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**BELIEFS AND ATTITUDES ABOUT TUBERCULOSIS CAUSATION AND
TREATMENT IN AFRICA: A SYSTEMATIC REVIEW.**

Carinne Annfred Lorraine Petersen

Keywords

Beliefs

Attitudes

Africa

Tuberculosis

HIV/AIDS

Tuberculosis causation OR transmission

Treatment adherence

Treatment default

Knowledge

Vulnerability to tuberculosis



Acronyms and Abbreviations

APA: American Psychological Association

ART: Anti-retroviral treatment

BCG: Bacillus Calmette–Guérin vaccine

BMREC: Biomedical Research Ethics Committee

CPCA: Categorical Principal Component analysis

CPT: Cape Town

DOT: Directly Observed Therapy

DR-TB: drug-resistant TB

FGD: Focus Group Discussions

HBM: Health Belief Model

HCPs: Health Care Providers

HCs: Health Centers

HIV/AIDS: Human Immunodeficiency Virus and Acquired Immunodeficiency Syndrome

LTBI: Latent Tuberculosis Infection

MA Psychology: Masters of Arts in Psychology (Postgraduate degree)

MDR-TB: Multi-drug resistant tuberculosis

MTB: Mycobacterium tuberculosis

PHC: Primary Health Care

PIO: Population, Intervention and Outcome (Tawfik et al., 2019)

PRISMA: Preferred Reporting Items for Systematic reviews and Meta-analyses

PTB: Pulmonary tuberculosis



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RCT: Randomised Control Trial

SD: Standard Deviation

SEM: Structural Equation Modelling

SR: Systematic review

TB: Tuberculosis

TBL: tuberculosis lymphadenitis

UN: United Nations

UWC: University of the Western Cape

WHO: World Health Organisation



Terms and Definitions

Attitudes may be defined as a direct determinant of behaviour. It represents the intention behind the action, as well as a person's subjective norms associated with the behaviour. The situation is taken into account when an individual has a belief about something. They evaluate the behavioural outcome and intentionally perform behaviours to create a social reality, or attitude about that phenomenon (Glanz, Rimer & Viswanath, 2008).

Beliefs about Tuberculosis (TB) may be associated with the Health Belief Model (HBM). There are four constructs within this model, namely: (a) perceived susceptibility, (b) perceived severity, (c) perceived benefits, and (d) perceived barriers of the illness (Glanz et al., 2008). These constructs are linked to the beliefs about the (a) probability or risk of contracting TB; (b) the seriousness of TB and its consequences; (c) the effectiveness of the medication or treatment used to reduce risks or the seriousness of its impact; and (d) the physical and psychological costs of taking treatment or medication (Glanz et al., 2008).

Tuberculosis (TB) refers to an ancient airborne illness that is caused by bacillus Mycobacterium TB (MTB) (World Health Organization [WHO], 2017). It is transmitted when people with active MTB release droplets of bacteria in the air through coughs, sneezes and/or sputum (WHO, 2018).

Causation refers to the causes, aetiology and/or probability of what leads to or predisposes an individual to contracting or developing the TB disease (WHO, 2018).

Treatment refers to a vaccine, treatment regimes, or medication that is used to reduce the risk of the TB infection. The medication, intervention or new treatment regimens is used primarily for preventing and/or curing the active MTB bacteria so that it becomes dormant, non-communicable or no longer active when the duration of medication was taken as prescribed (WHO, 2018).

Africa is the second largest continent that hosts the majority of developing countries that endures severe cases of tuberculosis accelerated by Human Immunodeficiency Virus and Acquired Immunodeficiency Syndrome (HIV/AIDS).

Abstract

Tuberculosis continues to affect a third of the world's population annually. Globally, Africa constitutes more than 25% of tuberculosis-related deaths. The high incidence of HIV/AIDS in Africa is associated with the severe tuberculosis fatality figures. The aim of this study was to systematically review literature with methodological rigour on people's beliefs and attitudes regarding tuberculosis causation and treatment in Africa. Ethical approval was obtained from the Biomedical Research Ethics Committee at the University of the Western Cape (Reference: BM19/5/1). A systematic search was conducted from the months of June 2019 to September 2019 and March 2020 to April 2020 as part of the initial data collection phase and the verification process, respectively. Index keywords were divided into two phases to identify literature on both the beliefs and attitudes (Phase 1: $N = 5$; Phase 2: $N = 19$, respectively) on the topic. Included studies were peer-reviewed, published from the year 2009 to 2019, and had either qualitative or quantitative methodologies. A database search and reference mining retrieved eligible studies ($N = 9$) from four databases, namely: (1) Biomed Central, (2) Ebscohost academic search complete, (3) Springerlink; and (4) Pubmed/Medline. Each study achieved a strong to excellent methodological rigor ($N = +70\%$). The Health Belief Model was used to conceptualise key concepts for this topic. Findings revealed that the beliefs and attitudes regarding tuberculosis causation and treatment in Africa were driven by sociodemographic factors. Deep-rooted religious beliefs, societal and/or personal experiences were found to influence the outcomes of treatment initiation, adherence, non-adherence and/or default. Key results highlighted the effects of knowledge, attitudes and practices of patients, communities and health care providers' misconceptions of the tuberculosis disease; its transmission; and inconsistencies in the healthcare system. Patients disclosed experiences of stigma, isolation and inconsistent treatment regimens. The effectiveness of the biomedical TB treatment regimens and treatment offered by traditional healers were also questionable. In conclusion, negative and positive attitudes toward tuberculosis and treatment may affect people's health-seeking behaviour, motive of gaining knowledge, and receiving treatment from hospitals or traditional healers. The significance of findings was to inform interventions and provide coherence on the topic.

Keywords: Africa, tuberculosis, TB causation or transmission, attitudes, beliefs, knowledge, vulnerability to TB, treatment adherence, treatment default, HIV/AIDS.

Declaration

I hereby declare that this research report titled, *Beliefs and attitudes about tuberculosis causation and treatment in Africa: A systematic review*, has not been submitted before to any university or institution. If any text from books, journals, thesis papers or any peer reviewed sources have been presented as my own, I take sole responsibility for my actions. All sources, as well as the written style of the paper have been cited and acknowledged according to the American Psychological Association (APA) seventh edition referencing style.

Signed on November 2020



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Acknowledgements

In 2013, I was diagnosed with multi-drug resistant tuberculosis (MDR-TB) and my world was turned upside down. I lacked knowledge about the illness. My family, friends, doctors and nurses helped me understand what TB was, and contributed to my passion to research more about the TB illness. While searching on the internet about the TB illness, stigma surrounding its association with HIV and its description as a “poor man’s illness” became unclear. I decided to gain more knowledge and coherence about TB, and developed a passion for health psychology with regards to overcoming communicable illnesses. This experience made me stronger, contributed to my willpower, as well as resilience to persevere even though I developed a mild hearing impairment due to the treatment’s drug toxicity. To date, my hearing has improved since 2015. I believe my experience can contribute to research and may save many lives by clarifying the misconception regarding TB illness and the treatment.

I come before God with a humble and grateful heart for strength and the people who played an important role in my personal and professional development. I extend my gratitude to the University of the Western Cape (UWC) for selecting me as a Master’s student to contribute to the body of research on this subject matter. I am grateful for the medical staff at Melomed hospital in Bellville and the Bellville South Clinic. I would like to acknowledge my mother (Azalia Petersen) and Wayne Anthony (Mom’s fiancé) and those who prayed and supported me. Your love and encouragement are appreciated and acknowledged. To my supervisor, I would like to thank you for trusting in my ability to communicate my ideas and for guiding me throughout the thesis writing process.

Table of Contents

Acronyms and Abbreviations	ii
Terms and Definitions.....	iv
Abstract	v
Declaration.....	vi
Acknowledgements.....	vii
CHAPTER ONE	1
1. Introduction.....	1
1.1 Background to the study	1
1.2 Problem statement to the study	3
1.3 Rationale to the study.....	3
1.4 Aims and objectives of the study	4
1.5 Chapter organisation	4
CHAPTER TWO	6
2. Literature review and conceptual framework	6
2.1 Literature review	6
2.1.1 The history of TB.....	6
2.1.2 Global overview of TB	7
2.1.3 Prevalence of TB.....	9
2.1.4 Symptoms, risk factors, types of TB and treatment.....	9
2.1.5 Beliefs about the causes of TB and the treatment.....	12
2.1.6 Attitudes about the causes of TB and the treatment	14
2.1.7 Commonly published literature on TB	14
2.2 Conceptual framework.....	15
2.2.1 The Health belief model in Africa’s landscape.....	15
CHAPTER THREE	18
3. Methodology	18
3.1 Aims and objective of the study.....	18
3.2 Review Questions	18
3.3 Research design of the study.....	18
3.4 Inclusion criteria of the study	19
3.5 Exclusion criteria	20
3.6 Search strategy	20
3.6.1 Operational step 1: Identification (Titles reading of studies)	20

Table 3.6.1a: Index Keywords for the database search	21
Table 3.6.1b: Filtering of primary, secondary, and recurrent databases	22
Table 3.6.1c: Initial search strategy results	22
Table 3.6.1d: Databases retrieving literature with methodological rigor on the topic	23
3.6.2 Operational step 2: Screening abstracts	23
3.6.3 Operational step 3: Eligibility of full-text studies	23
Table 3.6.3: Scoring grid for the critical appraisal tool	24
3.6.3.1. The appraisal tool and methodological appraisal process	24
3.6.4 Operational step 4: Reference mining	25
3.7. Method of review	25
3.8. Data extraction	26
3.9 Peer review process	26
3.10 Data synthesis	27
Table 3.10 The main elements of a narrative synthesis (Popay et al., 2016; Ryan, 2013)	28
3.11 Ethics	29
3.12 Conclusion	29
CHAPTER FOUR	31
4. Results	31
4.1 Process results	31
4.1.1 Identification	31
4.1.2 Screening abstracts	31
Table 4.1.2 Applying PIO criteria for abstract screening	32
4.1.3 Eligibility for Full-text studies	32
4.1.4 Reference mining	32
4.1.5 General description of the eligible studies	33
4.1.5.1 Eligible studies through the database search	35
i) Phase 1: Beliefs	35
ii) Phase 2: Attitudes	41
4.1.5.2 Eligible studies through reference mining	46
4.1.5.3 Conclusion for beliefs and attitudes about TB causation and treatment	48
4.2 Descriptive meta-synthesis	49
4.2.1. Ranking eligible studies	49
Table 4.2.1a: Ranked scores of full-text studies assessed for eligibility	49
4.2.2 Ranking based on the subsections within the appraisal tool	50

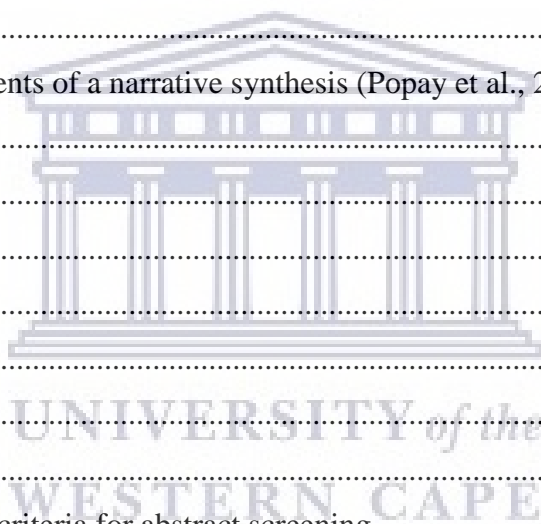


Table 4.2.2: Ranking of individual studies and their sub-scores	50
4.2.2.1. The Eight Main Items of the Critical Appraisal Tool	51
a) Purpose.....	51
b) Study Design.....	51
c) Ethics	52
d) Data Collection	52
e) Data Analysis.....	53
f) Sample.....	54
g) Results	54
h) Conclusion.....	55
4.2.3 Final summation of results.....	55
CHAPTER FIVE	56
5. The study's discussion and conclusion	56
5.1 Discussion of eligible studies.....	56
5.1.1 A context of TB	58
5.1.2 Beliefs about TB causation and treatment in Africa	59
5.1.3 Attitude about TB causation and treatment in Africa	61
5.1.4 Recommendation and implications for TB control.....	63
5.2 Overall conclusion for this study	65
5.2.1 Limitations during the systematic search and gaps in research	65
5.3 Conclusion, the significance of the results, and recommendations	66
5.4 Implications for research and practice	67
REFERENCES	68

Diagrams, Figures and Tables

Diagram 1: Risk factors for TB default and adherence.	11
Figure 1. The Health Belief Model framework	17
Figure 2. Search strategy flow diagram	20
Figure 3. Identification flow diagram	20
Figure 4. PRISMA systematic review template.....	28
Figure 5. PRISMA Systematic Review	33
Table 3.6.1a: Index Keywords for the database search	21
Table 3.6.1b: Filtering of primary, secondary, and recurrent databases.....	22
Table 3.6.1c: Initial search strategy results.....	22

Table 3.6.1d: Databases retrieving literature with methodological rigor on the topic	23
Table 3.6.3: Scoring grid for the critical appraisal tool	24
Table 3.10 The main elements of a narrative synthesis	28
Table 4.1.2 Applying PIO criteria for abstract screening	32
Table 4.2.1a: Ranked scores of full-text studies assessed for eligibility	49
Table 4.2.2: Ranking of individual studies and their sub-scores	50

Appendices

Appendix A.....	79
Appendix B.....	83
Appendix C.....	89
Appendix D.....	94
Appendix E.....	97
Appendix F.....	95
Appendix G.....	98
Appendix H.....	100
Appendix I.....	101



CHAPTER ONE

Chapter one consists of an introduction to provide a context for this topic. The introduction includes the background, problem statement, rationale, aims and objectives of the study, a conceptual framework, as well as the organisation of the chapters.

1. Introduction

1.1 Background to the study

The twenty-first century marks a critical era, whereby the social justice concern requires the coherence of people's beliefs and attitudes about tuberculosis (TB) causation and treatment in Africa (World Health Organisation [WHO], 2019). This informed the effectiveness and efficiency of health policies and its implementation to reduce the presence of the high mortality and morbidity figures regarding TB in the context of human immunodeficiency virus acquired immunodeficiency syndrome (HIV/AIDS) (United Nations [UN], 2019; WHO, 2019). A systematic review (SR) of existing literature was conducted to provide coherence on the beliefs and attitudes about TB causation and treatment in Africa.

Firstly, TB refers to an ancient airborne illness that is caused by bacillus *Mycobacterium TB* (MTB) (WHO, 2017). It is transmitted when people with active MTB release droplets of bacteria into the air through coughs, sneezes and/or sputum (Adane et al., 2017; Knutsen, 2010; Luba et al., 2019; Sima, Belachew, & Abebe, 2019; WHO, 2018). People with low immune systems have a five to 15% likelihood of developing TB after being exposed (WHO, 2017). Statistics showed that most at risk populations were identified in developing countries (WHO, 2017, 2018, 2019, 2020). Furthermore, chronic diseases and lifestyle choices also increased the chances of developing TB (WHO, 2018). The conditions identified to increase a person's risk include HIV/AIDS, diabetes, smoking, alcohol consumption, undernourishment, and malnutrition (Tola et al., 2016; WHO, 2017, 2018). While TB affects the respiratory organs, the quality of air and contact with TB patients increase one's vulnerability to contracting TB (Sullivan, Esmaili & Cunningham, 2017). Therefore, TB requires adequate surveillance, diagnoses, and treatment measures to prevent its transmission.

To date, TB is the ninth highest cause of global fatality accelerated by HIV/AIDS (Kakili, 2010; WHO, 2018). This has negative effects on the mortality and morbidity rates, TB-related deaths and preventative measures that promote, control and manage the TB epidemic

(Musuka et al., 2018; UN, 2018; WHO, 2018). While TB and HIV/AIDS were addressed in an integrated manner, TB is a curable airborne illness (WHO, 2019, 2020). In contrast, HIV/AIDS is incurable and transmitted through the exchange of bio-fluids such as blood, breast milk, spermatic fluid, and vaginal fluid (WHO, 2018). Statistics for Africa's TB incidences have doubled over the past two decades (WHO, 2018). Presently, Africa hosts the highest number and most severe cases of TB, which surpassed the fatality of HIV/AIDS (WHO, 2018). In 2016, the majority of the high TB burden internationally existed in more than 30 countries (WHO, 2017). Of the 30 countries, more than 16 were developing countries in Africa with the highest number and severe cases of TB with HIV co-infection.

Consequently, stigma, prejudice, discrimination, and ignorance could be identified in people's beliefs and attitudes about TB causation and treatment (Knutsen, 2010). For example, TB patients and their families, as well as their communities, often displayed stigmatizing attitudes toward the TB illness (Knutsen, 2010; McLaughlin, 2018; Tola et al., 2016). As a result, patients masked their diagnosis with socially acceptable illnesses due to TB's association with HIV/AIDS (Kakili, 2010; Knutsen, 2010). Prejudices relied on the premise that TB patients had multiple sexual partners due to misunderstandings about the TB transmission and its association with HIV/AIDS (Bisallah et al., 2018; Maswanganyi et al., 2014). Consequently, the fear of loneliness, lack of support and decreased motivation reduced treatment adherence and increased TB incidences (Chinenye, 2015; Knutsen, 2010). Issues related to discrimination emphasized the act of excluding TB patients from the community and cultural practices (Chinenye, 2015; Knutsen, 2010; Sima et al., 2019; Tachfouti et al., 2012). The latter was due to the beliefs that TB was a source of bewitchment and uncleanness, whereby TB patients relied on traditional healers' medicinal remedies (Knutsen, 2010; Sima et al., 2019). Negative attitudes from health care providers (HCPs) also resulted in treating TB patients inhumanely or denying them treatment (Kakili, 2010; Knutsen, 2010; Tola et al., 2016). Patients with TB-HIV co-infection also disclosed that the toxicity of both TB treatment and antiretroviral drugs (known as HIV/AIDS treatment) increased non-adherence to treatment (Maswanganyi et al., 2014). Nyasulu et al. (2016) also stressed that ignorance was presented in the curricula at schools, where children were provided with inaccurate information about TB causation (Kakili, 2010). From the above, people's beliefs and attitudes could have hindered the control and prevention of the TB illness.

1.2 Problem statement to the study

In the twenty-first century, TB surpassed the fatality figures of HIV/AIDS (WHO, 2017). The highest number and most severe cases of TB were identified in the majority of countries in Africa. Furthermore, Africa continues to fight the struggle against the HIV/AIDS co-epidemic which negatively affects health outcomes (Musuka et al., 2018). With the existence of primary qualitative and quantitative studies that focus on people's beliefs and attitudes about TB, it was difficult to compare these studies without a systematic evaluation of their research methodologies. Hence, there was a need for filtered literature on people's attitudes and beliefs about TB causation and treatment in Africa. A SR of literature generated a filtered body of current literature with methodological rigour to provide coherence for the debates around the increase in mortality and morbidity figures of TB.

