedicated to TB management influence the adherence to TB Diagnosis guideline?	☐	☐	☐	☐	☐

78. Which of the following resource(s), influence the adherence to TB Diagnosis guideline? (Select All Applicable Option(s) Multiple and State how often on q79)

☐ Peers/supervisors support
☐ Enough of staff:
☐ Enough of working time:
☐ Other (Mention)

	Not at all	Sometime,	Often	Very often	All the time
79 a. Peers/supervisors support :	☐	☐	☐	☐	☐
79 b. Enough of staff:	☐	☐	☐	☐	☐
79 c. Enough of working time:	☐	☐	☐	☐	☐
79 d. Other (Mention)	☐	☐	☐	☐	☐

Readiness for Implementation: Access to knowledge and information

	Not ease at all	Somewhat ease	Neither	Ease	Very ease
80. How's easy to access digested information and knowledge about the adherence of TB Diagnosis Guideline and incorporate them into your work tasks??	☐	☐	☐	☐	☐

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
81. Do you agree that to have easy access to digested information and knowledge about the adherence of TB Diagnosis guideline and incorporate them into your work tasks, influence the adherence TB Diagnosis guideline?	☒	☐	☐	☐	☐

CHARACTERISTICS OF HEALTHCARE PROVIDERS

Knowledge & Beliefs about the Intervention

	Very poor	Poor	Fair	Good	Very good
82. How's your knowledge and your belief on the facts, truth, and principles on TB infection management, particularly to diagnose TB suspected patient?	☐	☐	☐	☐	☐

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
83. Do you agree that having enough knowledge and positive belief on the facts, truth, and principles on TB infection management, particularly to diagnose TB cases, influence the adherence to TB Diagnosis Guideline?	☐	☐	☐	☐	☐
84. Do you agree that healthcare provider perceives isn't difficult and wastage of time to adhere to the TB Diagnosis Guideline influence the adherence to TB Diagnosis Guideline?	☐	☐	☐	☐	☐

85. Do you perceive that it is difficult and wastage of time to adhere to TB Diagnosis Guideline?	☐ Yes ☐ No
---	---

	Very poor	Poor	Fair	Good	Very good
86. How good are you familiar with TB Diagnosis Guideline's contents?	☐	☐	☐	☐	☐

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
87. Do you agree that being familiar with TB Diagnosis Guideline's contents, influence the adherence to TB Diagnosis guideline?	☐	☐	☐	☐	☐

Self-efficacy

88. For how long are you working and attending TB cases (TB suspected patients)? (Select Single Best Answer).

☐ Less than 1 Month
☐ 1-3 Months
☐ 3-6 Months
☐ 6-12 Months
☐ 1-2 Years
☐ 2-3 Years
☐ More than 3 Years

89. What do you think is enough time (period) to work in the TB clinic to gain enough experiences to influence the adherence to TB Diagnosis Guideline? (Report in months or years).

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
90. Do you agree that healthcare provider's efficacy to diagnose TB infection particularly to the use of TB Diagnosis Guideline is needed to influence the adherence to TB Diagnosis Guideline?	☐	☐	☐	☐	☐

	Very poor	Poor	Fair	Good	Very good
91. How do you rate yourself on the ability to execute and adhere to TB Diagnosis Guidelines?	☐	☐	☐	☐	☐

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
92. Do you agree that healthcare provider's individual capability to diagnose TB, influence the adherence to TB Diagnosis Guideline?	☐	☐	☐	☐	☐

Individual Stage of Change

	Very poor	Poor	Fair	Good	Very Good
93. How is your stage of change toward skilled, enthusiastic, and sustained to use and adherence to TB Diagnosis Guideline?	☐	☐	☐	☐	☐

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
94. Do you agree that the stage of change toward skilled, enthusiastic, and sustained to use and adherence TB Diagnosis Guideline, influence its adherence?	☐	☐	☐	☐	☐

Individual Identification with Organization

	Very poor	Poor	Fair	Good	Very good
95. How do you perceive toward your healthcare facility, your relationship, and degree of commitment with the healthcare facility?	☐	☐	☐	☐	☐

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
96. Do agree that healthcare provider's perception toward healthcare facility, relationship and degree of commitment with the healthcare facility, influence the adherence to TB Diagnosis guideline?	☐	☐	☐	☐	☐

Other Personal Attributes

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
97. Do you agree that personal traits such as tolerance of ambiguity, intellectual ability, motivation, values, competence, capacity, and learning style influence the adherence to TB Diagnosis Guideline?	☐	☐	☐	☐	☐

PROCESS (Guideline's Implementation Strategy)**Planning**

	Very poor	Poor	Fair	Good	Very good
98. How good are your healthcare facility's plans and schemes on TB infection intervention particularly to the adherence to TB Diagnosis Guideline?	☐	☐	☐	☐	☐

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
99. Do you agree that good developed plans and schemes on TB infection intervention influence the adherence to TB Diagnosis guideline at your healthcare facility?	☐	☐	☐	☐	☐

Engaging**Engaging: Opinion Leaders**

100. Do you have a role model at your healthcare facility who is attracting you to adhere to TB Diagnosis Guideline?

☐ Yes
☐ No

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
101. Do you agree that having opinion leader at your healthcare facility who attracts you to adhere to TB Diagnosis guideline, influence its adherence?	☐	☐	☐	☐	☐

Engaging: Formally appointed internal implementation leaders

102. Do you have anyone at your healthcare facility who has been formally appointed with the responsibility as a coordinator, project manager, team leader, or other similar duties who promote and coordinate TB care specific the adherence to TB Diagnosis Guideline?

☐ Yes
☐ No

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
103. Do you agree that, having someone at your healthcare facility who have been formally appointed with responsibility as coordinator, project manager, team leader, or other similar duties who promote and coordinate TB care specific the adherence to TB Diagnosis Guideline influence its adherence?	☒	☐	☐	☐	☐

Engaging: Champions

104. Do you have individuals at your healthcare facility who are dedicated themselves to support and 'drive through' by overcoming indifference or resistance to adherence to TB Diagnosis guideline at your healthcare facility?

☐ Yes
☐ No

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
105. Do you agree that having individuals at your healthcare facility who are dedicated themselves to support and 'drive through' by overcoming indifference or resistance that interfere to the adherence to the guideline, influence the adherence to TB Diagnosis guideline?	☐	☐	☐	☐	☐

External Change Agents

106. Do you have individuals who are from outside and affiliated with your healthcare facility who formally influence the adherence of TB Diagnosis Guideline in a desirable direction?

☐ Yes
☐ No

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
107. Do you agree that, having individuals who are from outside and affiliated with your healthcare facility who formally influence the adherence of TB Diagnosis Guideline in a desirable direction influence its adherence?	☒	☐	☐	☐	☐

Executing

108. Do you carry out/accomplish/execute the TB care implementation as intended, particularly to the adherence to TB Diagnosis guideline?

☐ Yes

☐ No

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
109. Do you agree that carry out/accomplish/execute TB care implementation plan as intended, particularly to the adherence TB Diagnosis guideline, influence the adherence to TB Diagnosis guideline?	☐	☐	☐	☐	☐

Reflecting & Evaluating

110. Do you receive both quantitative and qualitative feedback about progress and quality of adherence to TB Diagnosis Guideline, accompanied with regular personal and team debriefing about progress and experience on adherence to TB Diagnosis Guideline?

☐ Yes

☐ No

	Strongly disagree	Disagree	Neutral	Agree	Strongly agree
111. Do you agree that receiving both quantitative and qualitative feedback about progress and quality of adherence to TB Diagnosis Guideline, accompanied with regular personal and team debriefing about progress and experience on adherence to TB Diagnosis Guideline, influence the adherence to TB Diagnosis guideline?	☐	☐	☐	☐	☐

Appendix iii: Interview Guide.

INTERVIEW GUIDE.

UNIVERSITY OF THE
WITWATERSRAND,
JOHANNESBURG



Study code:

Interviewee's job title

Name of interviewer

Interview Date.....

Checklist for Facilitator and Note taker

The In-depth Interview shall only progress once the following are confirmed;

- Interviewee has read and understood Study Participant Information Sheet and a signed copy given to the interviewee
- Interviewee has signed Consent Form

Study Title: Examining fidelity of health care providers to Tuberculosis (TB) Diagnosis Guidelines in Tanzania

Qualitative Research question: Is there fidelity in relation to use the Tuberculosis (TB) Diagnosis Guidelines in Tanzania among health care providers in 2018?

Interview Guide Questions.

Note: Start recording.

1. Could you tell me a little bit about the TB Diagnosis Guidelines

Probe: When did you start to use it?

Do you think you adhere to it?

➤ Tell me more about it.

2. Do you have Algorithm's poster showing the steps to diagnose PTB posted on the wall at your healthcare facility. Could you tell me the steps (algorithm) if you do remember them?

Probe: Tell me about the challenges of following the algorithm?

Tell me more about that?

Do you think there is any other ease way you can use to ascertain the diagnosis instead of using TB Diagnosis Guideline?

Tell me more about that?

Tell me your suggestion(s)

3. Do you think TB Diagnosis Guideline is being used and adhered optimally by you as well as by other staffs at your healthcare facility?

Probe: Please give reasons for your answer.

How can you suggest ways to ensure that it adhere optimally?

4. Could you tell me factor(s) which you have come across and/or you think might influence the adherence to the guideline? The factors could be on all level from individual to national level (Guideline characteristics factors, Individual factors, Implementation strategies, Outer settings and Inner settings)

Probe more on factors (constructs) which have shown association with fidelity (after we did Stepwise regression)

-Implementation Climate: Tension for change

-Implementation Climate: Goal and Feedback

- Implementation Climate: Compatibility

- Implementation Climate: Learning Climate

-Readiness for Implementation

-Knowledge and Belief

-Self -efficacy

-Peer Pressure

-Patient Needs and Resources

-Engaging: Opinion Leader

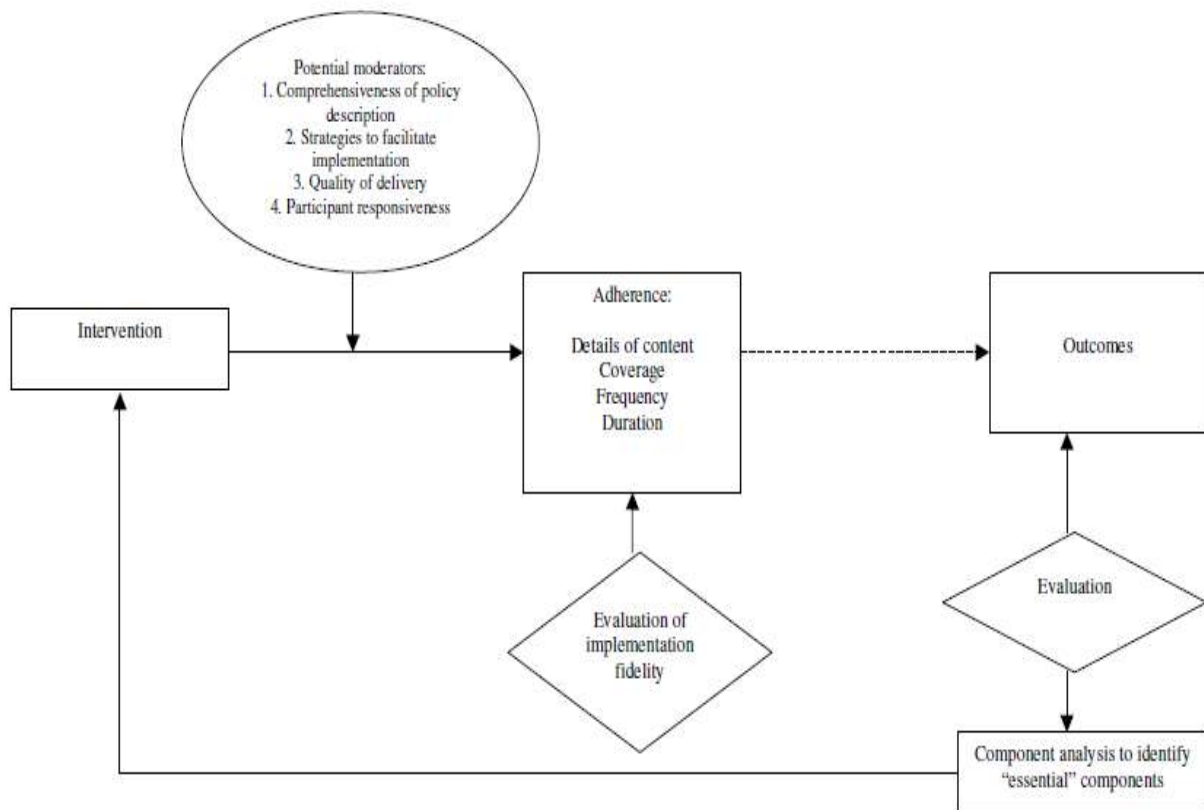
-Planning

-Structural Characteristics

5. What is your overall suggestion about the adherence? would you want to be done differently now, if you would want things to change positively?

Thank you for participation in this study, your contributions are well appreciated.

Appendix iv: Conceptual Framework for Implementation Fidelity by Carroll et al...,



Appendix v: CFIR Constructs with Short Definitions.

Topic/Description	Short Description
I. INTERVENTION CHARACTERISTICS	
A. Intervention Source	Perception of key stakeholders about whether the intervention is externally or internally developed.
B. Evidence Strength & Quality	Stakeholders' perceptions of the quality and validity of evidence supporting the belief that the intervention will have desired outcomes.
C. Relative advantage	Stakeholders' perception of the advantage of implementing the intervention versus an alternative solution.
D. Adaptability	The degree to which an intervention can be adapted, tailored, refined, or reinvented to meet local needs.
E. Trialability	The ability to test the intervention on a small scale in the organization [8], and to be able to reverse course (undo implementation) if warranted.
F. Complexity	Perceived difficulty of implementation, reflected by duration, scope, radicalness, disruptiveness, centrality, and intricacy and number of steps required to implement
G. Design Quality and Packaging	Perceived excellence in how the intervention is bundled, presented, and assembled
H. Cost	Costs of the intervention and costs associated with implementing that intervention including investment, supply, and opportunity costs.

II. OUTER SETTING

A. Patient Needs & Resources	The extent to which patient needs, as well as barriers and facilitators to meet those needs are accurately known and prioritized by the organization.
B. Cosmopolitanism	The degree to which an organization is networked with other external organizations.
C. Peer Pressure	Mimetic or competitive pressure to implement an intervention; typically, because most or other key peer or competing organizations have already implemented or in a bid for a competitive edge.
D. External Policy & Incentives	A broad construct that includes external strategies to spread interventions including policy and regulations (governmental or other central entity), external mandates, recommendations and guidelines, pay-for-performance, collaboratives, and public or benchmark reporting.

III. INNER SETTING

A. Structural Characteristics	The social architecture, age, maturity, and size of an organization.
B. Networks & Communications	The nature and quality of webs of social networks and the nature and quality of formal and informal communications within an organization.
C. Culture	Norms, values, and basic assumptions of a given organization.
D. Implementation Climate	The absorptive capacity for change, shared receptivity of involved individuals to an intervention and the extent to which use of that intervention will be rewarded, supported, and expected within their organization.

1. Tension for Change	The degree to which stakeholders perceive the current situation as intolerable or needing change.
2. Compatibility	The degree of tangible fit between meaning and values attached to the intervention by involved individuals, how those align with individuals' own norms, values, and perceived risks and needs, and how the intervention fits with existing workflows and systems.
3. Relative Priority	Individuals' shared perception of the importance of the implementation within the organization.
4. Organizational Incentives & Rewards	Extrinsic incentives such as goal-sharing awards, performance reviews, promotions, and raises in salary and less tangible incentives such as increased stature or respect.
5. Goals and Feedback	The degree to which goals are clearly communicated, acted upon, and fed back to staff and alignment of that feedback with goals.
6. Learning Climate	A climate in which: a) leaders express their own fallibility and need for team members' assistance and input; b) team members feel that they are essential, valued, and knowledgeable partners in the change process; c) individuals feel psychologically safe to try new methods; and d) there is sufficient time and space for reflective thinking and evaluation.
E. Readiness for Implementation	Tangible and immediate indicators of organizational commitment to its decision to implement an intervention.
1. Leadership Engagement	Commitment, involvement, and accountability of leaders and managers with the implementation.

2. Available Resources	The level of resources dedicated for implementation and on-going operations including money, training, education, physical space, and time.
3. Access to knowledge and information	Ease of access to digestible information and knowledge about the intervention and how to incorporate it into work tasks.

IV. CHARACTERISTICS OF INDIVIDUALS

A. Knowledge & Beliefs about the Intervention	Individuals' attitudes toward and value placed on the intervention as well as familiarity with facts, truths, and principles related to the intervention.
B. Self-efficacy	Individual belief in their own capabilities to execute courses of action to achieve implementation goals.
C. Individual Stage of Change	Characterization of the phase an individual is in, as he or she progresses toward skilled, enthusiastic, and sustained use of the intervention.
D. Individual Identification with Organization	A broad construct related to how individuals perceive the organization and their relationship and degree of commitment with that organization.
E. Other Personal Attributes	A broad construct to include other personal traits such as tolerance of ambiguity, intellectual ability, motivation, values, competence, capacity, and learning style.

V. PROCESS

A. Planning	The degree to which a scheme or method of behaviour and tasks for implementing an intervention are developed in advance and the quality of those schemes or methods.
B. Engaging	Attracting and involving appropriate individuals in the implementation and use of the intervention through a combined strategy of social marketing, education, role modelling, training, and other similar activities.
1. Opinion Leaders	Individuals in an organization who have formal or informal influence on the attitudes and beliefs of their colleagues with respect to implementing the intervention
2. Formally appointed internal implementation leaders	Individuals from within the organization who have been formally appointed with responsibility for implementing an intervention as coordinator, project manager, team leader, or other similar role.
3. Champions	“Individuals who dedicate themselves to supporting, marketing, and ‘driving through’ an [implementation]” [101] (p. 182), overcoming indifference or resistance that the intervention may provoke in an organization.
4. External Change Agents	Individuals who are affiliated with an outside entity who formally influence or facilitate intervention decisions in a desirable direction.
C Executing	Carrying out or accomplishing the implementation according to plan.
D. Reflecting & Evaluating	Quantitative and qualitative feedback about the progress and quality of implementation accompanied with regular personal and team debriefing about progress and experience.

Appendix vi: Screening Questionnaire.

ANNEX 8. NATIONAL TB SCREENING QUESTIONNAIRE

This standardized national TB screening questionnaire helps identifying patients who meet the definition of "TB suspect" so that appropriate precautions can be taken (e.g. respiratory hygiene, patient's education and separation in waiting areas) and he/she can be referred for direct sputum test.

MINISTRY OF HEALTH AND SOCIAL WELFARE

COLLABORATIVE TB/ HIV ACTIVITIES

TB SCREENING QUESTIONNAIRE FOR ABOVE 6 YEARS AND ADULT HIV/AIDS PATIENTS

Patient's name: CTC Reg. Number: Date of birth: .../.../... Sex: ☐ Male ☐ Female
Physical Address: Area leader/ neighbor: Contact telephone (if available):

Date																										
Tick appropriate response	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N
Cough for ≥ 2 weeks?																										
Coughing up bloodstained sputum (haemoptysis)?																										
Fevers for ≥ 2 weeks?																										
Noticeable weight loss for new patients or a 3 kgs weight loss in a month (subsequent visit)?																										
Excessive sweating at night for ≥ 2 weeks?																										