1.3 Rationale to the study

The health crisis continues to stress the urgency to end TB. The prolonged TB epidemic in Africa has resulted in severe cases of drug-resistant TB (DR-TB) (UN, 2018; WHO, 2018). Current debates stress the need to overcome this social justice concern by developing an understanding behind the 4 million underreported TB cases, TB-related deaths, gaps in intervention and policies, and the continual increase of TB incidences in Africa (UN, 2018). The socio-cultural systems in Africa recognized traditional medicine and traditional healers as a primary source of healthcare (Knutsen, 2010; Odugbemi, 2008; Sima et al., 2019; Tola et al., 2016, Tola, Karimi, & Yekaninejad, 2017; WHO, 2013). The latter was in sharp contrast with the current biomedical model of primary healthcare (Knutsen, 2010; Sima et al., 2019; WHO, 2017). The practice and beliefs of traditional medicine was considered among the African population which was passed down from generations and existed for centuries before modern scientific medicine introduced the biomedical model (Knutsen, 2010; Odugbemi, 2008; Sima et al., 2019). Traditional medicine included the philosophy of African general theories of curing illnesses and diseases (Odugbemi, 2008). It provided insights into people's sociodemographic backgrounds such as culture, tradition, religion and healthcare practices that underlie supernatural assumptions and/or religious ceremonial practices (Knutsen, 2010; Odugbemi, 2008; Sima et al., 2019; WHO, 2013). With this diversity, it was critical to provide coherence on the beliefs and attitudes about TB causation and treatment among the populations that reside in Africa. This understanding provided insights and clarifications with

regards to barriers to healthcare in Africa (Sima et al., 2019). Research results aim to provide healthcare professionals with high quality evidence to inform the implementation of interventions and policies, thus enhancing the knowledge and awareness regarding the factors that may hinder healthcare services. Clarity about beliefs of TB causation and treatment within a HIV/AIDS context may be uncovered (Knutsen, 2010; Sima et al, 2019).

1.4 Aims and objectives of the study

The aim of this study was to systematically review literature with methodological rigour on people's beliefs and attitudes regarding tuberculosis causation and treatment in Africa. A SR of literature aimed to generate filtered literature with methodological rigour was conducted. The objective was to systematically review literature on people's beliefs and attitudes about TB causation and treatment in Africa.

1.5 Chapter organisation

This thesis is comprised of five chapters. A brief description of each chapter is discussed below:

Chapter One provides an *Introduction* for the topic as an overview of the subject matter as well as a context produced by current literature in an attempt to address the aims, objectives, problem statement and rationale of this topic.

Chapter Two consists of a *Literature Review and Conceptual Framework*. An account of current literature was provided on people's beliefs and attitudes regarding TB causation and treatment in Africa. Current literature published on TB, as well as the inconsistencies in the niche areas were identified for further consideration. The contexts of studies published globally and within Africa were deliberated on. A conceptual framework was used to understand the concepts of TB in diverse contexts in Africa.

Chapter Three discusses the *Methodology* which involved the decisions made for the review process. A transparent systematic approach was carried out in an attempt to align with the methodological objectives. The chapter is discussed in conjunction with answering the review questions and aligning the evidence to the aims and objectives of this study.

Chapter Four represents the *Research Findings* of the study and a description of the tools that were used to ensure a rigorous systematic process. A detailed and comprehensive account of the results is discussed based on the following four main operational steps, namely: (1) Identification, (2) Abstracts screening, (3) Eligibility of full-text studies, and (4) Reference mining. The researcher further provided a narrative description of each study using the inclusion, exclusion, and the Population, Intervention and Outcome (PIO) criteria. Studies were ranked in descending order according to its threshold scores for methodological rigor. Finally, a final summation of data was tabulated according to the Method of Review process.

Chapter Five is comprised of the *Discussion and Conclusion*. The discussion emphasises three common themes identified across eligible studies. The overall conclusion of this study is discussed based on the following considerations, namely: (1) Limitations, (2) Conclusion, recommendations and Significance of the Results, and (3) Implications for Practice.



CHAPTER TWO

2. Literature review and conceptual framework

This chapter provides an account of current literature on people's beliefs and attitudes regarding tuberculosis (TB) causation and treatment in Africa. This literature review aims to identify areas of scholarship that researchers published on, and the inconsistencies in this niche area that requires further consideration. The contexts of studies published globally and within Africa will be deliberated on, and a conceptual framework of important concepts will be used to understand TB in diverse contexts.

2.1 Literature review

2.1.1 The history of TB

TB existed since the 1800's and remains a public health concern today (Barberis et al., 2017; WHO, 2020). Uncertainty regarding the MTB evolutionary and the source of causation is longstanding (Dodor, 2009; WHO, 2020). While pre-historic determinants identified TB in both human beings and animals, genetic data sources have originated from East Africa. The countries in this region included Zimbabwe, Réunion, Burundi, Mozambique, Djibouti, Ethiopia, Tanzania, Madagascar, Eritrea, Kenya, Malawi, Mauritius, Rwanda, Uganda, Seychelles, Somalia, Somaliland, Zambia, and Comoros (Barberis et al., 2017; Dodor, 2009). TB has been discovered within the spine of Egyptian and South American mummified bodies dated approximately 6000 years ago (Muñoz-Elías & McKinney, 2005). While researchers argued about the descriptions of and names for TB, it was described as “a grievous consumption that separates soul and body”; “Captain of all the Men of Death”; “The Great White Plague”; “Scrofula” or “The King's Evil” (Dodor, 2009; Gallagher, 1969 p.167; Myers, 1970 p.10). The causes of TB were debateable due to its airborne nature. As early as 1722, an English physician postulated that the TB disease was caused by micro-bacterium organisms that caused its airborne transmission (Muñoz-Elías & McKinney, 2005). In 1865, the disease was described as being spread through sputum or caseous tissue from a human being to an animal (Barberis et al., 2017; Muñoz-Elías & McKinney, 2005). In 1882, a German physician and microbiologist identified the causative organism of bacillus Mycobacterium TB (Muñoz-Elías & McKinney, 2005). Thereafter, the WHO promoted mass

vaccination with Bacille Calmette-Guérin (BCG) vaccine, as well as treatment regimens to cure TB (Dodor, 2009).

2.1.2 Global overview of TB

Today, TB is acknowledged as an airborne disease caused by bacteria known as Mycobacterium TB (Chamie et al., 2015; WHO, 2019, 2020). It may be described as a chronic and progressive communicable disease. The disease is transferable through a person's respiratory organs and often affects the lungs (Finlay et al., 2012; WHO, 2017, 2020). It is transmitted or spread through the air when droplets of saliva mixed with active TB is transmitted through coughs, sneezes, speaking and/or spitting (Knutsen, 2010; Sima et al., 2019; WHO, 2018). In turn, people in close proximity to a person with active TB may inhale droplets of sputum which increases the likelihood of developing or contracting the TB disease (Sima et al., 2019; WHO, 2018). Active droplets of TB bacterium may remain in an enclosed area for several hours, thus increasing the likelihood of being transmitted or spread (Dooley et al., 2011; WHO, 2020). Strains of patients with positive sputum smears are considered as more contagious than persons with positive cultures (Charmie et al., 2015; WHO, 2018). TB was ranked as the tenth highest cause of death as millions of people die from it annually (WHO, 2020). This surpassed the morbidity and mortality figures of HIV/AIDS (Dooley et al., 2011; Liao et al., 2012; WHO, 2020).

Devastating implications were observed in the global mortality and morbidity figures (Liao et al., 2012; Sima et al., 2019; WHO, 2018, 2020). The TB disease resulted in approximately 10 million people who suffered from morbidity (Liao et al., 2012; WHO, 2019, 2020). About 1.2 million identified cases revealed TB as the cause of death among HIV- negative individuals and 208 000 were deceased among HIV- positive individuals (WHO, 2019, 2020). More importantly, TB is not influenced by gender, demographic background, or financial status. The TB disease affects all people through a respiratory transmission (Tola et al., 2016, 2017; WHO, 2020). The Sustainable Development Goals (SDGs) and WHO have made strenuous efforts to eradicate the widespread of the TB disease by the year 2030 (Ogundele et al., 2016; WHO, 2019, 2020). The latter proposed the SDG 3.3 goal to ensure the health and wellbeing of all individuals across the globe (WHO, 2020). The WHO End TB Strategy is an initiative to reduce TB-related deaths and attempts to reduce 80% of TB incidences. As a result, the global TB incidence rates have decreased for the year 2019 (Liao et al., 2012; WHO, 2020).

However, the pace of the decline was considered to be too slow as there may be implications for not achieving the milestone of 20% reduction for the years 2015 and 2020 (WHO, 2020). Moreover, approximately 78 countries were able to achieve the milestone of a 20% decline in TB incidences. While there were 30 high TB burdened countries, the countries that met, and/or have the potential to reach the 2020 milestone include the United Republic of Tanzania, Cambodia, Namibia, Ethiopia, Kenya, the Russian Federation, Zimbabwe, South Africa, Myanmar and Lesotho (WHO, 2020).

Roughly 46 countries have the potential of reaching the 2020 SDG milestone of a 35% drop in TB- related deaths (WHO, 2018, 2020). While over 30 countries were high burdened since 2018 (WHO, 2019), many have met the 35% reduction milestone for 2020, namely: Myanmar, Mozambique, Sierra Leone, Bangladesh, Kenya, the Russian Federation, and the United Republic of Tanzania (WHO, 2018, 2020). Finally, considerations to reduce the TB epidemic include lowering the risk of TB through identifying co-morbidity; improving diagnosis and case detection rates; improving the worldwide healthcare coverage, action and the factors of the TB incidence with reference to causation and transmission; and to decrease the risk of developing TB through vaccination and treatment (WHO, 2020). Drug-resistant TB (DR-TB) also remains prevalent and longstanding. Implications for the resistance may affect people's beliefs and attitudes about treatment regimens conjoined with varied drug-toxicity, as well as potential aetiological attributes of the TB disease (WHO, 2020).

The estimation of DR-TB for the year 2019 comprised of approximately 3.3% of the newly discovered TB cases, as well as the 18% of patients who were previously treated with rifampicin-resistant (RR-TB) and/or multi-drug resistant tuberculosis (MDR-TB) (WHO, 2020). There was an improvement of data sources that informed the estimation of the TB burden. The case detection and the mortality figures were considered accurate while remaining high risk in many countries (WHO, 2020). DR-TB like MDR-TB remains a threat as approximately 206 030 people with MDR-TB or RR-TB were identified in 2019, increasing the incidence to 10% increase from 2018 (WHO, 2019, 2020). Therefore, important determinants that provide an explanation for the causes of the TB disease should be understood by everyone. This may aid healthcare agents to provide patient-centred preventative care to reduce the health concern within high-risk geographic areas (WHO, 2019, 2020).

2.1.3 Prevalence of TB

Geographically, there is a high occurrence of TB cases in the following regions: Africa (25%), the Western Pacific (18%), South-East Asia (44%), America (2.9%), Europe (2.5%) and the Eastern Mediterranean (8.2%) (WHO, 2020). Globally, 1.4 million people died due to the disease, while approximately 1.2 million of children fell ill as health providers found TB difficult to diagnose and treat (Liao et al., 2012; WHO, 2018, 2020). Many low-to-middle-income countries experience high mortality and morbidity figures (WHO, 2018). Among international countries ($N = 6$), two countries in Africa were found to have high prevalence rates, namely: Bangladesh, China, India, Indonesia, Pakistan, Philippines, Nigeria and South Africa. TB affects any person regardless of their demographic background; however, the case detection rates at a national level may vary annually dependent on the context of geographic areas (Liao et al., 2012; WHO, 2020). For example, countries that contribute to the highest global mortality and morbidity figures included South Africa (3.6%), Nigeria (4.4%), Indonesia (8.5%), China (8.4%), the Philippines (6.0%), India (26%), Pakistan (5.7%), and Bangladesh (3.6%) (WHO, 2018, 2020).

Research also revealed that environmental factors play a crucial role in the transmission or longevity of TB exposure (WHO, 2020). The frequent and/or prolonged exposure to persons with active MTB becomes high risk especially within overcrowded and poorly ventilated enclosed areas. Therefore, many postulate that those living in poverty or enclosed institutions have a high risk of TB transmission. One in three people with untreated pulmonary TB infect approximately 10 to 15 people per year (WHO, 2020). Therefore, it is important to identify the symptoms of TB to prevent its transmission.

2.1.4 Symptoms, risk factors, types of TB and treatment

Commonly identified symptoms of active lung TB include a prolonged cough with sputum and/or blood, night sweats, low energy, weight loss, fever, and chest pains (WHO, 2018, 2020). Diagnostic measures involve sputum tests and/or X-rays (WHO, 2014). Recommended diagnostic tests proposed by the WHO include the Truenat assays, Xpert MTB/RIF, as well as Xpert Ultra (WHO, 2020). Experts also recommend rapid molecular diagnostic tests for persons with symptoms of TB for an early detection of Latent TB Infection (LTBI) or DR-TB (WHO, 2019, 2020). Firstly, WHO (2018, 2020) defined LTBI as

a tenacious immune response to MTB antigens that may have limited clinical evidence of active TB strains as a person may not always display the symptoms of TB. The treatment regimens for LTBI comprise of a combination of the following medications as prescribed by a medical doctor, namely: Isoniazid, Rifampin, Ethambutol, Rifapentine and/or Pyrazinamide (Pontali et al., 2019). The duration of the treatment may range from six to nine months. However, failure to complete the treatment regimens may result in terminally ill patients with an infectious TB sputum smear and could be categorised as non-adherent or a default from TB treatment (Alobu et al., 2014). Such treatment outcomes enhance the airborne nature of the TB strain which is transmitted in the air and becomes drug-resistant to main regimens (Ifebunandu & Ukwaja, 2012). Secondly, DR-TB refers to the TB bacteria that do not respond to treatment regimens due to the bacterium's susceptibility (Ifebunandu & Ukwaja, 2012). The duration of the treatment regimens for DR-TB may take eight to 20 months to complete and may include the following medication dependent on the resistant strain, namely: Fluoroquinolone and a second-line injection such as Amikacin, Capreomycin or Kanamycin (Pontali et al., 2019).

Other than biological determinants that were mentioned, poverty, social, and environmental determinants also play an important role in a person's understanding about TB causation and treatment. For example, a person's lifestyle choices or habits may increase the chances of TB transmission (Dooley et al., 2011; Liao et al., 2012; Viney et al., 2014). Vulnerable populations with high risk to co-morbid conditions include persons infected by HIV/AIDS and chronic conditions that weaken their immune system (Sima et al., 2019; WHO, 2020). The most prevalent conditions include over-crowdedness, malnutrition, alcohol use disorder ($N = 0.72$ million), and smoking tobacco ($N = 0.7$ million) (WHO, 2020). Research also revealed that a person's beliefs and attitudes are influenced by society (Kizub et al., 2012; Tola et al., 2016, 2017), and influences people's conversations about TB causation and treatment as illustrated below.

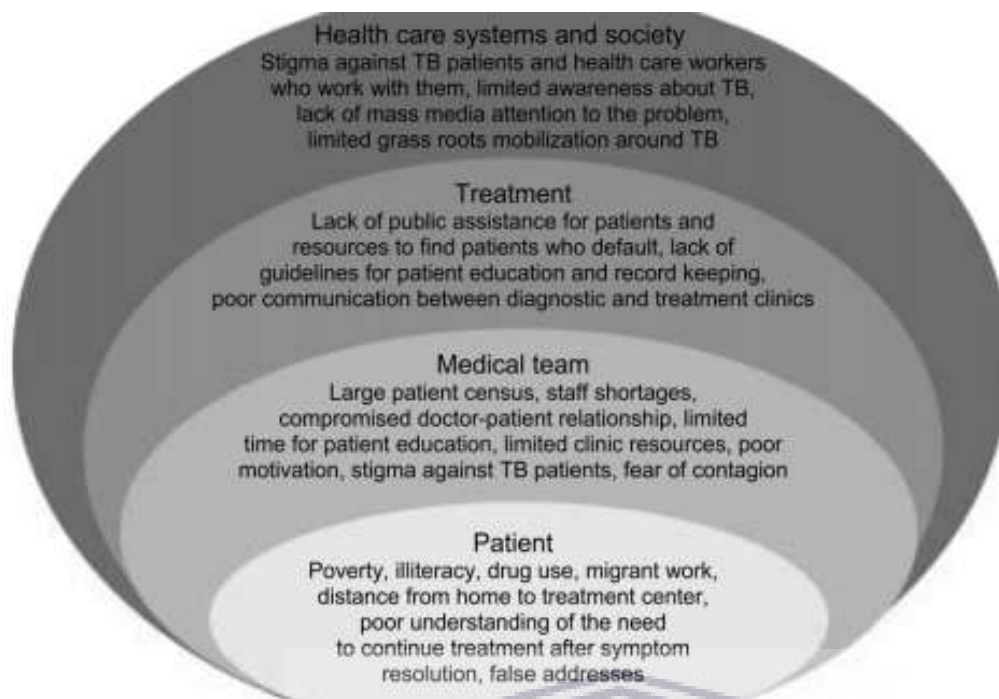


Diagram 1: Risk factors for TB default and adherence (Kizub et al., 2012).

From the diagram, the patients and medical team disclosed their perceptions regarding the risk factors that may affect the TB control through identifying factors leading to treatment default and non-adherence. While the types of TB are distinct, the causes of treatment non-adherence and default are diverse. Therefore, medicinal toxicity was emphasised as causing patients to feel more ill rather than feeling better (Knutsen, 2010). The side effects of most medication include: fatigue, dizziness, a low appetite, stomach and bodily pains, nausea, vomiting, heartburn, flu-like symptoms with or without fever, shortness of breath, fevers or chills, diarrhoea or light coloured stools, discoloured urine, yellow skin pigment or yellow colour in a person's eyes, skin rashes, irritable itching, bruises or red and purple spots on your skin, nosebleeds, bleeding from your gums or around your teeth (Knutsen, 2010; Pontali et al., 2019; Sima et al., 2019; WHO, 2020).

Apart from the determinants of health, treatment for TB cured about 63 million lives in 2019 (WHO, 2020). Almost 58 million patients were saved as a result of effective TB diagnosis and treatment measures (WHO, 2020). Challenges as identified in Diagram 1 consisted of the lack of public assistance, resources and societal involvement which was paired with communication barriers (Kizub et al., 2012). Among many mentioned factors, these factors

had effects on the management of TB cases, diagnostics, and treatment outcomes (Dooley et al., 2011; Kizub et al., 2012; Knutsen, 2010). At a grassroots level, patients and healthcare workers were able to identify challenges within the healthcare system as people discussed their concerns regarding the TB disease, its transmission and the effectiveness of treatment regimens (Knutsen, 2010; WHO, 2020). While countries in Africa inquired about the integration of traditional medicine and biomedical treatment regimens, beliefs and attitudes about TB causation and treatment shed light on the need to identify Africa's perspectives for diagnostic purposes (Chamie et al., 2015; Knutsen, 2010; Liao et al., 2012; Sima et al., 2019; WHO, 2018, 2020).