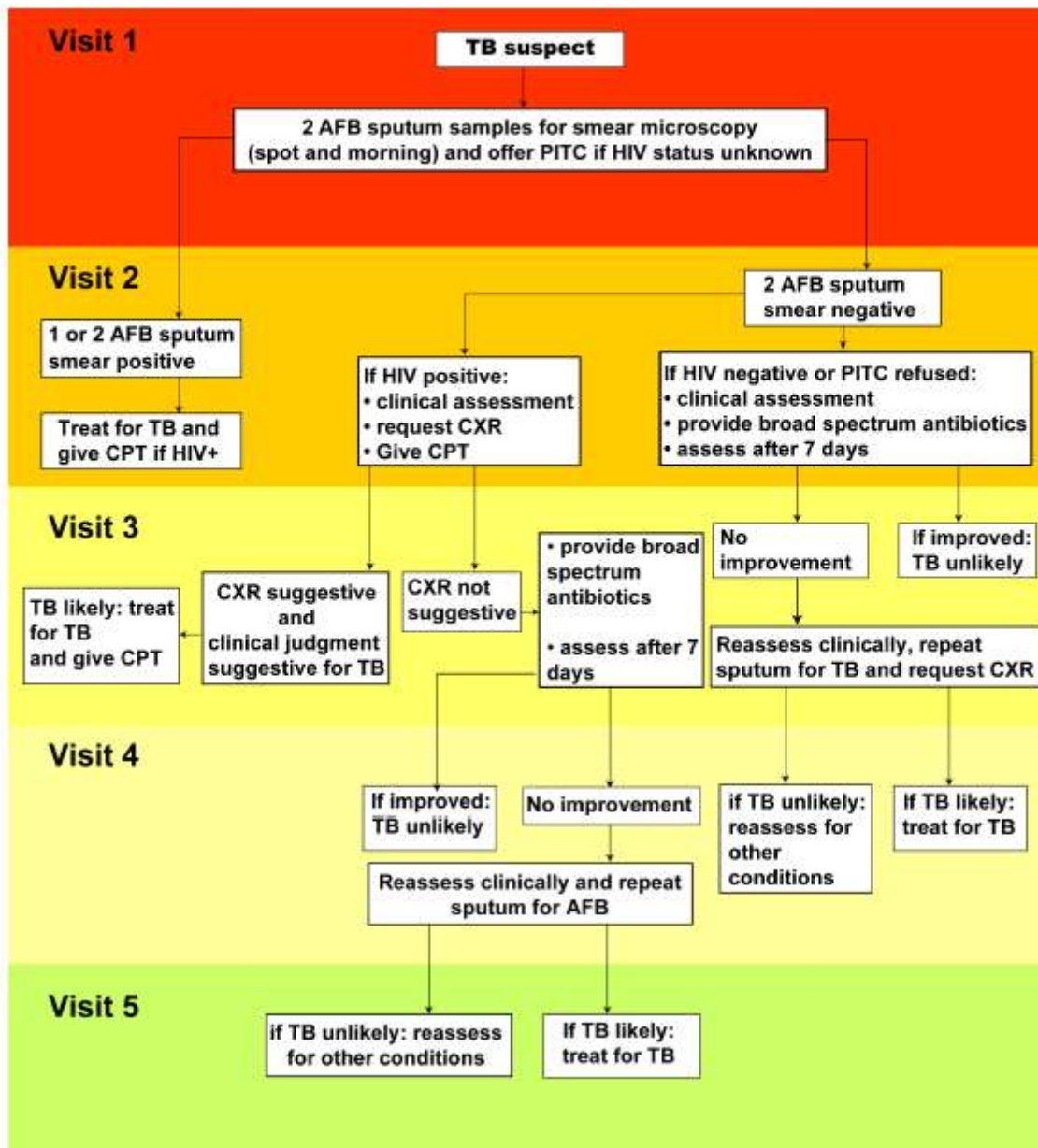
If 'YES' to one or more questions enter the code "TB Susp" in the TB status column of the CTC2 form and complete the respective column in the table below:

Date																								
Do sputum smear for AFB and enter results (pos / neg)																								
If sputum negative, do chest X-ray and enter result (suggestive or not suggestive)																								
Outcome of assessment (TB or No TB)																								

If 'No' to all questions: Do not initiate TB investigations and repeat screening at the subsequent visit. Enter the code "NO" in the TB status column of the CTC2 form

Appendix vii: Flowchart on the Diagnosis of Pulmonary Tb in Children above 6years and Adult.

FLOWCHART ON THE DIAGNOSIS OF PULMONARY TB IN CHILDREN ABOVE 6 YEARS AND ADULT



Appendix viii: List of Healthcare Facilities which provide TB care in Ubungo District.

	Name of Health facility	Ownership	
		Public	Private
Sinza	Sinza hospital	x	
	UDSM Health center	x	
	Moyo safi wa Maria Health Centre		x
	Msewe Dispensary	x	
	Kimara Health centre	x	
	Goba Dispensary	x	
	Mpiji Magoe Dispensary	x	
	Mavurunza Dispensary	x	
Mbezi	Mbezi Health Centre	x	
	Bochi Hospital		x
	Kwembe Kati Dispensary	x	
	Luguruni Health Centre		x
	Kwembe Dispensary	x	
	Gati Dispensary		x
	Kibwegere Dispensary	x	
	Kisopwa Dispensary	x	
	Kibamba Dispensary	x	
	Kiluvya Dispensary	x	
Mburahati (proposed)	Makuburi Dispensary	x	
	Mburahati Health centre	x	
	St. Monica Hospital		x
	Kibangu Mission		x
	Manzese Dispensary	x	
			x
	Msumi Dispensary	x	
	Mabibo Dispensary	x	
	Ekenywa Hospital		x

Sources: Office of District Medical Officer- Ubungo Municipality, in 2018.

Appendix ix: Participant's Information Sheet

Each participant must receive, understand and sign this document before any study-related procedure



Good day, my name is Dr. Vangilisasi Msola. I am an Epidemiology (field of Implementation science) student at the University of Witwatersrand, South Africa. I would like to invite you to participate in a research.

STUDY TITLE: Examining fidelity of health care providers to Tuberculosis (TB) Diagnosis Guideline in Tanzania

SPONSOR: WHO-TDR

PRINCIPAL INVESTIGATOR: Dr. Vangilisasi Msola

CONTACT: Cell No: +255 677 504158, Email: vangimsola@gmail.com, vangilisasi.msola@students.wits.ac.za

INSTITUTIONS: The University of the Witwatersrand, Johannesburg, South Africa.

PURPOSE OF THE STUDY

The aim of this research project is to find out if there is fidelity in relation to use the Tuberculosis (TB) Diagnosis Guidelines in Tanzania among health care providers in 2018?

PROCEDURES: What will happen if you participate?

This activity will involve answering series of questions on questionnaire which will be given. Some of the questions, their answers might need your opinion and insight about the issue. The questionnaire has about 100 questions and most of them are closed questions. It may take about 120 minutes to answer all questions completely.

What are some general things you should know about research study?

Your participation is voluntary, which means that you may refuse to participate, and that you may discontinue participating for any reason, at any time. This document is to help you to decide if you would like to participate. Before agreeing to participate in this study, it is important that you understand and be satisfied with the study purpose, procedures, benefits, and risks. You are free to speak your mind about how you think and feel about any topic that is raised here. There are no wrong or right answers. If you decide to participate in this study, you will be asked to sign two consent forms attached to this document. If you have any questions, do not hesitate to ask any team member of this study

There is no risk, psychologically or physically for participating in this study, even though some questions are directed to you personally. Should you feel uncomfortable to share any personal information you are free, voice that out and we will stop the interview without discriminating you.

All information obtained through this study will be kept confidential in a password protected database. Only study number will be used to identify participants instead of names. No participants will be identified in any report or publication about this study instead we will use pseudonym (false name) to represent your participation.

Data collected from this study will also be stored under password protected database, the research study team members will be the only individuals to have access to the data. The recorded tapes will also be kept under lock and key and destroyed 2 years after the research is published.

There is no direct benefit to study participants. But, your participation to this study is likely to help us answer the study question. There will be no cost incurred by you for participating in this study and there will be no remuneration to you as well, as this study is for academic purposes only.

Should you have any questions about the study, you can contact me at any time or phone me Cell No: +255 677 504158 or a local supervisor (Dr.Nyogea) through Cell No: +255 757 741 922.

If you have any questions afterwards about this research, feel free to contact us on the details listed below. This study will be written up as a research report which might be available online through the university library website. If you wish to receive a summary of this report, we will be happy to send it to you upon request.

If you have any queries, concerns or complaints regarding the ethical procedures of this study, you are welcome to contact the University (Wits) Human Research, Tanzania for ethical procedures.

Wits' Contacts for ethical procedures:

Chairperson: Prof. Peter Cleaton Jones email: peter.cleaton-jones1@wits.ac.za or

Administrators- Ms Zanele Ndlovu / Mr Rhulani Mkasi / Mr Lebo Moeng

Tel 011 717 2700/2656/1234/1252 or email: HREC-Medical.ResearchOffice@wits.ac.za

Yours sincerely,

Dr. Vangilisasi Msola

Email: vangimsola@gmail.com or vangilisasi.msola1@students.wits.ac.za

Cell: +255 677 504158

Internal Supervisor: Dr. Sumaya Mall (Wits, SPH)

Email: sumaya.mall@wits.ac.za

Cell: +27 84 6570490

External/Local Supervisor: Dr. Daniel Nyogea

Email: nyogea.daniel@gmail.com

Cell: +255 757 741 922.

Appendix x:Participant's Information Sheets Qualitative part

Each participant must receive, understand and sign this document before any study-related procedure



Good day, my name is Dr. Vangilisasi Msola. I am an Epidemiology (field of Implementation science) student at the University of Witwatersrand, South Africa. I would like to invite you to participate in a research.

STUDY TITLE: Examining fidelity of health care providers to Tuberculosis (TB) Diagnosis Guideline in Tanzania

SPONSOR: WHO-TDR

PRINCIPAL INVESTIGATOR: Dr. Vangilisasi Msola

CONTACT: Cell No: +255 677 504158, Email: vangimsola@gmail.com, vangilisasi.msola@students.wits.ac.za

INSTITUTIONS: The University of the Witwatersrand, Johannesburg, South Africa.

PURPOSE OF THE STUDY

The aim of this research project is to find out if there is fidelity in relation to use the Tuberculosis (TB) Diagnosis Guidelines in Tanzania among health care providers in 2018?

PROCEDURES: What will happen if you participate?

We will ask you questions regarding your general knowledge and experience about fidelity (adherence) of health care providers to TB Diagnosis Guideline and determinants/factors affecting its fidelity. This activity will involve a single simple in-depth interview where we will ask you questions and you will give your insight about the issue(s). The interview will take around 45-60 minutes. With your permission, we would also like to record the interview using an audio recorder.

What are some general things you should know about research study?

Your participation is voluntary, which means that you may refuse to participate, and that you may discontinue participating for any reason, at any time. This document is to help you to decide if you would like to participate. Before agreeing to participate in this study, it is important that you understand and be satisfied with the study purpose, procedures, benefits, and risks. You are free to speak your mind about how you think and feel about any topic that is raised here. There are no wrong or right answers. If you decide to participate in this study, you will be asked to sign two consent forms attached to this document. If you have any questions, do not hesitate to ask any team member of this study

There is no risk, psychologically or physically for participating in this study, even though some questions are directed to you personally. Should you feel uncomfortable to share any personal information you are free, voice that out and we will stop the interview without discriminating you.

All information obtained through this study will be kept confidential in a password protected database. Only study number will be used to identify participants instead of names. No participants will be identified in any report or publication about this study instead we will use pseudonym (false name) to represent your participation.

Data collected from this study will also be stored under password protected database, the research study team members will be the only individuals to have access to the data. The recorded tapes will also be kept under lock and key and destroyed 2 years after the research is published.

There is no direct benefit to study participants. But, your participation to this study is likely to help us answer the study question. There will be no cost incurred by you for participating in this study and there will be no remuneration to you as well, as this study is for academic purposes only.

Should you have any questions about the study, you can contact me at any time or phone me Cell No: +255 677 504158 or a local supervisor (Dr.Nyogea) through Cell No: +255 757 741 922.

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Administrators- Ms Zanele Ndlovu / Mr Rhulani Mkasi / Mr Lebo Moeng

Tel 011 717 2700/2656/1234/1252 or email: HREC-Medical.ResearchOffice@wits.ac.za

Yours sincerely,

Dr. Vangilisasi Msola

Email: vangimsola@gmail.com or vangilisasi.msola1@students.wits.ac.za

Cell: +255 677 504158

Internal Supervisor: Dr. Sumaya Mall (Wits, SPH)

Email: sumaya.mall@wits.ac.za

Cell: +27 84 6570490

External Supervisor: Dr. Daniel Nyogea

Email: nyogea.daniel@gmail.com

Cell: +255 757 741 922.

Appendix xi: Consent Form



STUDY TITLE: Examining fidelity of health care providers to Tuberculosis (TB) Diagnosis Guidelines in Tanzania

INSTITUTIONS: The University of the Witwatersrand, Johannesburg, South Africa.

I the undersigned confirm that I was given information about the study “Examining fidelity of health care providers to Tuberculosis (TB) Diagnosis Guidelines in Tanzania”

I understand that it is my decision whether or not to participate in providing answers and that there will be no negative consequences should I decide not to. I also understand that I do not have to provide answers to any questions that I am uncomfortable with and that I can stop at any time.

I understand that the researcher(s) involved in this project will ensure confidentiality and that my name and the names of the providers will not be used in the study reports, and that comments that I make will not be reported back to anybody else.

I understand that I may, at any stage, without prejudice, withdraw my consent and participation in the study.

(make a cross in the appropriate box below)

☐ I give consent to participate in the study.

Interviewee’s signature Date.....

Researcher’s signature..... Date.....

Appendix xii: Audio recording Interview Informed Consent Form



STUDY TITLE: Examining fidelity of health care providers to Tuberculosis (TB) Diagnosis Guidelines in Tanzania

INSTITUTIONS: The University of the Witwatersrand, Johannesburg, South Africa.

I the undersigned confirm that I was given information about the recording of my interview based on the study “Examining fidelity of health care providers to Tuberculosis (TB) Diagnosis Guidelines in Tanzania”.

I understand that it is my decision whether or not to be recorded during the interview. I also understand that I do not have to provide answers to any questions that I am uncomfortable with and that I can stop at any time.

I understand that the researcher(s) involved in this project will ensure confidentiality and that my name and the names of the providers will not be used in the study reports, and that comments that I make will not be reported back to anybody else. I also understand that the recording will be kept safely for 2 years before being destroyed.

I understand that I may, at any stage, without prejudice, withdraw my consent and participation in the study.

(make a cross in the appropriate box below)

☐ I give permission for my interview to be recorded.

Interviewee’s signature Date.....

Researcher’s signature..... Date.....

Appendix xiii: Correlation Matrix.

	<i>gx32</i>	<i>gx34</i>	<i>gx36</i>	<i>gx38</i>	<i>gx40</i>	<i>os44</i>	<i>os45</i>	<i>os47</i>
<i>gx32</i>	1.0000							
<i>gx34</i>	0.2022	1.0000						
<i>gx36</i>	0.0736	0.1238	1.0000					
<i>gx38</i>	-0.0215	0.0784	-0.0547	1.0000				
<i>gx40</i>	0.1526	0.1076	0.3303	-0.2763	1.0000			
<i>os44</i>	0.1474	0.1647	0.1165	-0.0332	0.0888	1.0000		
<i>os45</i>	0.1429	0.2368	0.2477	0.0039	0.1571	0.4693	1.0000	
<i>os47</i>	0.1398	0.0089	0.5745	-0.0104	0.1033	0.1972	0.2691	1.0000
<i>os49</i>	0.1418	0.1015	0.5352	-0.1220	0.2978	-0.0303	0.1019	0.5477
<i>os51</i>	0.0146	0.0895	0.5870	-0.1061	0.1383	0.1780	0.2468	0.3938
<i>os53</i>	0.3738	0.1164	0.2455	-0.0879	0.1461	0.3261	0.2417	0.4304
<i>os54</i>	0.1438	0.2072	0.3873	-0.0942	0.2782	-0.0170	0.1912	0.4424
<i>is56</i>	0.2863	0.0599	0.2889	-0.2152	0.3647	0.1022	0.2090	0.3084
<i>is58</i>	0.1058	0.1001	0.3055	-0.0558	0.1936	0.3046	0.4678	0.3855
<i>is60</i>	0.0348	-0.0287	0.3826	-0.0610	0.0798	-0.0869	0.1792	0.3173
<i>is62</i>	0.0737	0.0109	0.4095	-0.1052	0.2291	0.0112	0.1855	0.4695
<i>is64</i>	0.1679	0.0768	0.5458	-0.0847	0.2450	0.1144	0.2456	0.5052
<i>is66</i>	0.0493	0.1934	0.3420	-0.0417	0.1319	0.1280	0.0241	0.3121
<i>is68</i>	-0.0200	0.0713	0.2675	0.0518	0.0972	0.1818	0.1243	0.3750
<i>is70</i>	0.1276	0.4026	0.3342	-0.0475	0.1222	0.0927	0.4045	0.3131
<i>is72</i>	0.0911	0.2175	0.0335	0.2442	-0.1276	-0.0584	0.0010	-0.0718
<i>is73</i>	0.0084	-0.0157	0.3517	0.0756	0.0458	0.0028	0.1272	0.3129
<i>is75</i>	0.1262	-0.0125	0.5437	-0.0696	0.1932	0.0718	0.2165	0.5647
<i>is77</i>	0.1187	0.1141	0.4952	0.0071	0.1462	0.0618	0.2803	0.5535
<i>is81</i>	0.0746	0.1117	0.3716	0.0228	0.0428	0.0742	0.3336	0.4257
<i>idx83</i>	0.2362	0.1303	0.4145	0.0053	0.1837	0.0722	0.4466	0.5554
<i>idx84</i>	0.1215	0.0395	0.1648	-0.1546	0.1901	0.1972	0.3118	0.2080
<i>idx87</i>	0.1884	0.2842	0.3253	0.0703	-0.0235	0.1475	0.3180	0.5601
<i>idx90</i>	0.1269	0.1042	0.2101	-0.0261	0.0271	0.0023	0.0758	0.3834
<i>idx92</i>	0.1509	0.1746	0.2457	-0.1315	0.2528	0.1233	0.0919	0.3795
<i>idx94</i>	0.1691	0.0939	0.2756	0.1326	0.0697	0.0968	0.3191	0.4069
<i>idx96</i>	0.1889	0.0213	0.3106	-0.0021	0.0681	0.0265	0.0956	0.5445
<i>idx97</i>	0.1161	0.3154	0.3594	-0.0283	0.1719	0.1230	0.1324	0.4973
<i>prs99</i>	0.1238	0.1962	0.3893	-0.1230	0.2157	0.0571	0.2092	0.5108
<i>prs101</i>	0.0673	0.1440	0.2456	-0.1427	0.1293	0.1125	0.1783	0.4894
<i>prs103</i>	0.0642	0.1727	0.2822	0.0534	-0.0607	0.0380	0.2691	0.3657
<i>prs105</i>	0.0625	0.0209	0.1474	-0.2009	0.0314	0.2203	0.1493	0.3604
<i>prs107</i>	0.1239	0.0062	0.2843	-0.1775	0.1987	0.1117	0.2007	0.4644
<i>prs109</i>	0.1893	0.1898	0.4676	-0.1406	0.3422	0.1842	0.3392	0.5197
<i>prs111</i>	0.1437	0.2041	0.3380	-0.0898	0.1893	0.2176	0.3348	0.5373