2.1.5 Beliefs about the causes of TB and the treatment

A belief about TB may be described based on the Health Belief Model (HBM). There were four constructs to describe the nature of TB which may be vague (Glanz, Rimer & Viswanath, 2008). The four constructs to understand how one thinks about TB, include: (a) perceived susceptibility, (b) perceived severity, (c) perceived benefits, and (d) perceived barriers of the TB illness. These constructs were linked to the beliefs about (a) the chances of being at risk to contracting TB; (b) the seriousness about TB and its consequences; (c) how effective the medication/ treatment to reduce risk or seriousness of its impact; and (d) the physical and psychological costs of taking treatment or medication (Glanz et al., 2008).

With this in mind, Tola et al. (2017) explained the interaction between the socio-demographic characteristics and patients' health beliefs in Ethiopia and highlighted its significant effect on treatment outcomes. Thus, one's truth may rely on the social construction of the TB disease within a religious or cultural context as conversations about the causes of TB are disclosed (Knutsen, 2010). For example, a study by Ogundele et al. (2016) identified the hierarchy of factors that may enhance a patient-centred approach for transforming negative beliefs to achieve positive attitudinal outcomes. Results revealed that people's beliefs determined their perceived wellness whilst being cured, as well as the effectiveness of treatment outcomes on a person's health (Ogundele et al., 2016). These factors were dependent on people's social networks comprised of family and community support, as well as the stigma or perceived stigma that one experiences while TB and HIV/AIDS are treated in an integrated manner (Munro et al., 2007; Ogundele et al., 2016; WHO, 2020).

While the TB epidemic in Africa has continued within the context of HIV/AIDS, severe cases of DR-TB (UN, 2018; WHO, 2018) questioned the effectiveness of modern medicine in comparison to the treatment of traditional healers in Africa. While HIV/AIDS is incurable and is associated with blood transfusion or sexual transmission, many patients fear the stigma attached (Knutsen, 2010). Furthermore, the diagnosis of TB occurs simultaneously with an HIV/AIDS test which enhances the fear of having a long-term stigma of HIV/AIDS (WHO, 2020). The socio-cultural systems in Africa recognize traditional medicine and traditional healers as a primary source of healthcare (Knutsen, 2010; Odugbemi, 2008; Sima et al., 2019; Tola et al., 2016, 2017; WHO, 2011). Traditional medicine was strongly utilised by the older generation, whilst preparing the younger generation to integrate traditional and modern medicine as a form of acculturation to modern society (Knutsen, 2010; Odugbemi, 2008; Sima et al., 2019). The adjustment from rural to urban areas also affects the way in which people respond to medicine due to technology (Finlay et al., 2012). The philosophy of African general theories sheds light on the inconsistencies of science as patients still feel ill after adhering to treatment (Knutsen, 2010). Many patients' lifestyle choices of alcohol use or smoking may also automatically categorise them as defaults due to the conflict in medicine and substance use (Knutsen, 2010; Tola et al., 2016, 2017). These theories provide insights into people's sociodemographic backgrounds such as culture, tradition, religion and healthcare practices that underlie supernatural assumptions and/or religious ceremonial practices (Knutsen, 2010; Odugbemi, 2008; Sima et al., 2019; Tola et al., 2016, 2017; WHO, 2013). The seriousness of the TB disease was somewhat misunderstood as inaccurate information about its transmission was communicated by leaders in society (Finlay et al., 2012). The motivation level of patients has also been questioned to prevent treatment default or non-adherence (Tola et al., 2016, 2017). However, the fear of isolation, stigma and degradation became a social justice concern hindering TB control (Knutsen, 2010; Sima et al., 2019; Tola et al., 2016, 2017). Therefore, research ought to identify the belief system that may hinder the management of TB within Africa, as it hosts the highest mortality and morbidity figures (WHO, 2020). Few studies have been published on the beliefs about TB, while research focuses on people's perceptions as an experience that drives their belief to react or ignore the TB burden (Knutsen, 2010; Tola et al., 2016, 2017).

2.1.6 Attitudes about the causes of TB and the treatment

While beliefs contextualise a person's truth, their attitudes direct an action. Attitudes refer to a direct and intentional attribute of behaviour (Glanz et al., 2008). In this regard, a person's attitudes may be observed based on their reaction to health-seeking behaviours, treatment adherence or non-adherence, and treatment default (Glanz et al., 2008). Literature about attitudes identified the knowledge and practices to explain the attitudes a person possesses. For example, Mclaughlin (2018) conducted a study on clinicians' knowledge, attitudes, and practices of TB management within primary healthcare facilities in Southern Africa. Moreover, Chimatira (2012) also argued that the TB/HIV co-epidemics in Namibia may also determine the attitudinal outcomes of treatment adherence for both HIV/AIDS and TB which have varied medicinal toxicity. Bisallah et al. (2018) published a study on the effectiveness of a health education intervention to improve the knowledge, attitudes, and practices regarding TB among HIV patients in the hospital of Nigeria. The outcome of the study highlighted the importance of awareness and accurate knowledge that forms the foundation for how a person thinks and acts to prevent the spread of TB also in order to guide attitudinal outcomes which are patient-focused (Bisallah et al., 2018). Adane et al. (2017) also published a study on the Ethiopian prisoners' knowledge, attitudes, and practices regarding TB and how it impacts on the TB control efforts. Bati et al. (2013) explored the Ethiopian community's knowledge, attitudes, and practices about TB. Many causal factors highlighted were the exposure to cold air (26.1%), smoking (17.5%), as well as drinking fresh cow's milk (16.6%). Hemoptysis (60.2%), emaciation (14.7%) chest pain (30.8%), and coughing for at least two weeks or more (9.9%) (Bati et al., 2013). Strong attitudes about TB identified patients as demon-possessed which validated their isolation from society, thus increasing cases of treatment default and non-adherence (Courtwright & Turner, 2010). Existing literature on both beliefs and attitudes emphasised the extent to which the misconceptions about TB causation and treatment affects the TB control.

2.1.7 Commonly published literature on TB

A lack of current literature on beliefs and attitudes about TB causation and treatment was noted for countries in Africa. Through a database search, majority of studies ($N = 229$) focused on TB and treatment default, treatment adherence, transmission, risk factors or determinant of TB, intervention, knowledge, perceptions, vulnerability, and HIV/AIDS. The

general overview of included studies was understood through the PIO criteria to identify the core concern stipulated in this study's review questions, aims and objectives. Hence, there is a need to build on research for this topic within Africa. Due to misconceptions about TB, a conceptual framework was utilised.

2.2 Conceptual framework

The conceptual framework and/or model in the review process reinforced the rigor and transparency of the integrative method. This provided a foundation for the synthesis of current preeminent literature on the topic (Godfrey et al., 2010). This systematic review (SR) generated the highest level of current evidence over the past 10 years (Godfrey et al., 2010). A conceptual framework was used to align with current literature on this topic, as well as allowing for the operationalization of the main constructs that were discussed within the body of this thesis (Adom, Hussein & Agyem, 2018). The benefits of using a conceptual framework was to provide: (1) a comprehensive meaningful idea that emerged from the research findings; (2) the foundation for assessing the acceptability and/or the appropriateness of the theoretical concepts for the subject matter; as well as (3) a more succinct methodology with the objective of providing rigor, transparency, generalizability, clear, systematic, empirical and unbiased results confirmed by current literature on the topic (Adom et al., 2018; Dixon-Woods et al., 2005). Through the use of a conceptual framework, a synthesis of current literature was done, thus giving life to the research findings within the African context.

2.2.1 The Health belief model in Africa's landscape

The HBM was chosen to explain the context in which this topic was understood as guided by the literature on this subject matter. The HBM was suitable as it was a frequently utilised theory in health education and promotion that uses psychological indicators such as beliefs and attitudes to predict health behaviours and conditions (Escombe, 2008). The model explained health behaviours as a function of four constructs to explain preventative health behaviours (Webel et al., 2016). Health behaviours may be influenced by one's personal beliefs or attitudes about the TB disease, as well as the strategies available to reduce its occurrence, mortality and morbidity rates (Escombe, 2008). The four constructs were namely: (1) perceived susceptibility; (2) perceived severity; (3) perceived benefits; and (4) perceived

barriers (Rosenstock, 1974; Becker, 2001; Escombe, 2008; Jones-Lopez et al., 2017; Koenig & Furin, 2016; Young, Walzl & Du Plessis, 2020). Firstly, perceived susceptibility referred to the individual's personal risks of contracting TB. Secondly, perceived severity referred to the degree to which the individual judges the seriousness of the illness, as this may have an effect on their emotional reaction toward the disease, or they may believe that the difficulties of having TB may be overbearing (Jones-Lopez et al., 2017; Koenig & Furin, 2016; Rosenstock, 1974). Both perceived susceptibility and severity were associated with a strong cognitive component dependent on the individual's knowledge about TB causation and the awareness of the vulnerability or transmission of TB (Rosenstock, 1974). Thirdly, the construct of perceived benefits refers to a person's view of the value of their new behaviour in reducing the risk of developing a disease like TB (Young et al., 2020; Rosenstock, 1974). It relies on an individual's evaluation of both the perceived susceptibility and benefit that the person would accept the recommended health actions if they were perceived as beneficial for the individual and the circumstances the individual may be faced with (Young et al., 2020; Rosenstock, 1974). The fourth construct, perceived barriers, coincides with the perceived benefits. For example, in order for people to adopt any beneficial behaviour, they would need to believe that there are benefits in adopting a new behaviour to outweigh the penalties of continuing the old behaviour (Young et al., 2020). This may in turn determine the perceived barriers that are important in determining behaviour change (Young et al., 2020). Perceived barriers refers to an individual's belief that a given action will be effective to reduce the risk of contracting an illness, however, at the same time viewing that action itself as inconvenient, costly, unpleasant, agonizing, or upsetting (Rosenstock, 1974).

On the other hand, people's attitudes were explained by means of the health behaviour that was a result of the relevant beliefs that triggered the way individuals believed their personal health to be threatened (Munro et al., 2007). An attitude is a relatively long-term formation of beliefs, emotions, and/or behavioural tendencies towards a socially consequential objects, groups, occasions and/or symbols (Haddock & Maio, 2004; Hogg & Vaughan 2005, p. 150). Attitudes have an emotional, cognitive, and behavioural component. For example, the emotional arousal associated with contracting TB may be with regards to an individual's state of negativity, depression, fear, anxiety, denial and so forth. Secondly, a person's cognitive component refers to the beliefs, thoughts or attributes that contribute to how patients with TB are treated based on their knowledge or experience of being among TB patients. Lastly, a

person's behaviour demonstrates how favourable or unfavourable a condition may be, such as having strong attitudes toward the TB illness which may result in treatment default, treatment adherence or practicing discriminatory practices against TB patients. In this regard, the HBM assists in understanding attitudes through three constructs which interconnect with an individual's state of mind and the role of an individual's reactions with regards to the TB illness, namely: (1) Cue to action; (2) self-efficacy; and (3) modifying variables (Haddock & Maio, 2004). The HBM operationalized "cue to action" as the stimuli that triggers the decision-making process such as internal cues (chest pains, panting, and anxiety) or external cues (advice from people, risk to contracting the illness due to your family history, media). Self-efficacy refers to a person's confidence in his or her ability to perform an action that is anticipated but also results in satisfactory outcomes (Haddock & Maio, 2004). The modifying factors refer to the individual's age, sex, cultural background, socioeconomic status, socio-psychological facets and so on (Haddock & Maio, 2004). All these constructs interact simultaneously and do not occur in isolation of the individuals' understanding about the TB-HIV endemic.

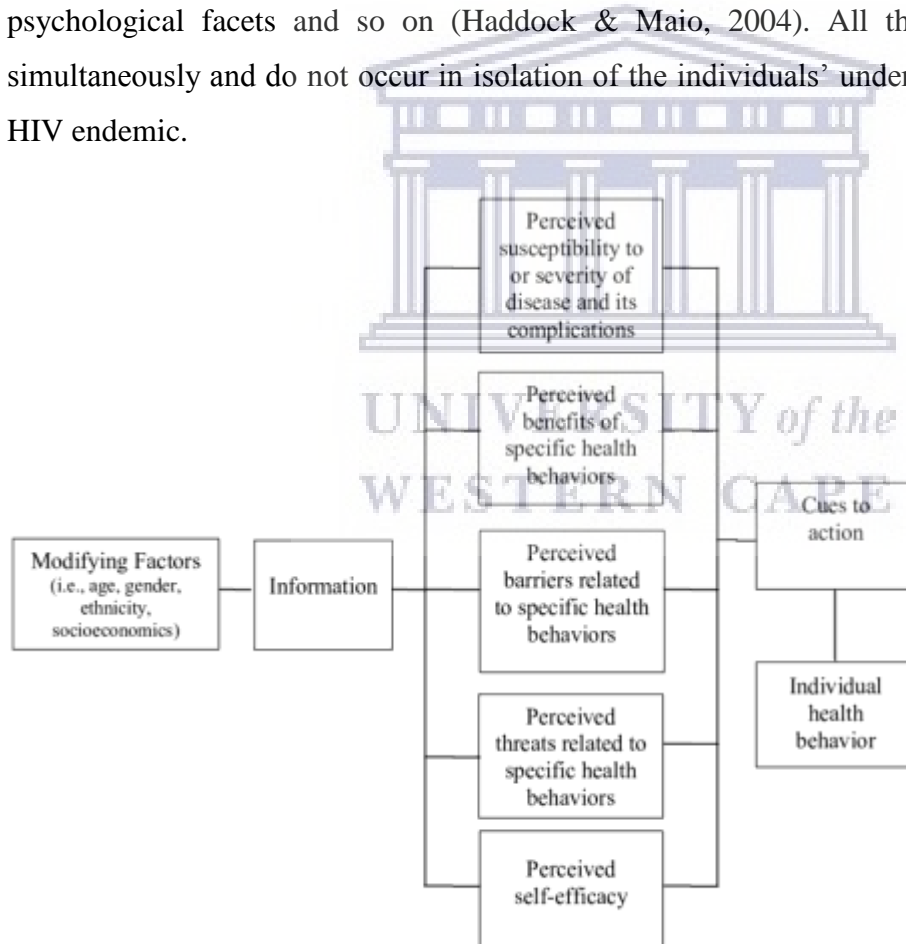


Figure 1. The Health Belief Model framework

CHAPTER THREE

3. Methodology

This chapter describes the methods and procedures utilized to investigate the research aims and objectives, review questions, problem statement, as well as the rationale of this study. A Systematic Review (SR) methodology was employed from the months of June 2019 to September 2019 and March 2020 to April 2020. Methodological objectives and ethical considerations were considered to enhance the reliability and validity of the study. Key findings were critically appraised and synthesised to identify relevant existing literature.

3.1 Aims and objective of the study

The aim of this study is systematically review literature with methodological rigour on people's beliefs and attitudes regarding tuberculosis causation and treatment in Africa. A SR of literature aimed to generate filtered literature with methodological rigour was conducted. The objective was to systematically review literature on people's beliefs and attitudes about TB causation and treatment in Africa.

3.2 Review Questions

The following review questions were asked:

- What are the beliefs regarding TB causation in Africa?
- What are the beliefs regarding TB treatment in Africa?
- What are the attitudes regarding TB causation in Africa?
- What are the attitudes regarding TB treatment in Africa?

3.3 Research design of the study

The SR methodology was employed to answer the review questions based on the entire body of current literature for this topic (Sofaer & Strech, 2012). The SR was relevant for filtering large quantities of existing data into manageable presentations of current literature with methodological rigour (Dixon-Woods et al., 2005; Finan et al., 2020). This methodology purposefully employed methodical, clear, unbiased, transparent, rigorous, and reliable methods to synthesize and integrate all of the existing peer-reviewed literature on the subject matter. The methodological objectives enabled the researcher to use methodical methods to

identify, select, evaluate, appraise, and synthesize relevant current literature with methodological rigor. The pre-specified inclusion and exclusion criteria guided the selection of empirical data to answer the broad review questions (Dixon-Woods et al., 2005; Regmi, Kunwar & Ortega, 2016).

3.4 Inclusion criteria of the study

The researcher and supervisor determined the inclusion criteria to minimize bias and maintain the objectivity and integrity of the data. The following criteria were considered:

- *Main foci*: The foci were on people's beliefs and attitudes about TB causation and treatment in Africa. Included studies related to TB in human beings and within the context of countries in Africa.
- *Time period of the review*: Relevant literature published from 2009 to 2019 was included. The last 10 years were plausible for the SR due to the aim of ensuring that evidence was current and suitable for the subject matter under study (Mouton, 2001).
- *Text selection*: Studies were included if they were peer-reviewed, published in English, and had free access to abstracts and full-texts. Many theses, also known as grey literature, were relevant for this topic. Hence, it was difficult to exclude dissertations (Doctoral theses) and theses (Master's theses) which were not published in accredited journals. These were electronically retrievable from university portals and were not controlled by commercial publishers. The reason for including theses was to retrieve empirical evidence from developing professionals, whose theses were thoroughly graded by the institutional board for their quality. Thus, it contributes to the body of scientific knowledge on this topic (UN, 2020). For journal articles, experts recommended publications in accredited journals under the Department of Higher Education and Training (DHET) list (DHET, 2019).
- *Type of participants*: All the populations groups in Africa were included, such as all genders and people of all ages despite their demographic backgrounds. The reason for this was that anyone is at risk of contracting TB due to its airborne transmission (WHO, 2017, 2019). The motivation for choosing Africa was due to the fact that a majority of countries in Africa make up the global TB epidemic, and Africa hosts the second largest population

worldwide since 30 May 2020 based on the UN estimates ($N = 1, 337, 471, 779$) (UN, 2020; WHO, 2017). Also, Africa is rich in cultural diversity, has a population density of 45 per Km^2 , and has a median age of 19.7 years (UN, 2020). Therefore, an understanding was needed when applying the biomedical model of healthcare (Odugbemi, 2008; WHO, 2013) for curing the highest prevalence of TB, while people in Africa still believe in the traditional methods of African medicine.

- *Types of studies:* Qualitative and quantitative studies were included.

3.5 Exclusion criteria

The following were excluded: books; book chapters; reports; appendices; pamphlets; notices; study modules; required payments; no peer-review; published before 2008 or after 2019; and primarily focused on other illnesses.

3.6 Search strategy

This study followed four operational steps to review the journal articles and grey literature for inclusion. Figure 2 below provides the flow for the search strategy. Each step included subordinate steps to maintain a systematic and rigorous process.



Figure 2. Search strategy flow diagram

3.6.1 Operational step 1: Identification (Titles reading of studies)

This step involved the process of screening the titles and keywords of existing literature. Three subordinate steps were carried out as seen in Figure 3 below.

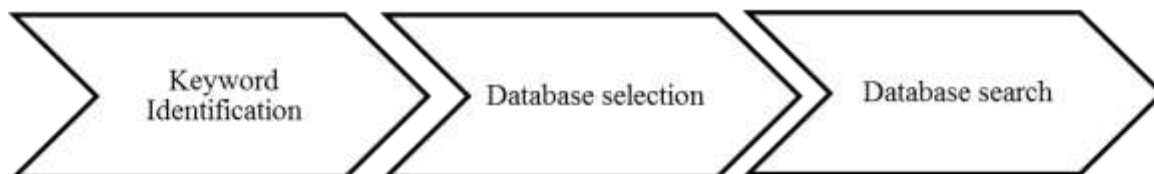


Figure 3. Identification flow diagram

a) Keyword identification: Provisional keywords were identified from literature, namely: beliefs, attitudes, knowledge, TB, vulnerability to TB, TB causation or transmission, treatment adherence, treatment default, Africa and HIV/AIDS. These terms were verified and refined to match the subject terms that described the main idea of the studies (Gusenbauer & Haddaway, 2019). Firstly, an exploratory search was conducted to explore whether the initial keywords would produce relevant results within generally used databases, namely: Google Scholar, Ebscohost, and Scopus (Gusenbauer & Haddaway, 2019). Index keywords and Boolean operating terms, such as “AND” and “OR”, were combined to create strings or phrases which broadened and focused the database search (Brusilovsky, Ahn & Rasmussen, 2010). The final set of keywords in Table 3.6.1a below was divided into two phases to retrieve the highest quantity of literature on the topic:

Table 3.6.1a: Index Keywords for the database search

Phases	Keywords
1	“Beliefs” AND “Africa” AND “Tuberculosis” AND “HIV/AIDS” AND “Tuberculosis causation” OR “transmission” OR “Treatment adherence” OR “Treatment default” OR “Knowledge” OR “Vulnerability to tuberculosis”
2	“Attitudes” AND “Africa” AND “Tuberculosis” AND “HIV/AIDS” AND “Tuberculosis causation” OR “transmission” OR “Treatment adherence” OR “Treatment default” OR “Knowledge” OR “Vulnerability to tuberculosis”

b) Database selection: The combination of Boolean operating terms and index keywords generated a comprehensive search which was consistent across the following databases ($N = 10$): Wiley Online Library, Elsevier Science Direct Journals, BioMed Central, SpringerLink, Cochrane, Ebscohost, NCBI (Pubmed and Medline), University of the Western Cape (UWC) library database and United Nations Research Guides. Databases ($N = 4$) that retrieved eligible studies included the following, namely: (1) Biomed Central, (2) Pubmed/ Medline, (3) Ebscohost academic search complete, and (4) SpringerLink. Table 3.6.1b below further represent the filtering of databases based on the relevant literature located in them. Firstly, primary and secondary databases were used in the exploratory search to identify, select and verify the databases that retrieved the highest quantity of relevant evidence on the topic. Recurrent databases, identified with an asterisk, were selected as eligible studies were located in them as illustrated in the Table 3.6.1b below:

Table 3.6.1b: Filtering of primary, secondary, and recurrent databases

Code	Primary	Secondary	Recurrent
1	BioMed*	Scopus	BioMed*
2	Cochrane	SAGE	Ebscohost*
3	Ebscohost*	Pubmed	Medline (Pubmed)*
4	Science Direct	Medline	Springer Link*
5	Medline (Pubmed)*	Google scholar	
6	SpringerLink*	Research Gate	
7	UWC Library	Jstor	
8	United Nations Research Guide	Embase	
9	Wiley Online Library		
10	WHO publications		

c) Database Search: The researcher independently read through and screened the literature by titles. All duplicates were identified and removed. The title summary sheet (Appendix A) further summarized the literature by their titles in order to locate the evidence relating to the subject matter. The search strategy was described based on the summaries of the titles (Appendix A), abstracts (Appendix B) and full-texts (Appendix D) that were screened by a reviewer. From the database search, referred to as the initial search strategy, the results per database is described in Table 3.6.1c below.

Table 3.6.1c: Initial search strategy results

Code	Primary databases	Phase 1	Phase 2
A	BioMed*	262	310
B	Cochrane	200	200
C	Ebscohost*	5900	6700
D	Science Direct	3600	3600
E	Medline (Pubmed)*	14600	21400
F	SpringerLink*	515	581
G	UWC Library	330	330
H	UN Research Guide	142	120
I	Wiley Online Library	2000	2000
	Total per phase	27549	35241
	Grand Total		62790

Furthermore, recurrent databases were tabulated to identify their scope of eligible journals that were retrieved as illustrated in Table 3.6.1d below.

Table 3.6.1d: Databases retrieving literature with methodological rigor on the topic

Databases	Scope of journals' expertise	Peer-review and quality	Special features or foci
1. Biomed Central	Science, technology, engineering, medicine	Peer-reviewed journals; high quality research; free access; global healthcare and medicine.	Leading journals include: <i>BMC Biology</i> , <i>BMC Medicine</i> , <i>Genome Biology</i> and <i>Genome Medicine</i> , academic journals like <i>Journal of Hematology and Oncology</i> , <i>Malaria Journal</i> and <i>Microbiome</i> etc.
2. Ebscohost academic search complete	Multi-disciplinary	Designed for academic institutions. Include scholarly, multi-disciplinary full-texts, global and peer-reviewed	Expertise in healthcare, medicine, social science, and psychology; provides evidence-based findings within the Ebscohost health Journals. The academic search complete option allows for a broader array of results to be retrieved and is accessible to the UWC
3. Springer Link	Multi-disciplinary	Peer-reviewed, global, scientific and medical	Expertise in Health research; has advanced, robust and insightful science; supports research niches.
4. NCBI-Pubmed/ Medline	Multi-disciplinary	Peer-reviewed theoretical, analytical and applied science, include biology and medicine	Focuses on biomedical sciences, clinical data and healthcare practices. Stems from the biomedicine and health fields, and are related life sciences, behavioural sciences, chemical sciences, and bioengineering.

3.6.2 Operational step 2: Screening abstracts

After identifying studies by their titles and keywords, scrutinising was done using the inclusion and exclusion criteria. Included studies were scrutinised to determine their relevance. The outcome of the screening process was further documented in the abstract summary sheet in Appendix B. The main criteria for scrutiny were based on PIO, an acronym for identifying the study's *Population*, *Intervention* and *Outcome* (Tawfik et al., 2019). Here, literature was scrutinized based on the suitability of the *population* under study (populations within the region of Africa), the *intervention* (treatment or exposure to TB) was linked to TB causation or treatment or HIV co-infection, as well as the *outcomes* of the study centred on people's beliefs and/or attitudes, treatment adherence or default related to the TB illness. The PIO criterion was an attempt to answer the review questions, substantiate the problem statement and rationale, and guided the eligibility of studies.

3.6.3 Operational step 3: Eligibility of full-text studies

After screening studies by their abstracts (Appendix B), the full texts of included abstracts were retrieved and downloaded if they were free of charge and accessible to the UWC

student community. Completing the final step of scrutinizing, full texts were critically appraised for eligibility using Appendix C. The critical appraisal tool was used to award a threshold score based on the inclusion and exclusion criteria. The scoring system developed by Smith et al. (2015) was used to appraise evidence for methodological rigour. The range of threshold scores were divided into four categories, namely: weak (0-40%), moderate (41-70%), strong (71-80%) and excellent (81-100%) (Smith et al., 2015). Emoticons were used to represent the rank of scores: (1) an excellent ranking had an excited face (😄); (2) a strong ranking had a smiling face (😊); (3) a moderate ranking had a neutral face (😐); and (4) a weak ranking had a worried face (😟). A strong to excellent threshold (71–81%) was recommended for eligible studies. The scoring grid is tabulated in Table 3.6.3 below.

Table 3.6.3: Scoring grid for the critical appraisal tool

0-40%	41-70%	71-80%	81-100%
0/45 to 18/45	19/45 to 31/45	32/45 to 36/45	37/45 to 45/45
Weak (😟)	Moderate (😐)	Strong (😊)	Excellent (😄)

3.6.3.1. The appraisal tool and methodological appraisal process

The critical appraisal tool was developed by a Professor in the Department of Psychology at UWC (Smith et al., 2015). Permission to use the tool was previously negotiated and granted by the developer in Isaacs (2017), *A Systematic Review regarding the emotional/psychological experiences of medically complicated pregnancies*. The tool was adapted to accommodate the needs of this mini-thesis. There were eight main items and a total of 45 sub-items to evaluate qualitative and quantitative studies (Appendices C and D). The scoring of literature was based on specific criteria to provide a description of the overall methodological quality of the eligible studies. A strong to excellent threshold score (71% - 80%) was recommended for eligible studies (Isaacs, 2017). This tool has been used within a Master’s thesis, and was piloted for reliability and validity (Isaacs, 2017). The results following this step were presented in the Full Text Review summary sheet (Appendix D).

3.6.4 Operational step 4: Reference mining

After eligible studies were appraised, the reference list of each study was reviewed to identify additional studies for inclusion. Identified studies underwent the same search strategy of identifying literature through a title and keyword search (Appendix A) ($N = 6$), abstract screening (Appendix B) ($N = 4$), and scrutinising full-texts for eligibility (Appendix D) ($N = 4$). Thereafter, eligible studies were included in the total number of results as described in the Method of Review.

3.7. Method of review

Evidence was independently retrieved, evaluated and documented. The peer review process, which included one peer reviewer and the supervisor, confirmed the integrity of the data and systematic process. This review process aligned with Godfrey and Harrison's (2012) postulation of conducting a SR by at least two reviewers. This process is explained in the peer-review process subsection to follow.

The method of review followed three subordinate steps. This yielded a total of 62 790 studies and grey literature (also known as academic dissertations and/or theses) which were searched for across all databases. Firstly, studies were screened by their titles and keywords which yielded a total of 24 results (Appendix A). After removing 10 studies due to having duplicates, a total of 14 studies were eligible for abstract screening (Appendix B). During abstract screening, studies were further scrutinised using the inclusion and exclusion criteria, as well as PIO criteria to identify the *Population*, *Intervention* and *Outcome* that aligns with the review questions. All the characteristics pertaining to the inclusion criteria were further tabulated in Appendix B to guide the appraisal of eligible studies. The full-texts of eligible literature were retrieved, independently reviewed and critically appraised (Appendices C and D). The researcher and peer reviewer compared the scoring of the appraised literature and held discussions in which discrepancies of consensus for appraised evidence were reached. Following this, a total of seven studies were included in the final step of data extraction and synthesis. Thereafter, reference mining was conducted through reviewing the reference lists of eligible studies. A total of six studies were identified and two studies were excluded due to having a duplicate. After those studies were scrutinized using the inclusion, exclusion and PIO criteria, of which one study was published in a country other than Africa, a total of four

journal articles were critically appraised in Appendix C. Thus, a total of two journal articles were eligible from reference mining and were further synthesized with the seven eligible studies retrieved from the systematic search. Overall, a total of nine studies were synthesized and discussed through alignment with the study aims, objectives, review questions, problem statement and rationale.

3.8. Data extraction

A data extraction sheet (Appendix C) was adapted in order to provide a summarised overview of the study, thus highlighting the main points of the subject matter and important characteristics of the studies. Data extraction was completed for nine studies. Appendix C was guided by the data which were included after screening the abstracts. This extraction sheet summarised the studies' characteristics according to the main headings of the critical appraisal tool, namely: (1) studies' identity number, (2) reference, (3) quality, (4) purposes, (5) study designs, (6) ethics, (7) data collection, (8) data analyses, (9) sample, (10) results, (11) conclusion and (12) final score ($N = \%$). Headings highlighted the main categorises, and studies were scored per category, while a peer-review process guided the integrity of data.

3.9 Peer review process

The reviewing process involved two reviewers excluding the primary researchers namely, a supervisor and a MA (Master of Arts) Psychology peer at UWC under the supervision of Professor Kelvin Mwaba. The supervisor is an expert in health research and SR methodologies, and reviewed the content and methodological validity. The MA Psychology peer reviewer verified the reliability, validity and methodological concerns of included studies. All reviewers were experts in Research Psychology. The supervisor and reviewer provided a brief summary, comments, questions and recommendations on the content and methodological concerns to increase the quality of this study (Moher, 2015). Appendices A, B, C and D guided the peer reviewing and reporting process in terms of the researchers' transparency and objectivity, as well as the expertise in selecting and reporting on relevant evidence in the field of study. After the examination of included literature, the researcher revised the final thesis according to the peer reviewers' comments and recommendations. Thereafter, a final write-up of this thesis was based on the research findings in which a discussion was formulated to inform the conclusion, recommendations, implications for

practice and limitations of the study. Each level of the assessment was evaluated and no inconsistencies were found between the reviewers and the researcher. Both the peer reviewer and researcher agreed that the supervisor would make the final decision if there were disputes. There was one disagreement in response to the time period at which the researchers and reviewers verified the title search which was approximately two weeks apart. Within those two weeks, a growing body of literature was published after the main researcher conducted the title and database search. It was therefore recommended that an additional search be conducted which added to the existing studies and were additional to the verification process. No further disputes or inconsistencies were experienced during the reviewing process. All documented feedback was kept on a laptop under restricted passwords and will be kept for 5 years. Only the supervisor, peer reviewer and the primary researcher had access to the data. After 5 years from the completion date of data collection, all documents will be disposed. The above protocol was used for a SR by Moher (2015).

3.10 Data synthesis

Data synthesis refers to the process of integrating findings of included and relevant literature in order to provide coherence for the topic under study (Popay et al., 2006). A narrative synthesis put forward by Popay et al. (2006) and Ryan (2013) was employed. A narrative synthesis involves integrating textual data from existing literature on the topic to form a story or context for gaining an understanding for the phenomenon under study. While methodologies cannot be singled out due to their unique context, the narrative synthesis assists with a systematic approach to identify the similarities, differences and potential themes within data to justify the rationale, problem statement, review questions, aims and objectives of this study. Four main elements proposed by Ryan (2013) and Popay et al. (2016) were specific for SRs, namely: (1) developing a theory; (2) developing an initial synthesis of findings of included studies; (3) exploring associations in the data; and (4) assessing the vigour of the synthesis. For the purpose of this study, only point two and four were appropriate as methodological rigor of studies were determined rather than developing a theory or intervention. A detailed description of the four main elements is tabulated below.

Table 3.10 The main elements of a narrative synthesis (Popay et al., 2016; Ryan, 2013)

Main elements	Purpose
1. Develop a theory of an intervention	<ul style="list-style-type: none"> • Inform decisions regarding the study's review questions • Add to the explanation of the review's findings • Appraise the relevancy of the review's findings
2. Develop a synthesis of the study's results	Sort findings of eligible studies to describe the patterns based on the: (a) direction of effects; and (b) size of effects
3. Exploring the relationships in data	Examine the factors that explain the changes in direction and effect size across the eligible studies
4. Assessing the vigour of the synthesis	Assesses the robustness of the data for drawing conclusions regarding direction and effect size; concluding the effect size for varied population groups and/or contexts

Furthermore, the retrieval strategy of how research findings were achieved was illustrated using the PRISMA flow chart (Figure 4 below) which was adapted to accommodate the research procedure in the Results Chapter to follow.

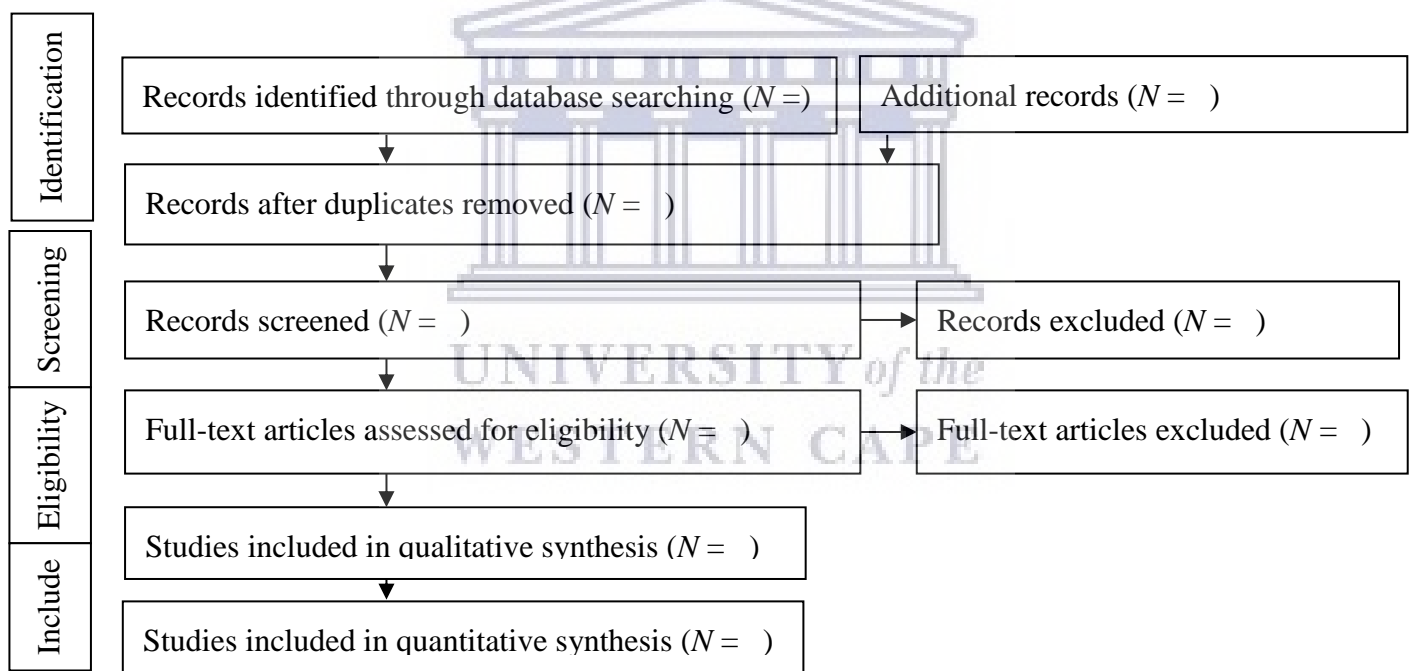


Figure 4. PRISMA systematic review template (Moher et al., 2015)

The PRISMA tool above was developed by Moher et al. (2015). PRISMA is acronym for *Preferred Reporting Items for Systematic reviews and Meta-analyses*. The meta-analysis was therefore fulfilled based on PRISMA. This tool was suitable as it improves the reporting of SRs. Furthermore, eligible studies were ranked based on their threshold scores obtained from their critical appraisal quality. Through this, studies with methodological rigor were apparent,

thus enabling a nuanced engagement with the ranks of included journal articles according to their quality of methodological rigor. Data synthesis was carried out through data extraction from included eligible articles in the final review. Data extraction was carried out through answering the review questions. Ethical considerations were also highlighted to adhere to the regulations of the institutional board.

3.11 Ethics

Ethical approval was sought by the Biomedical Research Ethics Committee (BMREC) at UWC (Reference: BM19/5/1) (Appendix I). The ethical guidelines used to conduct this SR included using methodical, clear, unbiased, transparent, rigorous, and reliable methods to synthesize and integrate existing evidence. The verification and reviewing process involved a supervisor, peer-reviewer and the primary researcher. The primary researcher was a registered MA Psychology student at UWC for the years 2018 to 2021. Access to UWC databases was achieved by providing proof of registration (Appendix H). No funding was awarded to conduct this study. The tools (Appendices A, B, C and D) used in this SR were previously used in Isaacs (2017) and this was acknowledged. The researcher was able to systematically appraise included journal articles for methodological rigor and verified findings through a rigorous peer-reviewing process. The researcher acknowledged all literature, tools and content produced by other authors.