	<i>os49</i>	<i>os51</i>	<i>os53</i>	<i>os54</i>	<i>is56</i>	<i>is58</i>	<i>is60</i>	<i>is62</i>
<i>os49</i>	1.0000							
<i>os51</i>	0.4534	1.0000						
<i>os53</i>	0.3682	0.2171	1.0000					
<i>os54</i>	0.5205	0.3421	0.5205	1.0000				
<i>is56</i>	0.2073	0.3673	0.3468	0.2338	1.0000			
<i>is58</i>	0.3073	0.2812	0.1394	0.2249	0.2998	1.0000		
<i>is60</i>	0.4118	0.4673	0.0799	0.3724	0.1047	0.2948	1.0000	
<i>is62</i>	0.5183	0.4227	0.2399	0.4239	0.2841	0.3110	0.4985	1.0000
<i>is64</i>	0.5660	0.4387	0.3417	0.4965	0.2856	0.4420	0.4976	0.4811
<i>is66</i>	0.4424	0.3591	0.2164	0.2383	0.1512	0.2084	0.2735	0.2936
<i>is68</i>	0.2717	0.2561	0.0860	0.2024	0.1318	0.3162	0.1460	0.2978
<i>is70</i>	0.2695	0.3337	0.1074	0.4007	0.1902	0.3933	0.5624	0.3425
<i>is72</i>	0.1083	0.0957	0.0460	0.0403	0.1090	0.0259	0.1649	-0.0656
<i>is73</i>	0.3335	0.2729	0.1638	0.2304	-0.0068	0.1752	0.4342	0.1602
<i>is75</i>	0.4741	0.4707	0.2824	0.2794	0.2948	0.3373	0.3313	0.4672
<i>is77</i>	0.5802	0.3771	0.2777	0.4407	0.2728	0.4582	0.4082	0.5986
<i>is81</i>	0.2394	0.4138	0.1477	0.3887	0.2706	0.4496	0.6740	0.3508
<i>idx83</i>	0.3770	0.2626	0.2409	0.3506	0.3280	0.4911	0.5512	0.3241
<i>idx84</i>	0.1999	0.1994	0.1448	0.0442	0.1948	0.2256	0.2443	0.1156
<i>idx87</i>	0.2192	0.2867	0.2512	0.2324	0.3440	0.3456	0.3088	0.4100
<i>idx90</i>	0.2960	0.2359	0.0764	0.3270	0.1707	0.3617	0.4162	0.3915
<i>idx92</i>	0.3766	0.1252	0.2516	0.2320	0.2200	0.3064	0.1608	0.3467
<i>idx94</i>	0.3359	0.2211	0.0668	0.2331	0.1406	0.3266	0.4260	0.2725
<i>idx96</i>	0.3906	0.1797	0.1355	0.2635	0.3562	0.3889	0.3388	0.3552
<i>idx97</i>	0.3288	0.2579	0.2468	0.2797	0.3474	0.2448	0.2592	0.3192
<i>prs99</i>	0.4419	0.2987	0.2237	0.3726	0.3220	0.3952	0.4407	0.5088
<i>prs101</i>	0.2992	0.2694	0.1209	0.1751	0.3885	0.4147	0.3110	0.3507
<i>prs103</i>	0.1988	0.2319	0.0759	0.1717	0.2035	0.3391	0.4735	0.1609
<i>prs105</i>	0.2793	0.1859	0.0675	0.0837	0.0890	0.2601	0.2244	0.2976
<i>prs107</i>	0.4339	0.3162	0.2087	0.3844	0.2576	0.4758	0.3774	0.4797
<i>prs109</i>	0.4941	0.3691	0.2278	0.3698	0.3676	0.4534	0.3269	0.5070
<i>prs111</i>	0.3868	0.3454	0.2442	0.2795	0.3345	0.3837	0.3102	0.4895
	<i>is64</i>	<i>is66</i>	<i>is68</i>	<i>is70</i>	<i>is72</i>	<i>is73</i>	<i>is75</i>	<i>is77</i>
<i>is64</i>	1.0000							
<i>is66</i>	0.3935	1.0000						
<i>is68</i>	0.3708	0.4239	1.0000					
<i>is70</i>	0.4531	0.2435	0.1905	1.0000				
<i>is72</i>	0.0567	0.0706	0.0329	0.1536	1.0000			
<i>is73</i>	0.3031	-0.0265	0.0039	0.2444	0.1444	1.0000		
<i>is75</i>	0.5421	0.3666	0.3780	0.4106	-0.0604	0.1177	1.0000	
<i>is77</i>	0.6256	0.5080	0.4197	0.4277	-0.0313	0.1654	0.5829	1.0000
<i>is81</i>	0.4477	0.2786	0.1882	0.7014	0.1360	0.2546	0.4630	0.4824
<i>idx83</i>	0.4834	0.3547	0.2564	0.6512	0.1602	0.2795	0.4652	0.5201

<i>idx84</i>	0.1771	0.0195	-0.0757	0.2646	-0.0302	0.4642	0.1054	0.0453
<i>idx87</i>	0.3708	0.2776	0.4079	0.4621	-0.0076	0.0850	0.5242	0.4568
<i>idx90</i>	0.2778	0.2597	0.3000	0.3025	0.0515	0.0290	0.2763	0.3714
<i>idx92</i>	0.3472	0.4369	0.3188	0.2199	-0.0187	0.1348	0.2234	0.4310
<i>idx94</i>	0.4064	0.4252	0.3946	0.4399	0.1683	0.3129	0.2599	0.4812
<i>idx96</i>	0.3971	0.3284	0.3284	0.4164	0.1041	0.2367	0.3893	0.4261
<i>idx97</i>	0.3814	0.4211	0.2824	0.4667	0.1829	0.2557	0.3741	0.4121
<i>prs99</i>	0.5241	0.5158	0.3554	0.5159	-0.0332	0.0823	0.5575	0.6179
<i>prs101</i>	0.3711	0.3579	0.3328	0.3870	0.0543	0.0292	0.4113	0.4111
<i>prs103</i>	0.3875	0.3346	0.1885	0.5903	0.3198	0.3339	0.3147	0.3107
<i>prs105</i>	0.2150	0.4130	0.3088	0.1878	-0.0781	0.0000	0.2198	0.3545
<i>prs107</i>	0.5061	0.5562	0.4555	0.2927	-0.0179	0.0389	0.3559	0.5854
<i>prs109</i>	0.5235	0.4884	0.3935	0.4056	-0.0110	0.0491	0.5095	0.6029
<i>prs111</i>	0.4247	0.3238	0.3271	0.4326	-0.0526	0.1700	0.5029	0.5637
	<i>is81</i>	<i>idx83</i>	<i>idx84</i>	<i>idx87</i>	<i>idx90</i>	<i>idx92</i>	<i>idx94</i>	<i>idx96</i>
<i>is81</i>	1.0000							
<i>idx83</i>	0.5512	1.0000						
<i>idx84</i>	0.2443	0.1156	1.0000					
<i>idx87</i>	0.3088	0.4100	0.3708	1.0000				
<i>idx90</i>	0.4162	0.3915	0.2778	0.2597	1.0000			
<i>idx92</i>	0.1608	0.3467	0.3472	0.4369	0.3188	1.0000		
<i>idx94</i>	0.4260	0.2725	0.4064	0.4252	0.3946	0.4399	1.0000	
<i>idx96</i>	0.3388	0.3552	0.3971	0.3284	0.3284	0.4164	0.1041	1.0000
<i>idx97</i>	0.2592	0.3192	0.3814	0.4211	0.2824	0.4667	0.1829	0.2557
<i>prs99</i>	0.4407	0.5088	0.5241	0.5158	0.3554	0.5159	-0.0332	0.0823
<i>prs101</i>	0.3110	0.3507	0.3711	0.3579	0.3328	0.3870	0.0543	0.0292
<i>prs103</i>	0.4735	0.1609	0.3875	0.3346	0.1885	0.5903	0.3198	0.3339
<i>prs105</i>	0.2244	0.2976	0.2150	0.4130	0.3088	0.1878	-0.0781	0.0000
<i>prs107</i>	0.3774	0.4797	0.5061	0.5562	0.4555	0.2927	-0.0179	0.0389
<i>prs109</i>	0.3269	0.5070	0.5235	0.4884	0.3935	0.4056	-0.0110	0.0491
<i>prs111</i>	0.3102	0.4895	0.4247	0.3238	0.3271	0.4326	-0.0526	0.1700
	<i>idx97</i>	<i>prs99</i>	<i>prs101</i>	<i>prs103</i>	<i>prs105</i>	<i>prs107</i>	<i>prs109</i>	<i>prs111</i>
<i>idx97</i>	1.0000							
<i>prs99</i>	0.5623	1.0000						
<i>prs101</i>	0.5669	0.7252	1.0000					
<i>prs103</i>	0.6181	0.5036	0.5968	1.0000				
<i>prs105</i>	0.2865	0.3794	0.4066	0.2127	1.0000			
<i>prs107</i>	0.4112	0.5109	0.5222	0.3277	0.4934	1.0000		
<i>prs109</i>	0.3984	0.6279	0.5585	0.3030	0.4923	0.6027	1.0000	
<i>prs111</i>	0.4323	0.5736	0.5562	0.3601	0.3911	0.4767	0.6798	1.0000

*See items/variables labelling on Appendix xiii

Appendix xiv: Items labelling.