3.12 Conclusion

The evidence retrieved from the databases was supported by the mention of the main keywords, namely beliefs and attitudes, which were consistently used throughout the systematic search. A strenuous review process followed the SR methodological objectives between the periods of June 2019 to September 2019, and March 2020 to April 2020. The time periods used to retrieve the results resulted in disputes between the peer-reviewer and researcher. A reason for this was due to verifying the results in 2020, which yielded additional publications on the subject matter. Through the verification of an additional search, disputes were resolved, and thorough peer-reviewing enhanced the integrity and rigor of the research process. Furthermore, the databases only allowed the researcher to retrieve a smaller amount of the literature than what was truly reflected upon within the database search. In turn, there was a significant amount of literature that was excluded due to this. Although a

verification and peer-review process were put in place, there was a need to highlight the limitations to retrieving sufficient literature on the topic.



CHAPTER FOUR

4. Results

This chapter provides a detailed and comprehensive account of the results that were retrieved during the systematic search. The researcher describes the process results and the meta-synthesis process. For the process results, a description of the method of review was illustrated using four main operational steps, namely: (1) Identification, (2) Abstracts screening, (3) Eligibility of full-text studies, and (4) Reference mining. Thereafter, the researcher narratively described eligible studies based on the inclusion and exclusion criteria, and the PIO (Population, Intervention and Outcome) criteria (Tawfik et al., 2019). The ranking of studies was described using the scores achieved during the critical appraisal of studies for methodological rigor and a meta-synthesis was guided by Ryan (2013) and Popay et al. (2016) guidelines for systematic reviews (SRs). The chapter concludes with a final summation of data that was tabulated within the Appendix A to I.

4.1 Process results

4.1.1 Identification

Firstly, a comprehensive search was independently conducted across nine databases which yielded a total of 62 790 results. The search was divided into Phase 1 and Phase 2 ($N = 28\ 023$ and $N = 35\ 715$, respectively). Phase 1 included of the following keywords: Beliefs, Africa, Tuberculosis (TB), HIV/AIDS, TB causation, transmission, Treatment adherence, Treatment default, Knowledge, and Vulnerability to TB. Similarly, Phase 2 included of the following keywords: Attitudes, Africa, TB, HIV/AIDS, TB causation, transmission, Treatment adherence, Treatment default, Knowledge, and Vulnerability to TB. A total of 62 766 titles of studies were excluded based on their irrelevance. Only a total of 24 potential studies were identified as relevant across all of the databases (Phase 1: $N = 5$; Phase 2: $N = 19$). A total of 10 studies were removed due to having duplicates. As a result, a total of 14 studies met the criteria for the abstract screening.

4.1.2 Screening abstracts

After the identification of studies, a total of 14 studies were further scrutinised using the inclusion and exclusion criteria to determine the suitability of included studies. A total of four

studies were removed due to not mentioning the carrying out of a peer-review. Thus, a total of 10 results were yielded. Both journal articles ($N = 9$) and grey literature of a Master's theses ($N = 1$) was included. Thereafter, data were independently extracted through summarising important characteristics using the PIO criteria, which were relevant for strengthening the logic behind refining the scope for SRs (Tawfik et al., 2019). The acronym PIO stands for *Population* under study, *Intervention* and/or *Treatment*, and the *Outcome* of the medical condition. Table 4.1.2 below illustrates the application of the PIO criteria in an attempt to answer the review questions, thus aligning with the scope of this thesis.

Table 4.1.2 Applying PIO criteria for abstract screening

PIO criteria	Inclusion criteria for included studies
1. Population under study	TB patients, medical professionals, community, countries in Africa
2. Intervention and/or treatment	TB causation, TB treatment, HIV co-infection
3. Outcome of the medical condition	attitudes, beliefs, treatment adherence or default

4.1.3 Eligibility for Full-text studies

A total of 10 studies met the inclusion and exclusion criteria for appraisal. The full-texts of eligible studies were retrieved and independently reviewed and appraised. The researcher and peer-reviewer compared the scoring of the appraised studies and held discussions during which discrepancies of consensus for appraised evidence were reached. Following this, a total of seven eligible studies were further scrutinized based on the final step of data extraction and analysis. Eligible studies included one Master's thesis and six journal articles. Threshold scores of 70% to 100% were considered acceptable as it represented a strong to excellent rank for methodological rigor. The main foci were on the beliefs and attitudes, as well as TB causation and treatment in countries in Africa. These topics aligned with the PIO criteria and review questions. References of the included studies were further screened to retrieve relevant literature for the scope of this topic.

4.1.4 Reference mining

After the final scrutiny of included studies, eligible studies' reference lists were further reviewed for inclusion. A total of six studies were identified and one study was excluded due to having a duplicate. Next, the studies were screened by their abstracts and scrutinized based

on the inclusion, exclusion, and the PIO criteria. A total of five journal articles were included for further scrutiny and appraisal for methodological rigor. Thereafter, a total of two journal articles were considered eligible for answering the review questions and were added to the seven studies retrieved through the systematic search. Overall, a total of nine eligible studies were included for this mini-thesis as illustrated in Figure 5 below.

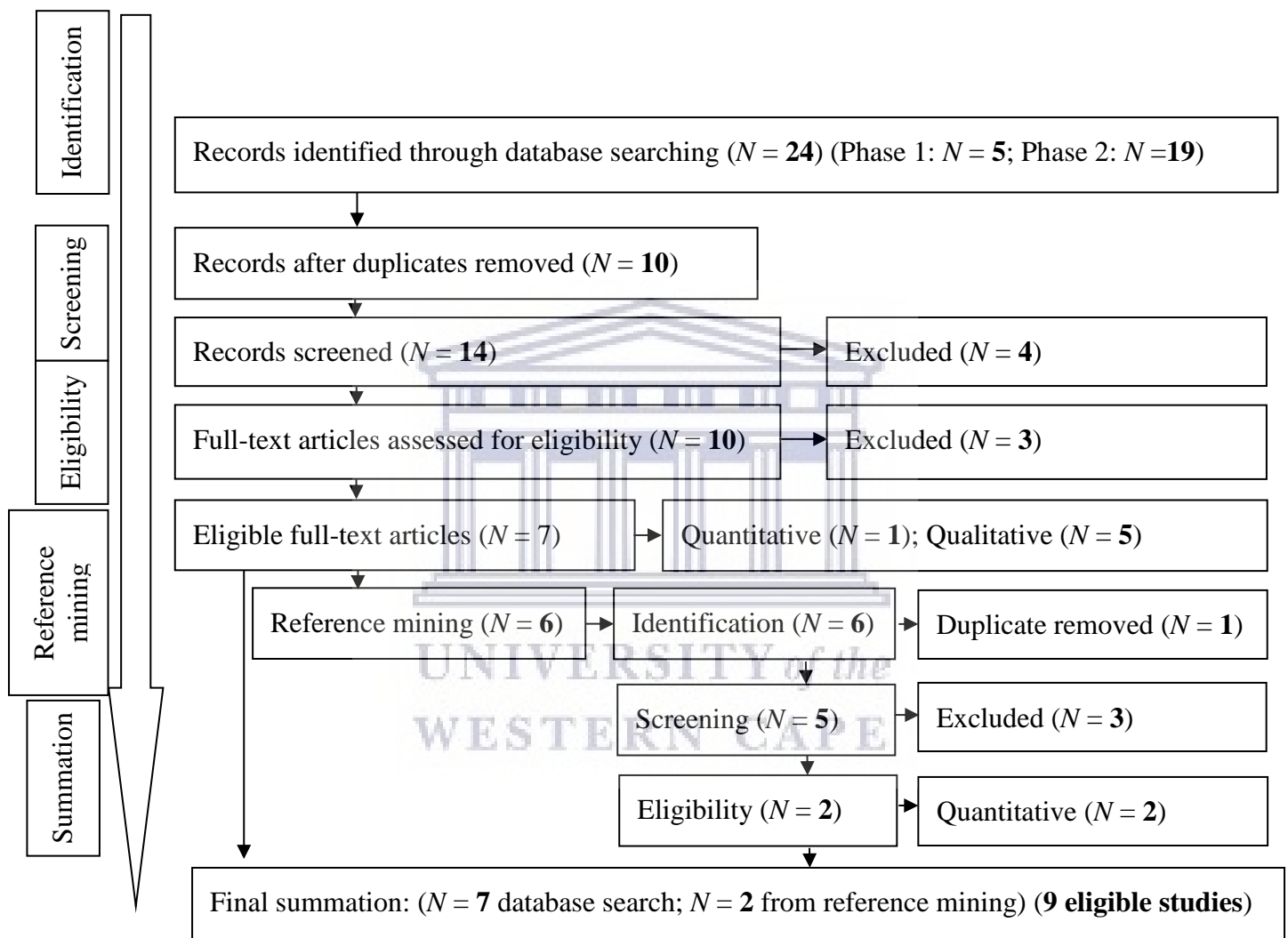


Figure 5. PRISMA Systematic Review

4.1.5 General description of the eligible studies

Comprehensiveness for this study was guided by the logic of the PIO criteria. This evidence-based model was the basis for highlighting similarities, differences and subthemes of the attitudes, beliefs, TB causation and treatment among different population groups from individual studies. While a comprehensive search aimed to identify published literature

across countries in Africa, reviewed literature was prominent within four countries across Africa, namely: Tanzania, Ethiopia, South Africa and Rwanda. These countries identified study populations within fast growing commercial capital cities with large ethnic groups, active pastoral traditions and high levels of unemployment, poverty and marginalised groups who lacked education (Chinenye, 2015; Kigozi et al., 2017; Knutsen, 2010; Sima et al., 2019). Relevancy was due to the airborne nature of the TB disease. The sample consisted of TB patients, prisoners, communities, health care providers (HCPs), religious leaders and so forth.

The methodological frameworks included qualitative (Knutsen, 2010) and quantitative research (Adane et al., 2017; Bati et al., 2013; Chinenye, 2015; Kigozi et al. 2017; Sima et al., 2019; Tola et al., 2016, 2017; Tolossa, Medhin, & Legesse 2014). The research designs consisted of a qualitative explorative design (Knutsen, 2010), randomised control trial (RCT) (Tola et al., 2016) and cross-sectional designs (Adane et al., 2017; Bati et al., 2013; Chinenye, 2015; Kigozi et al. 2017; Sima et al., 2019; Tola et al., 2017; Tolossa et al., 2014). A total of 70 participants were included for the qualitative study that took part in focus group discussions (FGD) ($N = 9$ FGD with four to nine participants each) and individual semi-structured interviews ($N = 15$ interviews). The former sample size was too big according to Dworkin (2012) who proposed an acceptable sample of less than 50 for maintaining data saturation for an in-depth understanding. The RCT involved TB patients ($N = 698$) who took part in 14 Health Centre interventions and 16 Health Centre control groups that were randomly selected (Tola et al., 2016) which allows for a comparison between two groups according to the PIO criteria. Cross-sectional studies involved more than 100 and less than 700 participants ($N = 698, 507, 422, 108, 615, 411, \text{ and } 410$ participants) (Adane et al., 2017; Bati et al., 2013; Chinenye, 2015; Kigozi et al. 2017; Sima et al., 2019; Tola et al., 2017; Tolossa et al., 2014). For both RCT and cross-sectional studies which were quantitative in nature, sample representativeness is important and may be achieved through using (a) threshold numerals; (b) Formulas; or (c) Statistical requirements that are also highlighted in the critical appraisal tool. Thus, all these considerations were tabulated in the next section as this subsection only requires a general summary of studies. Furthermore, the study populations consisted of males and females over the age of 18 in Ethiopia, Rwanda, and South Africa. Data analysis of the qualitative study employed a Systematic Text Condensation in a form of a phenomenological analysis to produce knowledge centred on the

participants' experiences (Knutsen, 2010). The analysis involved transcribing, identification of major themes, units of meaning, extraction of abstract content into meaningful units, refining the content and the interpretation of condensed text (Knutsen, 2010). For the RCT, data was analysed using a multilevel logistic regression analysis was conducted with the MLwin 2.10 software (Tola et al., 2016). Tola et al. (2017) and Sima et al. (2019) analysed data using a chi-square test. Kigozi et al. (2017) and Bati et al. (2013) analysed data using chi-square tests, t-tests and a multiple logistic regression, while Adane et al. (2017), Chinenye (2015) and Tolossa et al. (2014) utilised a binary multiple logistic analysis. The quantitative studies had generalisation properties and determined the effects of sociodemographic factors with beliefs, attitudes, knowledge and practices with regards to TB and treatment adherence and non-adherence.

4.1.5.1 Eligible studies through the database search

An account of included literature was summarised to identify the *Population, Intervention, and outcome* (PIO) criteria based on the abovementioned Table 3.1.2. The characteristics of each eligible study were briefly described using PIO to understand the contexts in which included studies attempted to answer the review questions. Hence, the studies under the subheadings for Phase 1 and Phase 2 were described below:

i) Phase 1: Beliefs

- a. Knutsen (2010), conducted a study titled, *Perceptions and beliefs on tuberculosis and the influence on health seeking behaviour*

The intention of the study was to add to the understanding of people's health-seeking behaviour in the community of Dar es Salaam, Tanzania. Five objectives were to: (1) determine the health-seeking behaviour towards TB; (2) assess the knowledge of the causes, transmission and symptoms of TB; (3) explore the factors that influenced the delays in seeking healthcare at a health facility among community members; (4) explore perceptions and beliefs on TB; and to (5) assess social implications of TB for the patient on family and community levels. A qualitative methodology with an exploratory design was used to enhance an understanding of why people behave the way they do in situations.

The *Population* under study were recruited from both a hospital setting and from a community setting. A total of 70 participants were purposively selected, of which were 32 males and 38 females. Approximately nine focus groups were conducted and included approximately four to nine participants each ($N = 55$). Moreover, there were nine categories for the nine focus groups consisting of TB patients and TB staff from the hospital and females, males and leaders from the general community. Additionally, there were a total of 15 participants who took part in individual semi-structured interviews. The categories for the 15 participants were religious leaders ($N = 4$), TB patients and caretakers ($N = 4$), and TB staff ($N = 4$), and traditional healers ($N = 3$). The inclusion criteria for the selection of participants were as follows: (1) participants who were 18 years old or older; (2) TB patients who were newly diagnosed without being a follow-up patient; and (3) community members if they were religious or influential leaders, traditional healers or care takers, and health workers working with TB patients. For the *Intervention* and/or *treatment* criteria, the mode of data collection was considered as the nine FGD and 15 Individual Interviews. These modes of data collection enabled the researcher to identify the sample's beliefs of treatment and its causes; modes of transmission; resolutions for seeking care and treatment; sociodemographic factors; as well as family and community support. As a result, an in-depth understanding was obtained regarding the patients, healthcare workers and community's knowledge and beliefs about TB, the causes, and factors hindering on treatment adherence.

Finally, the *Outcome* of the study provided clarity regarding the conflicting beliefs about the effectiveness of the biomedical model of treatment today, as well as the traditional intergenerational treatment used within Tanzania. In turn, the general beliefs and perceptions of the participants from both the FGD and individual interviews were that TB was a normalised disease like Malaria. This was expressed by a caretaker in the community: "...now days TB is just a disease like Malaria, not a strange thing" (Knutsen, 2010, p. 35). Participants also shared that TB is a curable disease and could be cured if patients completed their treatment regimens. As a result, one participant stated that he or she was "shocked, but ... since the disease is known now, I will get cured... I was thankful to know the disease I had ... can get medication and get cured" (Knutsen, 2010, p. 35). These positive attitudes relied on their knowledge about the curative purposes of TB treatment and the importance of being cured as TB is infectious and fatal. Few participants believed that TB was a disease given by or planned by God and strongly associated TB with HIV / AIDS. On the other hand,

others felt as though TB and HIV/AIDS were the same. The preconceived ideas from community leaders were that “the moment you say that you have TB, they directly take it negatively since they think TB and HIV/AIDS go hand by hand so if you tell people you have TB they consider that you have HIV/AIDS already” (Knutsen, 2010, p. 32). Furthermore, participants distinguished between the types of TB and the diagnostic measures as expressed in this quote: “I think he should go to a TB clinic for sputum test as there are two types of TB, related to sputum and another related to lungs. So he will have to get the sputum tested and go for x-ray check up” (Knutsen, 2010, p.32). In conflict with the biomedical model of treatment, traditional healers expressed that God can heal TB. Others believed that if TB was cured by people or witches, it cannot be healed at the hospital. Other strong beliefs based on religious affiliations were that abnormal cases of TB were associated with “powers of darkness” therefore TB is associated with “bad spirits so the prayer becomes appropriate and the person gets healed” (Knutsen, 2010, p. 33). Thus, the attitudes towards TB patients influenced the way in which stereotypes were practiced. For example, in the community, the neighbours discriminate against patients. Consequently, a patient shared that he was “isolated ..., they abused me because they knew I couldn’t do anything to them since I was very weak” (Knutsen, 2010, p.47). People in the community also shared that “if you are taking care of a TB patient you must be sure she/he has his own plate, spoon and everything until he is healed” (Knutsen, 2010, p.47). While medical professionals were considered as professionals in the field, a nurse expressed that: “...previous understanding was limited, now-a-day’s people don’t even get surprised, they don’t abandon them, they sit and talk to them nicely” (Knutsen, 2010, p.47). Due to a lack of knowledge and accurate exposure to preventative practices, the beliefs and attitudes of healthcare workers and communities have been distorted. This, in turn, led to either treatment adherence or treatment default based on stereotypes and negative information or experiences.

While qualitative evidence is limited to participants’ experiences, quantitative studies to follow further identify additional beliefs about TB causation and treatment in other countries in Africa. Similar to Knutsen (2010), a study by Tola et al. (2017) below described an objective stance regarding the beliefs of treatment adherence and the effects of the Ethiopian population’s sociodemographic characteristics.

- b. Tola et al. (2017) conducted a study titled, *Effects of sociodemographic characteristics and patients' health beliefs on tuberculosis treatment adherence in Ethiopia: a structural equation modelling approach*

For context, the study's aim was to determine the direct and indirect effects of patients in Ethiopia's sociodemographic characteristics and health beliefs on TB treatment adherence. A Health Belief Model (HBM) conceptual framework was used for Structural Equation Modelling (SEM). A quantitative methodology with a cross-sectional design was used to conduct the study among patients with TB who were on Directly Observed Therapy (DOT) in Addis Ababa.

The study *Population* was situated in Addis Ababa, Ethiopia. They consisted of patients who were diagnosed with active TB. Non-probability sampling was used to select the participants who were on the TB register from 30 Health Centres (HCs) and one hospital. Approximately 57% of males and 42% of females with TB were included in the study. The average age of the participants was 32 years old, and the range was between 18–90 years old. Approximately 55.4% of participants were likely to have had psychological concerns. The *Intervention* used to identify the beliefs about TB was through using a structured questionnaire. The questionnaire used a three-point Likert scale for the response options for each question (I.e.: correct awarded a higher score; incorrect and don't know awarded a lower score). The total knowledge level was scored using a one-dimensional Categorical Principal Component Analysis (CPCA). In order to collect information on the six HBM domains, participants' responses were recorded using a five-point Likert scale ("strongly disagree" awarded the lowest score; and "strongly agree" awarded the highest score). Finally, the total composite index of each construct of the HBM domain was scored using one-dimension CPCA.

In summary, the structured questionnaire was developed using the below variables to align with the HBM domains. Perceived threat was a variable comprised of the perceived susceptibility and severity which was added after computing the separate composite index using one-dimension CPCA. Perceived barriers and/or benefits were determined by subtracting the total score of perceived benefits from the total score of perceived barriers. Psychological distress was measured using Kessler et al.'s 10-item scale and the response for each item was recorded using a five-point Likert scale (ranging from "every time" for a high score to "none of the time" for a low score). For reliability and validity, the questionnaires

were piloted before data collection at the selected study sites and used a Cronbach's alpha for ordinal scales and Kuder-Richardson Formula 20 for binary questions above 0.7. A visual analogue scale was used to assess the patients' treatment adherence which was useful for resource-limited settings and could be self-administered. An example of a question was: "How many of your scheduled medications did you take in the last 30 days (percentage)?" (Tola et al., 2017, p. 4). Those who estimated their adherence level to be above 90% were considered as adherent to TB treatment. Furthermore, the TB patients belonged to one of three categories: (1) those who interrupted their TB treatment and assumed to be adherent was less than 90%; (2) patients who interrupted their treatment for 10 doses or more due to experiencing adverse effects; and (3) those who did not go for follow-ups and were considered as non-adherent. While the technicalities of the intervention aimed to shed light on the subject matter, the outcome generalised the quality of the evidence to follow.

The overall *Outcome* for the treatment adherence level prior to the interview date was 80.5%. The findings revealed that participants with low economic statuses were more likely to be non-adherent (26.5%) than those in the high economic status category (13.6%) ($P < 0.001$). Participants with a high school education or lower (20.7%) were more likely to be non-adherent than those with higher education (10.7%) ($P = 0.030$). The analysis finally revealed that seven sociodemographic characteristics were exogenous observed variables: marital status, age, gender, education level, economic status, psychological distress and knowledge level. The structural equation model included the perceived threats and perceived barriers and/or benefits as dependent variables for the participants' sociodemographic characteristics; while the adherence status was considered as the main outcome variable for perceived threats and perceived barriers and/or benefits. Furthermore, perceived self-efficacy and the cue to action were also portrayed in this model as exogenous variables (independent variables) through perceived threats and perceived barriers and/or benefits. Participants' responses revealed that perceived barriers and/or benefits were shown to have a significant direct negative effect on TB treatment adherence. The adherence level was indirectly affected by cue to action and psychological distress through identifying the participants' perceived barriers and/or benefits.

While interventions were proposed to reduce perceived barriers and maximize perceived benefits, Tola et al. (2017) recommended that interventions should be implemented to

improve treatment adherence. Motivators (I.e.: cue to action) such as the involvement of the patients' friends and family, the media and health workers can aid in the promotion of treatment adherence to transform negative attitudes into outcomes for treatment adherence. Tola et al. (2016) proposed an intervention which was applied through a RCT below.

c. Tola et al. (2016) conducted a study titled, *Psychological and Educational Intervention to Improve Tuberculosis Treatment Adherence in Ethiopia Based on Health Belief Model: A Cluster Randomized Control Trial*

The objective of the study was to evaluate a combined psychological counselling and educational intervention in order to decrease treatment non-adherence based on the HBM in the Ethiopian sociocultural context. A quantitative methodology was appropriate to conduct the clustered Randomized Control Trial (RCT) among TB patients who were on the first line and MDR-TB treatment regimens in Addis Ababa.

The study was conducted with a population of 698 TB patients from 30 randomly selected Health Centres (HCs). There were approximately 14 HCs in the intervention group and 16 HCs in the control groups. Both groups were on treatment for approximately two months. From the study population, a total of 368 participants were randomly selected using simple random sampling. The intervention was to investigate the beliefs about TB treatment.

The *Intervention* allowed for the collection of data regarding the beliefs and treatment among those in the control and intervention group. The intervention therefore aligned with the requirements of the RCT. A total of 330 patients were enrolled into the control group and were provided with no intervention. The time period of treatment for newly diagnosed TB participants was six months under the DOTS regimens. Non-adherent and MDR-TB patients were not followed-up until they completed their full course of treatment regimens. At the end of this period, approximately 94% of patients were included in the analysis and consisted of the intervention group ($N = 344$), control group ($N = 297$) and approximately 17 defaulters. All defaulted participants were considered as non-adherent. The age range of participants was 18 to 90 years, while 66% of participants were younger age 35 years. There were more males (57%) than females (43%) in the study. From this control trial, the following results were revealed regarding the beliefs about treatment.

The *Outcome* revealed that approximately 15% of participants were at risk of an alcohol disorder, while 8.6% were smokers. Moreover, 49% of participants were manifested with mild to severe psychological disorders. Regarding treatment, there was a significant difference between treatment adherence and non-adherence regarding the knowledge level and the mean score of each HBM domain. Following the prescribed psychological counselling and educational interventions, a statistically significant difference was observed between the control and intervention groups with respect to the non-adherence level. The multilevel logistic regression analysis revealed a significant association with treatment non-adherence regarding Anti-retroviral treatment (ART) status, marital status, economic status, current smoking history, and alcohol disorder.

ii) Phase 2: Attitudes

- d. Kigozi et al. (2017) conducted a study titled, *Tuberculosis knowledge, attitudes and practices of patients at Primary Health Care (PHC) facilities in a South African metropolitan: research towards improved health education.*

The aim of the study was to measure TB-related knowledge, attitudes and infection control practices of patients attending Primary Healthcare (PHC) facilities. A quantitative methodology with a cross-sectional design was employed.

Moreover, the study *Population* consisted of all patients, including TB patients, who were older than 17 years of age. Patients attended services across the 40 PHC facilities in Mangaung. The sampling criteria included a 5% margin of error and a confidence interval (CI) of 95%. Convenience sampling was used and generalisability was ensured through oversampling. The inclusion criteria comprised of patients: (1) who were registered and were seeking TB services; and (2) those who generally did not have TB and were seeking non-TB related services. A total of 507 patients above the age of 17 years were selected among one of 40 PHC facilities in the Mangaung Metropolitan.

The *Intervention* used was a questionnaire that was administered by the fieldworker. The questionnaire included the following subsections: 1) sociodemographic information, 2) knowledge about TB, 3) attitudes towards TB, and 4) infection control practices. Participants' sociodemographic characteristics included age, sex, formal education, employment status and the location where patients attended PHC services. Furthermore, there were nine items used

to measure patients' knowledge about TB aetiology, transmission, susceptibility, and treatment. Participants' attitudes were measured using a list of 15 items about perceptions of care and treatment, views about infection control at PHC facilities, views regarding medication, risk perception, health control, and concerns about other patients knowing their TB status. A five-point Likert scale was used as response options for the questionnaire.

The *Outcome* of the study revealed that most of the participants knew that TB transmission was facilitated by crowded conditions (84.6%) and the contagiousness of pulmonary TB (73.0%). Approximately 85% of participants believed that people could get TB from kissing (65.0%) or sharing toothbrushes (85.0%). Majority of participants perceived TB to be serious (89.7%), and about 97.2% of participants agreed that patients should adhere to the treatment course. About 97% believed that preventative measures for spreading or transmitting TB included opening windows in PHC facilities. Adopting good infection control practices enhanced the likelihood among those who were TB patients, employed and gaining information about TB infection control from a PHC facility. While this study was conducted in the community of patients, Adane et al. (2017) attempted to explore the attitudes among Ethiopian prisoners for the TB control management below.

e. Adane et al. (2017) conducted a study titled, *Tuberculosis knowledge, attitudes, and practices among northern Ethiopian prisoners: Implications for TB control efforts*

The study's aim was to measure the level of knowledge, attitudes, and practices of prisoners about the TB disease and the related factors. A quantitative methodology and a cross-sectional design were used. This was part of a baseline measurement for an educational interventional study to increase TB screening and case detection in Ethiopian prisons.

The study *Population* was selected among eight northern Ethiopian prisons located in Tigray (Mekelle, Abi Adi, Alamata, Humera, and Wukro) and Amhara (Dessie, Debre Tabor, and Finote Selam) in 2016. Ethiopia was ranked tenth among the 22 high TB burden countries in 2015. Thus, researchers sought to understand the context of prisoners in confinement with limited resources to educational services compared to that of the community. A multistage cluster sampling technique was used to select prisons and prisoners aged 18 years and older.

The *Intervention* involved collecting data from 615 prisoners using a semi-structured standardized questionnaire in 2016. The questionnaire was designed in English following the

WHO guidelines and was translated into the local languages, Amharic and Tigrigna. The questionnaire consisted of 38 questions. The first section to the questionnaire addressed the socio-demographic characteristics and prison history; while the second section addressed aspects related to TB knowledge, attitudes, and practices. Questions identified the aetiology, transmission, prevention, and treatment of TB, beliefs, and feelings about TB and patients.

Consequently, the *Outcome* of the study revealed a low level of knowledge among the prisoners regarding TB causation and consequences of non-adherence to TB treatment. Participants' knowledge on the transmission, symptoms, and prevention was fairly high. Health education interventions mostly centred on the cause and the translation of the knowledge to appropriate practices. Out of 615 prisoners, only 37.7% mentioned bacteria as a cause of TB; while 21.7% related TB to exposure to cold air. Approximately 88% of prisoners mentioned the aerial route of TB transmission and 27.3% had perceived stigma towards TB. However, 63.7% of prisoners were unaware of the possibility of getting multi-drug-resistant strains when they were non-adherent to treatment. Only 24% knew the basic elements about TB, while 41% had favourable attitudes, and 55% had a good practice. Thus, illiterate participants were found to be less knowledgeable and less likely to have a favourable attitude, and less likely to practice good outcomes of TB adherence.

While prisoners ought to transition to the community after being rehabilitated back into society, it is important to also understand the communities' attitudes toward TB which was described by Bati et al. (2013) below.

- f. Bati et al. (2013) conducted a study titled, *Community's knowledge, attitudes and practices about tuberculosis in Itang Special District, Gambella Region, South Western Ethiopia*.

The aim of the study was to assess the knowledge, attitude, and practice regarding TB of a community in South Western Ethiopia. A quantitative community-based cross-sectional study was conducted in a randomly selected eight rural kebeles. Kebeles are smaller administrative units within the community.

Thus, the study *Population* comprised of a total of 422 study participants. Approximately 58.5% were males and 41.5% were females; ranging in age from 19-81 years. The sample was purposively selected. The average age of the study participants was 37 years old.

Approximately 50.7% of participants were illiterate while 70.9% were pastoralists. The sample was stratified according to their ethnic groups, namely: (1) Anywa ($N = 30.1\%$), (2) Nuer ($N = 66.6\%$), and (3) Opwo ($N = 3.3\%$). The majority of the participants belonged to the Protestant religion ($N = 78.4\%$) and Seventh day Adventist ($N = 11.4\%$) which may also affect their beliefs regarding TB.

The *Intervention* used was by collecting data through pre-tested structured questionnaires. The original language of the questionnaire was English. The questions were asked directly by translating them into the local languages orally (Nuer, Anywa, and Opwo). Clarity, consistence, and cultural acceptability were ensured when the questionnaire was developed. A total of three nurses conducted the interviews and were fluent in speaking and writing of these indigenous languages. Each nurse possessed a language diploma.

The *Outcome* through the study's results revealed that the knowledge about the causes and signs and/or symptoms of TB was general knowledge among 94.3% of those who have heard about TB. The sources of information for the participants were TB patients (37.7%), health extension workers (41.9%), relatives and/or family members (34.4%), television (1.6%), school (15.6%) and the public radio (0.95%). The primary causes of lung TB (i.e.: pulmonary TB [PTB]) as regarded by the participants were alcohol consumption (42.7%), germs and/or bacteria (3.3%), exposure to cold air (16.6%), and smoking (13.9%). The primary cause of tuberculosis lymphadenitis (TBL) was mentioned as exposure to cold wind (26.1%), smoking (17.5%) and ingestion of fresh cows' milk (16.6%). Hemoptysis (60.2%), emaciation (14.7%) chest pain (30.8%), and cough for two weeks or more (9.9%) were mentioned as the main symptoms of PTB. Approximately 51.1% of the participants mentioned that PTB may be transmitted through coughs. A further 31.3% of participants mentioned that both PTB and TBL could be transmitted through sharing of drinking utensils. About 15% of the participants mentioned that they immunize their children with Bacillus Calmette–Guérin (BCG) vaccine to protect against PTB and TBL. Hygiene was also a preventative measure for both PTB and TBL as mentioned by approximately 29.2% of the study participants.

Overall, a total of 243 study participants had a good level of knowledge about TB. However, the female participants and participants from Nuer site had low levels of knowledge about the TB disease. The age groups of 30–44 years old as compared to 19–29 years old well educated participants revealed a good level of overall knowledge about the TB disease. Regarding the

community's attitudes, 58% of participants described PTB as a killer disease even after adhering to treatment. On the other hand, 34.1% mentioned that PTB affects only people in poverty areas. Approximately 7.1% of participants disclosed that they do not share food and drink with TB patients, while 59% of participants described TB patients as being disgraceful, which was highly reflected among participants from the site in Nuer (85.8%). Approximately 40.8% of the participants had a positive attitude toward TB, with a significant association with a high educational level of the study participants. A low favourable attitude was significantly associated with the female gender. Moreover, the employment status of the participants other than the pastoralists was also associated with a favourable attitude towards TB. Overall, the practice of the communities showed less than half of the participants (45.9%) had good practices of prevention and TB control.

While the knowledge, attitudes, and practices within the community were significant contributors to TB treatment adherence and enhanced the knowledge about causation, Sima et al. (2019) explored a similar phenomenon among HCPs.

g. Sima et al. (2019) conducted a study titled, *Health care providers' knowledge, attitude, and perceived stigma regarding tuberculosis in a pastoralist community in Ethiopia: a cross-sectional study.*

The study aimed to explore HCPs' knowledge, attitudes and perceived stigma regarding the TB disease, as well as their perception regarding integrated practices with Traditional Healers (THs) on the TB control in the Kereyu pastoralist community in Ethiopia. A quantitative methodology with a descriptive cross-sectional design was used to conduct the study.

The study *Population* included a total of 108 HCPs. During the study period, the district had one district hospital, four health centres, and 18 health posts of which all were health facilities and where available HCPs were selected to participate. The included district was Kereyu and a hospital in Metehara Sugar Corporation called Merti Hospital.

Furthermore, the *Intervention* used to collect data was through using semi-structured and self-administered questionnaires. The survey comprised of 71 questions. The sections were namely: (1) sociodemographic characteristics; (2) the knowledge of TB; (3) attitudes; (4) perceived stigma about TB; and (5) perception of integrated practices with traditional healers.

Interestingly, the *Outcome* of the study revealed that approximately 64% of the HCPs had a poor overall knowledge about TB. A further 67.6 % and 57.6% had limited knowledge with regards to the TB diagnosis and airborne nature of the TB disease respectively. Moreover, approximately 66.7% and 55.6% of the HCPs had hostile attitudes towards the TB disease and TB control systems respectively. While we are living in the twenty-first century, which dominates in the Biomedical model of treatment for communicable diseases, about 60.2% of HCPs were willing to collaborate with traditional healers on the TB control activity. Hence, about 63% of the HCPs did not have TB-related training, while 65% of the respondents had worked in the TB unit for more than six months. Regarding knowledge on the causes, approximately 89.7% of participants reported that TB affects the lungs, while 7.4, 1.9 and 0.9% stated it affects the kidney, bones and abdominal organs. Moreover, a major risk factor identified for the transmission of the TB disease was close household contact with an active TB patient, while 5.6%, 9.3% and 5.6% believed that risk factors for the spread included overcrowding, humidity and poor nutrition.

Regarding attitudes, approximately 53.7% of the HCPs had an unfavourable attitude towards the TB disease and 55.6% had an unfavourable attitude towards the TB control systems. Approximately 66.7% of the HCPs had hostile attitudes toward patients with TB.

Furthermore, two additional studies below were identified from the reference list of Adane et al. (2017) and Bati et al. (2013), respectively.

4.1.5.2 Eligible studies through reference mining

- h. Tolossa et al. (2014) conducted a study titled, *Community knowledge, attitude, and practices towards tuberculosis in Shinile town, Somali regional state, eastern Ethiopia: A cross-sectional study.*

For a context, the main objective was to assess the Ethiopian community's knowledge, attitude, and practices towards the TB disease. A quantitative community-based cross-sectional design was used.

The study *Population* involved 410 randomly selected participants from among four villages in Shinile town, Ethiopia. Participants were aged 18 years and older. Simple random sampling was used to select participants and then calculated proportionally based on the

selected villages and number of households. From each of the selected villages, households were further selected using systematic random sampling techniques to participate in the interviews.

The *Intervention* involved collecting data using a standardized questionnaire consisting of questions on sociodemographic characteristics of the study participants and their knowledge, attitudes and practices towards the TB disease. The WHO guidelines and literature on a similar topic contributed to the development of the questionnaire. The data was further collected through face to face interviews. Interviews were conducted in the participants' local language at their homes.

The *Outcome* of the study revealed that about 94.9% of the participants never heard about the TB illness, and 22.9% had knowledge about the causes of TB. Approximately 80% were aware that TB could spread from a patient to another person, while 79.3% knew this could be prevented. The symptoms were a persistent cough (72.4%) and modern medication used in health institutions (68.1%) was preferred among patients. Approximately 71.0% of participants mentioned that they would seek treatment at health facilities if they realized that they had symptoms related to TB. Furthermore, approximately 69.3% of participants feared contracting TB. Individuals with a high school educational level had more knowledge of the TB disease compared to illiterate individuals.

Furthermore, a study by Chinenye (2015) explored TB patients' knowledge, attitudes, and practices about the TB disease below.

- i. Chinenye (2015) conducted a study titled, *Evaluation of Knowledge, Attitude and Practices of TB Diagnosed Patients in Rwanda towards TB Infection. Case of TB Diagnosed Patients in Kigali Urban and Rural Health Facilities.*

The main objective of the study was to assess the knowledge, attitudes and practices towards TB infection among patients who were diagnosed with TB in Rwanda. A quantitative methodology and a cross sectional analytic survey was used for the study. The population involved in the study is described below.

The *Population* included diagnosed TB patients who were on treatment and those who had completed their course of treatment. The patients were enrolled in the Kigali Rural and Urban health facilities from 2011 to 2012.