Item Name	Label
<i>gx32</i>	Agree on participation in preparation/development of TB Guideline (TBGui) influence Adherence to TB Guideline (IAtoTBGui
<i>gx34</i>	Agree on the good perception of the quality and validity of contents of TBGuiIAtoTBGui
<i>gx36</i>	Agree on the good perception that, adherence to TBGui has a greater advantage than the alternative solution of not adhere to TBGuiIAtoTBGui
<i>gx38</i>	Agree on the implementation complexity of TBGuiIAtoTBGui
<i>gx40</i>	Agree bundling, presentation, and assembling of TBGuiIAtoTBGui
<i>os44</i>	Agree on level of patient's needs and behaviour as the barrier(s) for HCP to adhere to TBGuiIAtoTBGui
<i>os45</i>	Agree to assist patient's needs and resources as the barrier(s) for HCP to adhere to TBGuiIAtoTBGui
<i>os47</i>	Agree on Healthcare facility (HCF) Communication and Networking with other HCF(s) or other external organization IAtoTBGui
<i>os49</i>	Agree to receive a good report(s) on adherence to TBGui from other HCF(s) IAtoTBGui
<i>os51</i>	Agree on regulation(s) from Government or other central entity(ies) on adherence to TBGuiIAtoTBGui
<i>os53</i>	Agree HCP receiving incentives (e.g. P4P) on adherence to TBGuiIAtoTBGui
<i>os54</i>	Agree receiving benchmark/public report(s) as the strategy(ies) to spread adherence to TBGuiIAtoTBGui
<i>is56</i>	Agree HCF's social architecture (interaction), age, maturity or the size on adherence to TBGuiIAtoTBGui
<i>is58</i>	Agree on social good communications and networks both formal and informal between staffs at HCF on adherence to TBGuiIAtoTBGui
<i>is60</i>	Agree to embrace good norms/values and basic assumptions by HCF on adherence to TBGuiIAtoTBGui

<i>is62</i>	Agree to perceive the current situation (i.e. miss-diagnosis feedback due to not adhere to TBGui) is intolerable/need a change at HCF IAtotBGui
<i>is64</i>	Agree on adherence to TBGui which not interferes but fit with your norms, values or not risky daily workflow and system at HCF IAtotBGui
<i>is66</i>	Agree on good perception of relative priority (importance) on adherence to TBGui at HCF IAtotBGui
<i>is68</i>	Agree HCF receiving goal-sharing awards, performance review, promotion, raise in salaries and/or get the respect due to good adherence to TBGuiIAtotBGui
<i>is70</i>	Agree to communicate goals to staffs, receiving feedback and discuss goals on adherence to TBGui with the leader(s) at HCF IAtotBGui
<i>is72</i>	Agree leader(s) express fallibility on adherence to TBGui and ask for assistance and input from team member IAtotBGui"
<i>is73</i>	Agree motivating team members to feel that they are essential, valued and knowledgeable partners on adherence to TBGuiIAtotBGui
<i>is75</i>	Agree leader's commitment, involvement and accountability on adherence to TBGuiIAtotBGui
<i>is77</i>	Agree on enough resource (e.g. money, physical space, time and training) at HCF dedicated on adherence to TBGuiIAtotBGui
<i>is81</i>	Agree on ease accessibility of digested information and knowledge about adherence to TBGuiIAtotBGui
<i>idx83</i>	Agree HCP's knowledge and belief on the facts, truth and principles on adherence/use of TBGuiIAtotBGui
<i>idx84</i>	Agree HCP's education/skill level on adherence/use of TBGuiIAtotBGui
<i>idx87</i>	Agree HCP's familiarity with TBGuiIAtotBGui
<i>idx90</i>	Agree HCP's experience to use/adhere to TBGuiIAtotBGui
<i>idx92</i>	Agree HCP's capability to execute and use TBGuiIAtotBGui
<i>idx94</i>	Agree HCP's stage of change toward skilled, enthusiastic, and sustained to use TBGuiIAtotBGui
<i>idx96</i>	Agree HCP's perception toward HCF, his relationship and degree of commitment with HCF on adherence to TBGuiIAtotBGui

<i>idx97</i>	Agree on HCP traits such tolerance of ambiguity, intellectual ability, motivation, values, competence, capacity, and learning style on adherence to TBGuiIAtoTBGui
<i>prs99</i>	Agree good and quality method(s)or/and scheme(s) planned/developed in advance on adherence to TBGuiIAtoTBGui
<i>prs101</i>	Agree that having opinion leader at your healthcare facility who attracts you to adhere to TBGuiIAtoTBGui
<i>prs103</i>	Agree a formally appointed coordinator, project manager, team leader or anyone with a similar role of responsibility promote adherence to TBGuiIAtoTBGui
<i>prs105</i>	Agree dedicated person/champion who is supporting, marketing, and 'drive through' adherence to TBGui as well as to overcoming indifference or resistance on adherence to TBGuiIAtoTBGui
<i>prs107</i>	Agree external person/agent affiliated with an external entity who formally influences or facilitate use/adherence to TBGuiIAtoTBGui
<i>prs109</i>	Agree caring/accomplish/executing TB care implementation according to plan particularly on adherence to TBGuiIAtoTBGui
<i>prs111</i>	Agree to receive both quantitative and qualitative feedback about progress and quality of adherence to TBGui accompanied with regular personal and team debriefing about progress and experience on adherence to TBGuiIAtoTBGui
<i>freq</i>	Frequency construct of Implementation Fidelity
<i>coverage</i>	Coverage construct of Implementation Fidelity
<i>contents</i>	Details of contents construct of Implementation Fidelity
<i>Ds</i>	Latent construct for Dose component of fidelity
<i>Gx</i>	Latent construct for Guideline Characteristics
<i>Os</i>	Latent construct for Outer Settings
<i>Is</i>	Latent construct for Inner Settings
<i>Idx</i>	Latent construct for Individual Characteristics
<i>Prs</i>	Latent construct for Process/Strategies
<i>Fi</i>	Latent item for Fidelity

Appendix xv: Codebook.

CODE	DECISION RULE
1. GUIDELINE'S CHARACTERISTICS	
Nature and Sources of the guidelines	<i>Nature, sources and quality/strength of evidence of TB guidelines/intervention.</i>
Healthcare provider's contributions and perceptions to TB guidelines.	
- Healthcare provider's contributions	<i>TB guidelines/intervention developed after healthcare providers' inputs and participation during designing phase to fit local context.</i>
- Healthcare provider's perception of TB guidelines	<i>TB guidelines/intervention's importance perceived by healthcare providers.</i>
Simplicity and Effectiveness of TB guidelines.	
- Simplicity guidelines	<i>TB TB guidelines/intervention perceived ease to implement and reflected by duration, scope, and number of steps required by healthcare providers to adhere.</i>

- Effectiveness of TB guidelines *Perceived that TB guidelines/intervention are effective and supportive to assist accurately TB case management as healthcare providers adhere to them/it*

Size, Bundle, and Package of

TB guidelines.

- Size of TB guidelines. *Size and portability of TB guidelines/manual*
- Bundle and Package of TB guidelines. *Bundle, package, appearance and shape of TB guidelines/manual.*

Quality and Design of TB guidelines *Quality and design of TB guidelines' contents and materials i.e. font size, colour, tables, flow charts, diagrams etc.*

2. OUTER SETTINGS

Patient's characteristics.

- Comorbidities and severity of medical conditions *Patient who are co-infected with other medical condition(s) such as HIV/AIDS and /or very severe ill with TB infection.*
- Patient's Socio-Economic Status (SES). *Patient's financial issues and socio-economical background leading to low or high healthcare facility utilization*

- Patient's attitude and cooperation *Patient's cooperation, behaviour/attitude, and/or practices that influence/motivate healthcare provider to adhere to TB guidelines/intervention.*
- Patient's awareness, prior knowledge, and information *Patient's familiarity, prior knowledge and information about TB infection and management together with/or patient's level of formal schooling/education*

Communication and Cooperation between facilities

- Sharing of ideas and experience between facilities *Networking and sharing of ideas and experience particularly TB guidelines/intervention between facilities.*
- Sharing of expertise and resources between facilities *Collaboration and sharing of expertise, skills and resources such as TB test reagents, send samples to other facility for testing and/or asking expert e.g. radiologist to interpret X-ray image between facilities.*

- Supportive supervision *TB management supportive supervision to low-level facilities and technical assistance from high-level to low-level facilities i.e. National TB technical team provide regular technical support and supervision to regional hospital.*

Facility's recognition and reward *Healthcare facility's recognition and reward after a good performance on patients' management especially on adherence to TB guidelines/intervention.*

External policies and guidance *External strategies (from government or other central entity) spread to implement good adherence to TB guidelines/intervention. These include TB management policies, guidance, external mandates and recommendations.*

Peer pressure

- Role model facility(ies) *Mimetic pressure from other healthcare facility(ies) which has/have good TB management outcomes and implementing TB guidelines/intervention with fidelity.*

- Good reports from other facilities *Competitive public and/or benchmark TB reports as well as reports from other key healthcare facilities/peers.*