The *Intervention* used to explore the topic included questionnaires on participants' sociodemographic characteristics, knowledge, attitudes and practices. Face to face interviews were conducted by trained community health workers from the health centre during their daily treatment routine.

The *Outcome* of the study revealed that the diagnosis of TB may lead to increased anxiety or tension. Participants were mostly worried during their prolonged treatment and feared the transmission of TB, stigma, quality of life and threatened self-esteem. There were some stigmatizing attitudes and indignant behaviours of the community members towards the participants, while most people were excluded (53.8%) and avoided (44.5%). Findings revealed that the social concept of TB in the community influenced the projection of negative attitudes like seclusion or stigmatization toward TB patients. Community stigma stemmed from a perceived risk of the TB infection and perceived link between TB and poverty. As a result, TB patients experience condemnation, disgrace, and marginalization by the society. Social stigma with a lack of understanding of TB led to delays in seeking treatment and poor adherence to therapy. Findings of this study revealed that the negative attitude may add to the illness burden in diverse ways.

4.1.5.3 Conclusion for beliefs and attitudes about TB causation and treatment

In conclusion, the overall picture of the beliefs about TB causation and treatment becomes deep-rooted in one's psychosocial reactions towards TB (Chinenye, 2015). Uncovering the beliefs associated with the TB causation and treatment (Tola et al., 2016, 2017) may reveal the state of a community's ideology and health system or the misconceptions and/or miscommunication and negative or positive experiences in the face of TB (Knutsen, 2010). Currently, TB is a preventable disease and may be co-infected with HIV. However, HIV is a long-standing incurable illness. Both TB and HIV are treated in an integrated manner as per the WHO and UN health regulations (WHO, 2019) which brings about confusion as to whether TB and HIV are of the same nature regarding the illness and treatment. Moreover, there are unidentifiable TB mortality and morbidity figures that may extend beyond the

health system. It surpasses the conflicting treatment methods proposed by traditional healers who are not experts in the medical field (Knutsen, 2010; Sima et al., 2019). Therefore, researchers ought to strengthen measures for mutual communication between the patients and providers for treatment adherence and the TB control at grass root levels (Chinenye, 2015).

4.2 Descriptive meta-synthesis

This subsection involves two operational steps, namely: (1) the ranking of included studies; and (2) a final summary of the extracted data for the final review.

4.2.1. Ranking eligible studies

The articles were ranked from the highest to lowest overall threshold scores based on the appraisal of eligible full-text studies. The highest rank showed stronger methodological rigour as assessed by the scoring system presented in Chapter two. Table 4.2.1a below summarised the ranked scores as per included study, and the representation of excellent (😊) and strong (😊) ranking were illustrated by excited and smiling emoticons respectively.

Table 4.2.1a: Ranked scores of full-text studies assessed for eligibility

Rank no.	Authors	Database	Appraisal category	Final appraisal score
1	Chinenye (2015).	Medline (Pubmed)	Excellent 😊	😊 84.4%
2	Knutsen (2010).	UWC library	Excellent 😊	😊 82.2%
3	Tolossa et al. (2014).	Medline (Pubmed)	Strong 😊	😊 77%
4	Tola et al. (2016).	Ebschost	Strong 😊	😊 73.3%
4	Bati et al. (2013).	Springer BMC	Strong 😊	😊 73%
5	Tola et al. (2017).	Ebschost	Strong 😊	😊 71.1%
5	Adane et al. (2017).	Ebscohost	Strong 😊	😊 71.1%
5	Kigozi et al. (2017).	Springer Link, BMC	Strong 😊	😊 71.1%
5	Sima et al. (2019).	Springer Link, BMC	Strong 😊	😊 71.1%

From Table 4.2.1a above, majority of the eligible studies ($N = 9$) revealed a strong to excellent ranked score with methodological rigour. There were more strong ranked studies ($N = 6$) than excellent ranked studies ($N = 3$) as described below.

4.2.2 Ranking based on the subsections within the appraisal tool

The critical appraisal tool included eight main items as mentioned in Chapter two. The ranking of the studies was discussed according to the main items. Overall, the included studies were generally ranked with strong to excellent threshold scores to represent the studies' methodological rigor. The maximum score each study was able to achieve was 45. This overall score was based on the scores obtained from the eight main items and their respective sub-items. For example, the main items with their respective maximum scores for each main item were namely: Purpose ($N = 5$), Study Design ($N = 7$), Ethics ($N = 6$), Data collection ($N = 7$), Data analysis ($N = 5$), Sample ($N = 8$), Result ($N = 3$), and Conclusion ($N = 4$). Table 4.2.2 below illustrates how each study was appraised, ranked and the overall threshold score obtained per study. Lastly, each study was ranked in descending order according to the strength of the threshold scores to show the overall methodological rigor.

Table 4.2.2: Ranking of individual studies and their sub-scores

no.	Authors	Quality	Purpose (5)	Study Design (7)	Ethics (6)	Data collection (7)	Data analysis (5)	Sample (8)	Result (3)	Conclusion (4)
1	Chinenye (2015).	😊 84.4%	5	6	6	5	5	6	2	3
2	Knutsen (2010)	😊 82.2%	4	7	6	2	5	7	2	4
3	Tolossa et al. (2014).	😊 77%	4	4	6	6	5	6	2	2
4	Tola et al. (2016).	😊 73.3%	4	4	4	5	4	5	3	4
4	Bati et al. (2013).	😊 73%	5	4	3	5	4	6	3	3
5	Tola et al. (2017).	😊 71.1%	4	4	3	6	4	5	3	3
5	Adane et al. (2017).	😊 71.1%	4	4	3	5	4	6	3	3
5	Kigozi et al. (2017).	😊 71.1%	5	3	3	4	4	6	3	4
5	Sima et al. (2019).	😊 71.1%	4	4	6	6	4	4	2	2

4.2.2.1. The Eight Main Items of the Critical Appraisal Tool

In this subsection, the nine eligible studies were described based on the eight main items as presented in the critical appraisal tool (Appendix C). Each item was described using the scoring system and the study's ranking for each item. The code for ranking the eligible studies was based on the score obtained for each of the main items ($N = 8$). The rankings were as follows: (1) excellent ranking was an excited emoticon (😊); (2) strong ranking was a smiling face emoticon (☺); (3) moderate ranking was a neutral emoticon (☹); and (4) a weak ranking was presented using a worried emoticon (😟).

a) Purpose

The first main item was to categorise the *purpose* of the eligible studies through identifying the reference details, namely; the author, year, title and source; as well as the reason why the studies were conducted based on their background or context, problem statement, rationale and the aims. The questions and scoring system were illustrated, whereby a “yes” answer scored the study a one and a “no” answer scored the study a zero. Thus, the highest score obtained for this item was a total of five. A total of three studies obtained a full five out of five points ($N = 100\%$ 😊), namely: Chinenye (2015), Bati et al. (2013) and Kigozi et al. (2017). There were six studies that obtained four out of five ($N = 80\%$ ☺), namely: Sima et al. (2019), Tola et al. (2017), Tola et al. (2016), Adane et al. (2017), Tolossa et al. (2014) and Knutsen (2010). All of these studies had high threshold scores. There was therefore minimal concern regarding this item.

b) Study Design

The second main item was to identify the *study design* of the eligible studies through identifying their theoretical framework, study design and motivation, elements of the design, as well as whether the aim and study design complimented the entirety of the eligible study. For Questions 1 to 5, a “yes” answer scored the study a one, and a “no” answer scored the study a zero. Question 6 emphasized the relevance of the research design based on the nature of the aim and awarded studies with zero points for minimal to no relevance; one point if there was moderate relevance; and two points if the study's aim and design was highly relevant. The highest score obtained for this item was a total of seven. There was one study

that obtained the full seven out of seven points ($N=100\%$ 😊) and one study achieved six out of seven ($N = 85.7\%$ 😊), namely, Knutsen (2010) and Chinenye (2015) respectively. These two studies still maintain the highest overall threshold scores with excellent methodological rigor for the scope of this thesis. However, majority of the studies ($N = 7$) obtained threshold scores with moderate (😐) ranked scores, namely: Bati et al. (2013), Tola et al. (2017), Tola et al. (2016), Adane et al. (2017), Tolossa et al. (2014), Kigozi et al. (2017) and Sima et al. (2019). While a moderate rank is considered an average score, it also shows that authors have minimally explained or motivated the research design.

c) Ethics

The third main item was to identify the *ethics* procedure of the eligible studies. The following were identified: ethics approval, as well as how issues of confidentiality, anonymity, withdrawal, and informed consent was obtained and reported on. The questions and scoring system were illustrated. For Questions 1 and 2, a “yes” answer scored the study a one, and a “no” answer scored the study a zero. Question 3 considered four important ethics requirements for empirical evidence and a total of four points were awarded if the study discussed all four requirements. Four of the studies obtained the full six out of six points ($N = 100\%$ 😊), namely: Knutsen (2010), Chinenye (2015), Tolossa et al. (2014) and Sima et al. (2019). The rest of the studies obtained a moderate score ($N = 50\%$ 😐) for this item, namely: Bati et al. (2013), Tola et al. (2017), Adane et al. (2017), Kigozi et al. (2017) and Tola et al. (2016). All of the studies still met excellent to average threshold scores for ethics based on what was reported on by the authors.

d) Data Collection

The fourth main item was to identify the *data collection* procedure of the eligible studies. For Questions 1 to Three, a “yes” answer from the researcher scored the sub-item a one, while a “no” answer received a score of zero. This depended on whether the data collection methods were reported on and motivated as well as whether the methods were appropriate for the research outcomes. Questions 4 and 5 were for either qualitative or quantitative methodological frameworks. Question 4 was chosen for quantitative studies ($N = 6$). If the study reported on important criteria, a “yes” answer scored the study a one and a “no” answer scored the study a zero if a sub-question was not reported on. Thus, a total of four points

could be awarded to Question 4. The quantitative important criteria involved identifying whether the study reported on the psychometric properties used, the scale used for the sample group, reporting on the type of data produced by the instrument, and whether an appropriate data analysis procedure was used. Question 5 was answered if the study was qualitative ($N = 1$). A total of four points was awarded if all the sub-questions were given a “yes” answer. The important criteria to obtain a total of all four points were to report trustworthiness, reflexivity, credibility, and respondent validation. However, if a sub-question was not reported on, a “no” answer scored the individual sub-question a zero. Therefore, Questions 4 and 5 had a maximum score of four points per question.

The majority of studies obtained strong threshold scores ranging from five to six out of seven ($N = +71\%$ 😊), namely: Chinenye (2015), Bati et al. (2013), Tolossa et al. (2014), Tola et al. (2017), Tola et al. (2016), Adane et al. (2017) and Sima et al. (2019). However, two studies obtained a weak ($N = 28\%$ 😞) to moderate ($N = 57\%$ 😐) threshold score, namely: Knutsen (2010) and Kigozi et al. (2017). While Knutsen (2010) had the weakest rank, it remains an overall excellent threshold score for methodological rigor. However, this requires more consideration regarding the rigor and trustworthiness for data collection.

e) Data Analysis

The fifth main item was to identify the *data analysis* procedure of the eligible studies. This item awarded a study with a total of five points as there were five sub-questions. The researcher identified whether the data analysis methods were made explicit and motivated. Data analysis procedures were scrutinised based on its appropriateness and relativity to the research question, conclusions drawn to support the data, and whether it supported the type of sampling method employed. A “yes” answer for a sub-question scored one point and a “no” answer scored the sub-question zero points. A total of three studies obtained five out of five points ($N = 100\%$ 😊), namely: Knutsen (2010), Chinenye (2015) and Tolossa et al. (2014). Furthermore, the rest of the studies obtained a strong ranking (😊), namely: Bati et al. (2013), Tola et al. (2017), Tola et al. (2016), Adane et al. (2017), Kigozi et al. (2017) and Sima et al. (2019). There were therefore minimal implications for the results of individual studies.

f) Sample

The sixth main item was to identify the *sampling* procedure of the eligible studies. This item awarded a study with a total of eight points as there were eight sub-questions. The researcher identified the following: (1) the sample source, (2) inclusion and exclusion criteria, (3) motivation for the sampling method, (4) appropriateness of the sampling method, and (5) the techniques used to ensure optimal sample size. A “yes” answer for a sub-question scored one point and a “no” answer scored zero points. For Sub-question 5, the researcher identified the process of how the sample size was determined and awarded zero points if it was not reported, one point if the study used threshold numbers, two points if formulas were reported on, three points if statistical requirements were reported on, and three points were awarded if data saturation was met. These points depended on whether the studies were quantitative or qualitative. There were six studies that obtained an excellent ($N = + 87.5 \text{ } \text{☺}$) to strong score ($N = 75\% \text{ } \text{☺}$) for this item, namely: Knutsen (2010), Chinenye (2015), Bati et al. (2013), Tolossa et al. (2014), Kigozi et al. (2017) and Adane et al. (2017). Furthermore, three studies obtained a moderate ranking ($N = + 50\% \text{ } \text{☹}$), namely: Tola et al. (2017), Tola et al. (2016) and Sima et al. (2019). While the majority of studies obtained an excellent to strong threshold, it is important to inquire about the generalisability of the eight studies which are quantitative, while only Knutsen (2010) is qualitative and doesn't require generalisability.

g) Results

The seventh main item was to identify the *results* procedure of the eligible studies. This item scored a study a total of three points. However, the latter depended on whether the eligible studies were qualitative or quantitative. For the qualitative study ($N = 1$), a “yes” answer was awarded if an individual sub-question was reported. However, a “no” answer was awarded if an individual sub-question was not reported. The same scoring system applied for the three quantitative sub-questions. A total of five studies obtained the full three out of three points ($N = 100\% \text{ } \text{☺}$), namely: Bati et al. (2013), Tola et al. (2017), Tola et al. (2016), Adane et al. (2017) and Kigozi et al. (2017). Furthermore, there were four studies that obtained a moderate rank ($N = + 66.6\% \text{ } \text{☹}$), namely: Sima et al. (2019), Knutsen (2010), Chinenye (2015) and Tolossa et al. (2014). While there were studies with moderate ranking, more information may help to understand the context of the studies.

h) Conclusion

The last main item was to identify the *conclusion* of the eligible studies. This item scored a study a total of four points as there were four sub-questions. The researcher identified whether a clear conclusion statement was made, whether it supported the overall findings of the eligible study, if relevant recommendations were linked to the findings, and whether limitations were reported. A “yes” answer for a sub-question scored one point and a “no” answer scored zero points. A total of three studies obtained the full four out of four points ($N = 100\%$ 😊), namely: Chinenye (2015), Tola et al. (2016) and Kigozi et al. (2017). Furthermore, there were four studies that obtained a strong ranking ($N = 75\%$ 😊), namely: Knutsen (2010), Bati et al. (2013), Tola et al. (2017) and Adane et al. (2017). Moreover, there were two studies that obtained a moderate ranking ($N = 50\%$ 😊), namely: Sima et al. (2019) and Tolossa et al. (2014).

4.2.3 Final summation of results

For the final summation of results, the tables for each main operational step for the Method of Review provided an illustration of how studies were identified, screened by their abstracts, the appraisal for eligibility and the reference mining procedure. The tables are presented in Appendices A to G, which are attached.



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CHAPTER FIVE

5. The study's discussion and conclusion

This study aimed to systematically review literature with methodological rigour on people's beliefs and attitudes regarding tuberculosis causation and treatment in Africa. A brief account of eligible studies was summarised on this subject matter to highlight the following themes, namely: (1) context for TB; (2) beliefs of TB causation and treatment in Africa; (3) attitudes of TB causation and treatment in Africa; and (4) the recommendations and implications for the TB control. These themes provided answers to the review questions, along with the discrepancies in literature regarding TB control within specific countries. The researcher concluded this study with discussions based on the following considerations, namely: (1) Limitations, (2) Conclusion, the significance of the results, and recommendations, and (3) Implications for Research and Practice. A brief description of the overall context of eligible studies follows below.

5.1 Discussion of eligible studies

Using two strings of Boolean terms and index keywords, databases were searched by means of a refined search strategy (Brusilovsky et al., 2010). Database searches and reference mining yielded a total of 36 studies. Thereafter, studies were examined and appraised for methodological rigor in which a total of nine eligible studies were generated. Through the critical appraisal of key findings, these nine studies were considered relevant for answering the review questions. The scarcity of evidence verified the lack of data with methodological rigor on this topic.

Coherence for this topic was guided by the logic of the PIO criteria and the Health Belief Model (HBM). Through using this evidence-based model and conceptual framework, the misconception of the TB disease was operationalised in relation to five prominent themes within current literature, namely: (1) TB; (2) beliefs; (3) attitudes; (4) causation, modes of transmission, and susceptibility; and (5) treatment. Existing preeminent literature also emerged on the subthemes of knowledge, practices, and sociodemographic factors associated with TB patients, communities, and health care providers (HCPs). Furthermore, sociodemographic factors also revealed significant associations with the domains of the HBM, namely the perceived: (a) susceptibility, (b) severity, (c) benefits, and (d) barriers of

the illness (Glanz et al., 2008). Due to the airborne nature of TB, the prominence of its effects is maintained by people's varied ideologies which may influence their health-seeking behaviours as well as treatment initiation, adherence, non-adherence and default (WHO, 2019). The latter was associated with the contexts of each country's scholarship of research areas with regards to the prevalence of TB.

The reviewed studies were conducted within four countries across Africa, namely: Tanzania, Ethiopia, South Africa, and Rwanda. Populations were located in fast growing commercial capital cities with large ethnic groups, active pastoral traditions and those with high levels of unemployment, poverty and marginalised groups who lacked education (Chinenye, 2015; Kigozi et al., 2017; Knutsen, 2010; Sima et al., 2019). The study populations consisted of TB patients, prisoners, communities, HCPs, and religious leaders, among others.

The methodological frameworks were qualitative (Knutsen, 2010), as well as quantitative (Adane et al., 2017; Bati et al., 2013; Chinenye, 2015; Kigozi et al., 2017; Sima et al., 2019; Tola et al., 2016, 2017; Tolossa et al., 2014). The research designs consisted of a qualitative explorative design (Knutsen, 2010), randomised control trial (RCT) (Tola et al., 2016), and cross-sectional designs (Adane et al., 2017; Bati et al., 2013; Chinenye, 2015; Kigozi et al., 2017; Sima et al., 2019; Tola et al., 2017; Tolossa et al., 2014). The sample of the qualitative study was 70 participants who took part in FGD ($N = 9$ FGD with 4 to 9 participants each) and individual semi-structured interviews ($N = 15$ interviews). The RCT involved TB patients ($N = 698$) who took part in 14 Health Centre interventions and 16 Health Centre control groups that were randomly selected (Tola et al., 2016). Cross-sectional studies involved more than 100 and less than 700 participants ($N = 698, 507, 422, 108, 615, 411, \text{ and } 410$ participants) (Adane et al., 2017; Bati et al., 2013; Chinenye, 2015; Kigozi et al., 2017; Sima et al., 2019; Tola et al., 2017; Tolossa et al., 2014). The study populations consisted of both male and female participants aged 18 and older in Ethiopia, Rwanda, and South Africa. Moreover, data analysis of the qualitative study employed a Systematic Text Condensation in a form of a phenomenological analysis to generate data on the participants' subjective experiences (Knutsen, 2010). The analysis involved transcribing, identifying the main themes, units of meaning, extraction of abstract content, refining the content and the interpretation of condensed text (Knutsen, 2010). For the RCT, data was analysed using a multilevel logistic regression analysis conducted with the MLwin 2.10 software (Tola et al.,

2016). Tola et al. (2017) and Sima et al. (2019) analysed data using a chi-square test. Kigozi et al. (2017) and Bati et al. (2013) analysed data using chi-square tests, t-tests, and a multiple logistic regression, while Adane et al. (2017), Chinenye (2015) and Tolossa et al., 2014 utilised a binary multiple logistic analysis. The quantitative studies had generalisation properties and determined the effects of sociodemographic factors associated with beliefs, attitudes, knowledge, and practices with regards to TB and treatment adherence and non-adherence.