3. INNER SETTINGS

Size and level of healthcare facility *Social and physical architecture as well as professionalism and competence level of healthcare facility on implementing and adhering to TB guidelines/intervention.*

In-house skill-building capacity

- Peer support and coaching *skill-building capacity between stuffs/peers within healthcare facility whereby senior/ experienced stuffs support and coach junior ones to promote adherence to TB guidelines/intervention.*
- In-house training *skill-building capacity whereby training, and workshops/seminars are conducted within healthcare facility to promote adherence to TB guideline/intervention.*

Performing internal review/ feedback *Internal reviewing of TB management reports and performance within healthcare facility*

Networking Communication	and	<i>Nature and quality social networks, formal and informal communication within healthcare facility.</i>
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Organizational culture	<i>Norms, values, customs, morals and basic assumptions/ideals of a given healthcare facility.</i>
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Intervention coherence

- | | |
|---|--|
| - Interfere/ease integrate with routine | <i>Interference or how ease to integrate TB
management/intervention with normal
routine/system e.g. outpatient clinics and
still adhere to TB guidelines</i> |
| - Many patients and/or lots of works | <i>Number of patients and workload which
interfere adherence to TB
guidelines/intervention</i> |
-

4. HEALTHCARE

PROVIDER'S

CHARACTERISTICS

Healthcare provider's Level of education, Knowledge, and Belief	<i>Healthcare provider' level of education and knowledge as well as belief and attitudes toward and value placed on the adherence to TB guidelines/intervention</i>
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*as well as familiarity with facts, truths,
and principles related to the intervention*

Healthcare provider's

willingness and readiness:

- Healthcare provider's individual efforts. *Healthcare provider's individual efforts and commitment to implement intervention/adherence to TB guidelines e.g. sense of being responsible and/or working for the betterment of others*
- Healthcare provider's willingness to change *The extent to which healthcare provider perceive the current situation (not adhere to TB guideline) as intolerable or needing change to progress toward skilled, enthusiastic and sustained use of the intervention.*
- Healthcare provider's learning habit/behaviour *Healthcare provider's learning habit/behaviour related to how eager the provider want to read and learn to be competent on the field.*
- Healthcare provider's self-efficacy and experiences *Healthcare provider's individual belief in her/his own capabilities to implement adherence to TB guidelines/intervention.*

**Healthcare provider's
motivation, recognition, and
identification.**

- Financial rewards *Incentive and rewards which are in fiscal/monetary form and given directly to healthcare provider after satisfactory performance particularly due to good adherence to TB guidelines/intervention e.g. Promotion, Pay-for-Performance and raises in salary.*
- Non-financial rewards *Incentive and rewards which are less tangible such as respect, given a certificate of appreciation, and given directly to healthcare provider after satisfactory performance particularly due to good adherence to TB guidelines/intervention*

**5. PROCESS FOR
IMPLEMENTATION**

Planning

- Implementation strategies *Plan of action developed in advance for implementing adherence to TB guidelines/intervention*

- Implementation policies *Principles of action developed in advance for implementing adherence to TB guidelines/intervention*

Engaging

- Internal change agents
- Opinion leaders *Individuals in healthcare facility who have formal or informal engaging and influence on the attitudes and beliefs of their colleagues with respect to implementing adherence to TB guidelines/intervention*
- Internal implementation Leaders *Individuals in healthcare facility who have formal or informal appointed as coordinator, project managers, team leader, or other similar role with responsibility for implementing adherence to TB guidelines/intervention*
- Champions *Individuals who dedicate themselves to supporting, marketing, and ‘driving through’ an implementation of TB guidelines/intervention and overcoming indifference or resistance that the adherence to TB*

guidelines/intervention may provoke in a healthcare facility.

- External change agents *Individuals who are affiliated with an outside entity who formally influence or facilitate adherence to TB guidelines/intervention in a desirable direction*

Execution

- Partner's and Monetary and non-monetary supports
Government's support *received from partners/donors and government which facilitating adherence to TB guidelines/intervention.*
- Mentorship and Attending conference outside workplace
Workshops *for discussion or be attached with experts who are more experienced on topic especially on adherence to TB guidelines/intervention*
- Meetings *Carrying out meetings within healthcare facility for sharing information, status update, decision making, innovation, team building and/or solving problems related to adherence to TB guidelines/intervention*

- Reminders e.g. wall charts, computer pop text etc *Tools which assist healthcare providers to remind to adhere to TB guidelines/intervention*

Reflecting and Evaluation

- Monitoring and Evaluation(M&E) *Feedback about the progress and quality of adherence of TB guidelines/intervention accompanied with regular personal and team debriefing about progress and experience.*
 - Supervisions *Overseeing, guiding, motivating, inspecting and reviewing healthcare providers' performance particularly adherence to TB guidelines/intervention.*
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Appendix xvi: Integrated Results Matrix, a Joint Display.

	Themes: Sub-themes and Supporting Quotation from IDS
Stakeholders' involvement, willingness and readiness to adhere to TB guidelines/intervention.	(i) Healthcare provider's willingness and readiness - (a) healthcare provider's individual efforts. (HPx) <u>Supporting quotation:</u> <i>Personal behaviour for someone to adhere to the guideline. First, it is someone's effort and readiness. But the other one is a reading habit since the guideline is big if one does not have that habit, it will be difficult to go through the guideline (Participant # 1. Male, Diploma, Health Center, Government).</i> - (b) healthcare provider's willingness to change. (HPx) <u>Supporting quotation:</u> <i>Because, if I am in stage of change, for instance, I attended three patients then I see my weakness to adhere to guideline, and because, I am willing to change, therefore when I will be attending the 9th patient, I will be better compared to the 1st three patients I attended from the start, Yes (Participant # 8. Female, Diploma, Dispensary, Government).</i>
	(ii) Internal change agents

	- (a) Internal implementation leader engagement. (PI) <u>Supporting quotation:</u> <i>The one we call TB focal person and is the one who passes to check and insist providers to screen patients. He solves our challenges and sometimes he reports to the higher authority if we encounter any challenge (Participant # 6. Male, Degree, Hospital, Government).</i> - (b) Champion engagement. (PI) <u>Supporting quotation:</u> <i>I am new here but one of the co-workers, who was working here got a reward for adhering to the guideline as required last month (Participant # 8. Female, Diploma, Dispensary, Government).</i> (iii) External change agents. (PI). <u>Supporting quotation:</u> <i>It is because he comes like an external auditor, an external supervisor who look at what we are doing. He assesses the guideline, he is the one who selected to supervise our facility. He helps us identify gaps more than the internal TB in-charge. Those gaps sometimes are very difficult even for our leaders to identify them, then from there we do QI and we move on (Participant # 1. Male, Diploma, Health Center, Government).</i>
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	(iv) Government and partners support/funds to execute the program. (PI) <u>Supporting quotation:</u> <i>Internally there is a regular follow-up but I can say there are people coming to do some interview in the sense of knowing whether the procedures are followed/ guideline is adhered or not, so one may come, persons from the Councils or the NGOs that support TB matters wanting to know, do we adhere to the guideline as required or not (Participant # 5. Male, Degree, Hospital, Private).</i>
Facilitations and Strategies to adhere to TB guidelines/intervention.	(i) Healthcare provider's perceptions and contributions to the guideline's preparation. - (a) Healthcare provider's contributions to the guideline's preparation. (HPx) <u>Supporting quotation:</u> <i>So, you may find that, if a healthcare provider gets a chance to participate in the preparation of guidelines, particularly TB guidelines. It means that it will simple for them to air out their opinions or shortcoming of the guidelines. For examples that</i>

	<i>children's algorithm, it has some challenges (Participant # 1. Male, Diploma, Health Center, Government).</i> - (b)Healthcare provider's perception of TB guidelines. (HPx) <u>Supporting quotation:</u> <i>TB Guideline is the guide or a book which guide TB management. It is a good guide; it shows and directs any provider aaah on how to diagnose TB. it instructs investigations that are recommended for the treatment of TB to the kids and adults in general (Participant # 1. Male, Diploma, Health Center, Government).</i> (ii) Peer pressure - (a) Good report from other facilities. (OS) <u>Supported quotation:</u> <i>Because we know others what they are doing, we do share reports if there any challenge which needs improvement, so it is very important and helpful to share reports about the adherence (Participant # 2. Female, Advance Diploma, Dispensary, Government).</i> - (b) Role model facility. (OS). <u>Supporting quotation:</u>
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	<i>Mhhhh it influences because through reports we will get more information about other health facilities, the number of TB patients they have attended, success and challenges they have faced while diagnosing TB patients (Participant # 4. Male, Diploma, Health Center, Government).</i> (iii) Plans and Implementation policies. (PI) <u>Supporting quotation:</u> <i>The policy is there for its purpose but there must be some sort of monitoring. Now, if monitoring exists, then the service provider will have to adhere, because of the regular monitoring (Participant # 5. Male, Degree, Hospital, Private).</i> (iv) Performing internal feedback/review. <u>Supporting quotation:</u> <i>We receive reports from each department, and we see which one is behind, does not do well. From the report, staffs from those departments which perform poorly always feel bad but this in another way to encourage them to improve and do better next time (Participant # 1. Male, Diploma, Health Center, Government).</i> (v) Execution
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	- (a) Mentorship and workshop s execute the adherence to TB guidelines/intervention. (PI) <u>Supporting quotation:</u> <i>Eee, we do training, mentorships which help us to remember how to identify the symptoms of Tuberculosis. For example, in the old guidelines were discovered that in children to use what we call algorithm, it was difficult, since children don't produce sputum. Therefore, nowadays we use this step chart, we call a paediatric step chart to diagnose children with TB. So, we have different charts for the diagnosis of TB (Participant # 10. Female, Advance Diploma, Hospital, Government).</i> - (b) Meetings to execute the adherence to TB guidelines/intervention. (PI) <u>Supporting quotation:</u> <i>We do have our own weekly program whereby we have a session of questions and answers if something is forgotten we refer to the guidelines and more explanations are provided to both Nurses and Doctors (Participant # 9. Female, Diploma, Dispensary, Private).</i>
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	- (c) Reminders e.g. wall charts, computer pop text etc to execute the adherence to TB guidelines/intervention. (PI) <u>Supporting quotation:</u> <i>At the time when there is no patient, you can go through the chart on the wall and revisit the steps hence making it easier to remember (Participant # 4. Male, Diploma, Health Center, Government).</i> (vi) Reflecting and Evaluation - (a) Monitoring and Evaluation. (PI) <u>Supporting quotation:</u> <i>The policy is there for its purpose but there must be some sort of monitoring. Now if monitoring exists, then the service provider will have to adhere, because of the regular monitoring (Participant # 5. Male, Degree, Hospital, Private).</i> - (b) Supervisions.(PI) <u>Supporting quotation:</u> <i>Policies But for policies to be implemented as intended, strong follow up and supervision is needed. By not doing that you can't</i>
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	<i>be assured that providers adhere to them (Participant #8. Female, Diploma, Dispensary, Government).</i>
Knowledge/information sharing and Goals' communication.	(i) Healthcare provider's Level of education, Knowledge, and Belief. (HPx) <u>Supporting quotation:</u> (ii) Communication and Cooperation between facilities. - (a) Sharing of ideas and experience between facilities. (OS) <u>Supporting quotation:</u> <i>We normally remind each other on adherence to TB guidelines whenever we meet with other facilities in different meetings on new treatment guidelines or TB treatment, this is one way we use to improve services and keep track our TB clients (Participant # 11. Male, Diploma, Dispensary, Government).</i> - (b) Sharing of expertise and resources. (OS) <u>Supporting quotation:</u> <i>There is investigation called GeneXpert since it is not available here, we are forced to send the samples to the nearest hospital in</i>

	<i>which it takes more than two days for the results to come out (Participant # 4. Male, Diploma, Health Center, Government).</i> (iii) Supportive supervision in low-level facilities. (OS) <u>Supporting quotation:</u> <i>You know we have other small facilities may be when a patient went to those facilities and then they may fail to manage because it is new to them or they are not sure, they call us to ask on how to handle those kinds of patients (Participant # 2. Female, Advance Diploma, Dispensary, Government).</i> (iv) In-house skill-building capacity. - (a) Peer support/coaching and information sharing. (IS) <u>Supporting quotation:</u> <i>Through discussion, many issues can be addressed and shared, this includes challenges whereby another healthcare provider can give advice to others on how they have overcome the same challenges (Participant # 4. Male, Diploma, Health Center, Government).</i> - (b) In-house training. (IS) <u>Supporting quotation:</u> <i>And those training even on-job training, training at the workplace, a provider can teach or explain matters to one another then</i>
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	updating each other (Participant # 1. Male, Diploma, Health Center, Government).
Client/patients' characteristics.	(i) Comorbidities and/or severity of the patient's medical conditions. (OS) <u>Supporting quotation:</u> <i>Sometimes you find that patient's condition is so bad then, you fail to adhere to guideline instead you first do ABC emergency protocol. If he/she was referred to our facility we can't admit her/him, so we need to re-refer the patient to the high level, you don't even bother about patient's TB symptoms even if you have noticed them, so you end up not adhering to the guidelines? (Participant # 2. Female, Advance Diploma, Dispensary, Government).</i> (ii) Patient's Socio-Economic Status (SES). (OS) <u>Supporting quotation:</u> <i>For example, you order sputum investigation, you order x-ray but the patient delay to take investigation because he/she can't afford</i>

	to pay, so that is a challenge (Participant # 9. Female, Diploma, Dispensary, Private). (iii) Patient's attitude and cooperation. (OS) <u>Supporting quotation:</u> <i>Also, many clinicians don't adhere to the guideline because they order investigation what the patients want to be ordered, they are influenced by patient decision. So, we need to counsel our patients that, they must start with sputum examinations then when results are negative, they can take the x-ray. Most of TB infection can be detected in sputum (Participant # 6. Male, Degree, Hospital, Government).</i> (iv) Patient's awareness, prior knowledge, and information. (OS) <u>Supporting quotation:</u> <i>It helps the providers at the facility to follow the guidelines because you find patients coming from facility X to facility Y with the information that at our centre s/he can get good service in terms of performing TB tests. So, our efforts spread the good news to other areas that we perform our duties efficiently with deadlines (Participant # 2. Female, Advance Diploma, Dispensary, Government).</i>
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Note:(HPx)- *Theme/sub-theme from Healthcare Provider Characteristic Determinant.*

(IS)- *Theme/sub-theme from Inner Setting Determinant.*

(OS)- *Theme/sub-theme from Outer Setting Determinant.*

(Gx)- *Theme/sub-theme from Guideline Characteristics Determinant.*

(PI)- *Theme/sub-theme from Process for Implementation Determinant.*



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NIMR/HQ/R.8a/Vol. IX/2781

15 May 2018

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P.O. Box 72868
Dar es Salaam

RE: ETHICAL CLEARANCE CERTIFICATE FOR CONDUCTING MEDICAL RESEARCH IN TANZANIA

This is to certify that the research entitled: Examining fidelity of health care providers to tuberculosis (TB) diagnosis in Tanzania (Msola V *et al.*) whose local supervisor is Dr. Daniel Nyogea of I-TECH has been granted ethical clearance to be conducted in Tanzania.

The Principal Investigator of the study must ensure that the following conditions are fulfilled:

1. Progress report is submitted to the Ministry of Health, Community Development, Gender, Elderly & Children and the National Institute for Medical Research, Regional and District Medical Officers after every six months.
2. Permission to publish the results is obtained from National Institute for Medical Research.
3. Copies of final publications are made available to the Ministry of Health, Community Development, Gender, Elderly & Children and the National Institute for Medical Research.
4. Any researcher, who contravenes or fails to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine as per NIMR Act No. 23 of 1979, PART III Section 10(2).
5. Site: Dar es Salaam.

Approval is valid for one year: 15th May 2018 to 14th May 2019.

Name: Prof. Yunus Daud Mgaya

Name: Prof. Muhammad Bakari Kambi

Signature
CHAIRPERSON
MEDICAL RESEARCH
COORDINATING COMMITTEE

Signature
CHIEF MEDICAL OFFICER
MINISTRY OF HEALTH, COMMUNITY
DEVELOPMENT, GENDER, ELDERLY &
CHILDREN

CC: RMO of Dar es Salaam.
DMOs/DEDs of Ubungu

UNIVERSITY OF THE
WITWATERSRAND
JOHANNESBURG



R14/49 Dr Vangilisasi Msola

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M180139

NAME: Dr Vangilisasi Msola
(Principal Investigator)
DEPARTMENT: Epidemiology and Biostatistics
Ubongo, Dar es Salaam, Tanzania

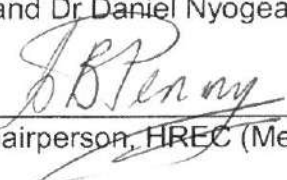
PROJECT TITLE: Examining Fidelity of Health Care Providers to
Tuberculosis (TB) Diagnosis Guidelines in Tanzania

DATE CONSIDERED: 26/01/2018

DECISION: Approved unconditionally

CONDITIONS: Only Phase 1 Approved

SUPERVISOR: Dr Sumaya Mall and Dr Daniel Nyogea

APPROVED BY: 
Prof C Penny, Chairperson, HREC (Medical)

DATE OF APPROVAL: 06/07/2018

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary in Room 301, Third floor, Faculty of Health Sciences, Phillip Tobias Building, 29 Princess of Wales Terrace, Parktown, 2193, University of the Witwatersrand. 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 resubmit the application to the Committee. **I agree to submit a yearly progress report.** The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. In this case, the study was initially reviewed in January and will therefore be due in the month of January each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

Principal Investigator Signature

Date

PLEASE QUOTE THE PROTOCOL NUMBER IN ALL ENQUIRIES



R14/49 Dr Vangilisasi Msola

HUMAN RESEARCH ETHICS COMMITTEE (MEDICAL)

CLEARANCE CERTIFICATE NO. M180139

NAME: Dr Vangilisasi Msola
(Principal Investigator)
DEPARTMENT: Epidemiology and Biostatistics
Ubongo District, Tanzania;
Dar es Salaam, Tanzania

PROJECT TITLE: Examining Fidelity of Health Care Providers to
Tuberculosis (TB) Diagnosis Guidelines in Tanzania

DATE CONSIDERED: 26/01/2018

DECISION: Approved Unconditionally

CONDITIONS:

SUPERVISOR: Dr Sumaya Mall and Dr Daniel Nyogea

APPROVED BY: 
Professor CB Penny, Chairperson, HREC (Medical)

DATE OF APPROVAL: 03/08/2018

This clearance certificate is valid for 5 years from date of approval. Extension may be applied for.

DECLARATION OF INVESTIGATORS

To be completed in duplicate and **ONE COPY** returned to the Research Office Secretary on the Third Floor, Faculty of Health Sciences, Phillip Tobias Building, 29 Princess of Wales Terrace, Parktown, 2193, University of the Witwatersrand. 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 resubmit the application to the Committee. **I agree to submit a yearly progress report.** The date for annual re-certification will be one year after the date of convened meeting where the study was initially reviewed. In this case, the study was initially reviewed in **January** and will therefore be due in the month of **January** each year. Unreported changes to the application may invalidate the clearance given by the HREC (Medical).

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