To understand the study populations' beliefs and attitudes, both Chinenye (2015) and Tola et al. (2017) used conceptual frameworks to understand the national TB programmes on knowledge, attitudes and practices, and the HBM. The following subsection will further explore the five themes that emerged from the findings, namely: (1) a context of TB; (2) beliefs about TB causation and treatment in Africa; (3) attitudes about TB causation and treatment in Africa; and (4) recommendation and implications for TB control.

5.1.1 A context of TB

Approximately 53 million people were cured of the TB disease in the years 2000 to 2016 (WHO, 2017). However, TB remains the ninth highest cause of global fatality (WHO, 2018). About 10.4 million people suffered from ill health due to the TB disease, while 1.7 million people were deceased (WHO, 2018; UN, 2018). Approximately 0.4 million people had HIV, while low and middle-income countries made up 95% of TB-related deaths (WHO, 2018). From 2016, mainly African countries made up 74% of TB patients who were HIV positive (WHO, 2018; UN, 2018). Medical breakthroughs increase the toxicity of TB treatment to cure TB patients at a faster pace (UN, 2018). However, curative properties of the latter are questionable due to the implications of non-adherence and default from TB treatment (WHO, 2017). As a result, three pillars were proposed to strengthen the efficacy of the 'End TB Strategy' (WHO, 2017). The first pillar involves an integrated patient-centred care for strategizing preventative measures; pillar two considers the policies and supportive systems; and pillar three aims to build on research. The implementation of the pillars were discussed at the UN General Assembly High Level Meetings (WHO, 2018; UN, 2018); however at grassroots levels, people's beliefs and attitudes still play a role in health-seeking behaviours and treatment initiation, adherence, non-adherence and default.

5.1.2 Beliefs about TB causation and treatment in Africa

Beliefs are considered as a person's truth and are influenced by religion, culture, values, morals and traditions (WHO, 2013). Barriers of healthcare go beyond treating the TB illness. Such barriers may be explained by African traditional medicine and traditional healers (WHO, 2013). For example, professional nurses in South Africa linked the low cure rate of TB patients to the drug-toxicity of TB medication and cultural practices (Maswanganyi et al., 2014). Patients claimed that the traditional healers and traditional health practitioners provided them with incorrect messages about TB causation and the curative properties of TB treatment. Furthermore, patients believed that the TB treatment provided at government clinics made them more ill after drinking the medication (WHO, 2017). Patients also believed that HCPs were dominant, stereotypical, and prejudiced during treatment (Nyasulu et al., 2016). Strong cultural beliefs and values influenced the practice of administering traditional medicine which included symbolized acts, cultural ceremonies, or non-conventional medicine (such as natural herbs) (WHO, 2013). As a result, cultural beliefs about TB transmission were associated with unholy social practices, witchcraft, or practices of sexual rebellion (Deribew et al., 2010; Knutsen, 2010; Maswanganyi et al., 2014; Sima et al., 2019).

The context of HIV/AIDS also influenced people's beliefs about TB due to diagnostic and screening measures that included HIV/AIDS tests and counselling services (Mntlangula, Khuzwayo & Taylor, 2017). Moreover, studies in Ethiopia and Tanzania revealed that the transmission of TB was misunderstood and was believed to be highly associated with the transmission of HIV/AIDS or an everyday 'cold' or 'flu' (Deribew et al., 2010; Knutsen, 2010). Another study in Limpopo revealed that the beliefs about TB were associated with poor healthcare seeking behaviours and ignorance toward the TB illness and treatment (Mabunda et al., 2016). The latter identified healthcare barriers related to culture, traditional beliefs, stigma and refusing to support the curative properties of treatment (Mabunda et al., 2016). Consequently, discriminatory practices of rejection heightened fear, denial and psychological distress among Kenyan and Ghanaian TB patients and their families, as well as the community (Amo-Adjei & Kumi-Kyereme, 2013; Knutsen, 2010; Muture et al., 2011). Despite demographic backgrounds, people's understanding about TB was likely to be driven by myths and misconceptions that hinder the control and preventive interventions for TB (Amo-Adjei & Kumi-Kyereme, 2013).

Likewise, Tola et al. (2016) used the HBM to illustrate how the beliefs of a population of 698 TB patients from 30 randomly selected Health Centres (HCs) in Ethiopia affected their health-seeking behaviours, as well as treatment initiation, adherence, non-adherence, and default. Firstly, psychological and educational intervention was applied at 14 healthcare centres as the intervention group, while the control group continued with TB treatment regimens as per the health regulations (Tola et al., 2016). Findings revealed a significant difference between the adherence and non-adherence to TB treatment among participants regarding the implementation of each of the HBM domains ($p < 0.001$). Following the prescribed psychological counselling and educational interventions, a statistically significant difference was observed between the control and intervention groups with respect to the non-adherence level to TB treatment. Moreover, a regression analysis revealed a significant association with treatment non-adherence regarding current smoking history ($COR = 2.3, p = 0.005$), marital status ($COR = 1.7, p = 0.048$), alcohol use disorder ($COR = 2.5, p = 0.002$), ART status ($COR = 0.45, p = 0.024$), and economic status ($COR = 0.91, p = 0.011$); while psychological distress had significant effects on the non-adherence to treatment. Similarly, Tola et al. (2017) found that TB patients' responses revealed HBM domain of the perceived barriers and/or benefits had a significant direct negative effect on TB treatment adherence. Alternatively, the adherence level of patients was indirectly affected by cue to action and psychological distress through perceived barriers and/or benefits (Tola et al., 2017). Therefore, the sociodemographic factors such as economic status, education, knowledge, psychological distress, community leadership or role, and religiosity may play a significant role on people's preconceived ideas (Knutsen, 2010; Tola et al., 2016, 2017). For example, people in Tanzania with strong pastoral backgrounds and community leadership may influence how religiosity determines the origin or causes of TB as assuming it is due to bad or evil spirits (Knutsen, 2010). In turn, the questions regarding the effectiveness of the biomedical modes of TB regimens and the intergenerational treatment of traditional healers may produce conflicting treatment outcomes (Knutsen, 2010; Sima et al., 2019) Thus, a lack of understanding may affect the way in which one understands the accurate or inaccurate knowledge within communities through conversational dialogues (Tola et al., 2016, 2017). Moreover, the causes of TB were based on what people had heard.

For example, Bati et al. (2013), postulated that the community in Ethiopia had various sources of information for the participants, namely; friends and/or relatives (34.4%),

television (1.6%), health extension workers (41.9%), school (15.6%), TB patients (37.7%), and public radio (0.95%). Through these sources, many people believed that alcohol consumption (42.7%), exposure to cold air (16.6%), any form of smoking (13.9%) and germs (3.3%) were regarded as primary causes of Pulmonary TB (PTB) by the participants (Bati et al., 2013). Furthermore, the primary cause of tuberculosis lymphadenitis (TBL) was mentioned as exposure to smoking (17.5%), cold air (26.1%), and drinking fresh cow's milk (16.6%). Also, Hemoptysis (60.2%), emaciation (14.7%) and bodily pain (30.8%), coughing for two weeks or more (9.9%) were mentioned as main symptoms of PTB. Approximately 51.1% of the participants mentioned that PTB may be transmitted through coughs and 31.3% mentioned that both PTB and TBL could be transmitted through sharing of cups, plates, and cutlery (Bati et al., 2013; Knutsen, 2010). Moreover, hygiene was also identified as a preventative measure for both PTB and TBL by 29.2% of the participants (Bati et al., 2013). However, with beliefs, an action is performed as presented in one's attitude.

5.1.3 Attitude about TB causation and treatment in Africa

An attitude refers to a set of emotions and behaviours towards a particular phenomenon (Mntlangula et al., 2017). It is often a product of an experience. In this regard, ill persons with a prolonged cough are expected to seek medical attention for a correct diagnosis and treatment (WHO, 2018). However, a study by Skinner and Claassen (2016, cited by Best, 2018) identified gaps in healthcare seeking behaviours after TB patients were diagnosed. Approximately 17 % to 25 % of newly diagnosed patients did not start treatment even though screening measures identified TB patients with an active or transmissible TB pathogen (Best, 2018; Kigozi et al., 2017). Non-adherence to TB treatment revealed inadequate knowledge, stigmas, prejudice, social conditions, poverty and challenges in the quality of the healthcare system (Adane et al., 2017; Bati et al., 2013; Best, 2018; Chinenye, 2015; Kigozi et al., 2017; Sima et al., 2019; Tolossa et al., 2014).

A sample of doctors who were diagnosed with TB revealed that concerns were related to the lack of TB prevention strategies in the workplace, delays in diagnosis and negative attitudes of senior medical practitioners and colleagues (Bati et al., 2013; Chinenye, 2015; Knutsen, 2010; Naidoo et al., 2013; Sima et al., 2019). Some doctors felt resentful when treating TB patients who were infected with an HIV co-infection (Naidoo et al., 2013). Nurses' and doctors' beliefs and attitudes were influenced by the fear of contracting the airborne illness in

the workplace or lacking sympathy from colleagues (Naidoo et al., 2013). As a result, TB patients were excluded or rejected from social activities due to the airborne nature of TB (Adane et al., 2017). Treatment adherence and default were related to reducing stigma, discrimination, and prejudice to maintain personal relationships with family, peers, work colleagues and the community (Adane et al., 2017; Best, 2016).

A study exploring challenges of treatment outcomes revealed that social determinants (poverty, inequality and social exclusion) strengthened negative attitudes due to cultural beliefs that TB patients were possessed by demons (Courtwright & Turner, 2010). Prejudice, discrimination, stigma, and ignorance of TB were explained and understood through socio-cultural conditions, cultural values, morals, and traditions. Populations in Ethiopia perceived and associated the transmission of TB with the exposure to extreme cold air which caused severe injuries to the lungs and gradual coughing (Adane et al., 2017; Bati et al., 2013; Daftary, 2010; Sima et al., 2019; Tola et al., 2016, 2017; Tolossa et al., 2014). A study conducted in sub-Saharan Africa revealed that beliefs and attitudes about TB causation and treatment were fuelled by cultural diversity (Nkwashu, 2016). The latter related to religion, education, and the importance of ceremonial cleanings to cure TB because the ancestors were dissatisfied the individual's social practices (Nkwashu, 2016). As a result, the social constructs of TB influenced people's understanding about TB which hindered treatment.

Furthermore, positive attitudes relied on the knowledge about the curative purposes of TB treatment and the importance of being cured as TB is infectious and fatal (Knutsen, 2010). Consequently, a belief may result in attitudes of adapting habits that may default treatment like smoking and drinking alcohol (Tola et al., 2016); and discriminating and stigmatising against, and/or isolation (Chinenye, 2015; Knutsen, 2010). It was observed that health education interventions mostly focused on the cause and the change of the knowledge into appropriate preventative practices for the TB control.

According to Adane et al. (2017), out of 615 prisoners, only approximately 37% mentioned bacteria as a cause of the TB disease; while approximately 21% linked TB to the exposure to a cold air. About 88% of prisoners mentioned the aerial route of the TB spread and 27.3% had perceived stigma towards TB. However, 63.7% of prisoners were unaware of the possibility of getting multi-drug-resistant strains when they were non-adherent to treatment. Overall, only 24% knew the basic elements about TB, while 41% had favourable attitudes,

and 55% had a good practice. Urban residents who were prisoners were generally more knowledgeable than rural residents. Those who were illiterate participants were found to be less knowledgeable and less likely to have a favourable attitude, and less likely to practice good outcomes of TB adherence.

A study by Bati et al. (2013) showed that about 58% of community members described PTB as a fatal disease even after treatment. On the other hand, 34.1% mentioned that PTB affects only people in poverty. Approximately 7.1% of participants reported that they do not share food and drink with TB patients. About 59% of participants described TB patients from Nuer site (85.8%) as being shameful. Approximately 40.8% of the participants had a positive attitude toward TB, with a significant association with high educational level of the participants in the study. A low favourable attitude had a significant relationship with the female gender. Moreover, the employment status of the participants other than pastoralists was associated with a favourable attitude towards TB. Overall, the practice of the communities showed that less than half of the participants had good practices; while poor practices of prevention and control of TB was significantly associated with females. While HCPs have average knowledge regarding the TB disease, miscommunication results in varied beliefs and attitudes which show in the global statistics of TB control (WHO, 2019).

Consequently, Tola et al. (2017) suggested that motivators (I.e: cue to action) such as the involvement of the patients' peers and family, the broadcasting, and healthcare workers can aid in the promotion of treatment adherence that may be vital to transform negative attitudes into positive attitudinal outcomes toward TB treatment adherence. Thus, a combination of TB treatment regimens and other interventions and/or preventative measures, among other recommendations, were suggested as revealed through the application of the HBM domains to enhance treatment adherence.

5.1.4 Recommendation and implications for TB control

Differing worldviews, beliefs and attitudes influence peoples' understanding about TB (Nkwashu, 2016). Research is made available to the public; however, TB remains misinterpreted and/or misunderstood. Thus, there is a need to operationalise TB to the public and within the academic spectrum at grassroots levels (Knutsen, 2010; WHO, 2019). While biomedical research constantly advances treatment, patients or people who present symptoms

often seek alternative treatment remedies in Africa and may resort to traditional healers or seek for an integrated regimen that incorporates biomedical medicine with traditional medicine (Adane et al., 2017). The attitudes and beliefs attached to TB strengthen the TB epidemic (Amo-Adjei & Kumi-Kyereme, 2013). While knowledge conventions vary across countries, not everyone has access to healthcare experts to sustain healthcare practices. The slow pace at which Africa develops research motivates the urgency to pursue the proposed topic. TB prevention is a social justice and public health concern and should be understood to identify barriers to healthcare that could hinder the control of TB (WHO, 2017).

Furthermore, included studies also highlighted that the majority of people in Tanzania, Ethiopia, South Africa, and Rwanda had several misconceptions about TB, its causes and reliable treatment regimens. Illness and disease control measures should therefore consider communication, advocacy, and social mobilization for addressing the research gap in the study sites (Esmael et al., 2013). Preventative measures should be practiced correctly by experts and leaders in order for the general community to adhere to and revive the public health concern for generations to optimally function. Control measures which include covering one's respiratory organs when sneezing and coughing, enhanced personal hygiene, and vaccination of family members were in poverty among the study participants (Chinenye, 2015). There is also a need to strengthen TB awareness and implement and/or evaluate interventions that contribute to stigma reduction (Chinenye, 2015) which could positively affect initiation of diagnosis and treatment (Haasnoot et al., 2010). Health education directed towards bringing about transformation on the knowledge of TB may change negative attitudes into positive attitudinal outcomes (Tolossa et al., 2014). This may especially assist with unidentifiable or misunderstood gaps in TB case control, mortality and morbidity figures, and knowledge gaps needed to implement a strengthened health system. A recommended and effective intervention was identified as psychological counselling and educational intervention that was guided by HBM (Tola et al., 2016). Through this intervention, the Ethiopian communities' conceptualisation of TB was understood using predictors from the domains within the HBM which highlighted concerns of health-seeking behaviours and treatment adherence, non-adherence and default (Bati et al., 2013; Kigozi et al., 2017; Tola et al., 2016). Moreover, evidence also revealed that healthcare workers' knowledge gap and unfavourable attitudes towards the TB control systems may cause poor

TB care and service delivery without the intervention of healthcare facilities (Sima et al., 2019).

5.2 Overall conclusion for this study

The overall conclusion of this study was discussed based on the following considerations, namely: (1) Limitations, (2) Conclusion, recommendations and Significance of the Results, and (3) Implications for Research and Practice.

5.2.1 Limitations during the systematic search and gaps in research

A limitation was that databases restricted the access of results during the systematic search. For example, although databases identified more than 10 000 results using the Boolean phrases and initial keywords, databases gave error messages when the researcher tried to screen all the results. As a result, databases displayed error messages with regards to the abuse of using a database for retrieving the journal articles valid for this study. Furthermore, the researcher and reviewer verified results approximately two weeks apart which resulted in a disagreement. Within those two weeks, there was an influx in published literature after the main researcher conducted the search strategy. For this reason, a verification process was conducted to resolve discrepancies between the months of March and April 2020. Furthermore, the methodologies of eligible studies were diverse and included a qualitative exploratory design, a RCT and cross-sectional studies. While a meta-analysis may have been best suited for the majority of quantitative studies ($N = 8$), the scope of this mini-thesis was limited. Results were quantified using the PRISMA tool and a narrative synthesis enabled the research to identify benefits, limitations, and a coherent context of TB through identifying the common thread within studies. This was an attempt to answer the review aims, objectives and questions supported by the existing literature on the topic. Other limitations were the scarcity of literature and the topics that indirectly spoke about the topic.

Majority of the excluded studies ($N = 229$) were centred on the following keywords: treatment default, treatment adherence, transmission, risk factors, intervention, knowledge, perceptions, vulnerability, and HIV/AIDS. There was a lack of studies that focused on the beliefs and attitudes of TB causation and treatment in Africa in its entirety. Moreover, 28 theses were retrieved from additional sources, of which one was peer-reviewed. The general overview of included studies was understood through the PIO criteria to identify the core

concern stipulated in this study's review questions, aims and objectives. Therefore, there is a need to do more research on this topic within high risk countries in Africa.

5.3 Conclusion, the significance of the results, and recommendations

The overall view of the beliefs and attitudes about TB causation and treatment in Africa were deep-rooted in Ethiopia, South Africa, Tanzania, and Rwanda's psychosocial reactions towards TB (Chinenye, 2015). While researchers uncovered the beliefs associated with TB causation and treatment (Tola et al, 2016, 2017), data collection instruments identified and intervened with the community's ideology regarding the health system or the misconceptions and/or miscommunication that may lead to negative or positive experiences in the face of TB (Knutsen, 2010). Furthermore, TB is a preventable disease and may be co-infected with HIV. However, HIV is a long-standing incurable illness believed to be the same as TB. Hence, both TB and HIV are treated in an integrated manner as per the WHO and UN health regulations (WHO, 2019) which brings about confusion as to whether TB and HIV are of the same nature regarding the illness and treatment. There was conflict between treatment methods proposed by traditional healers and biomedical treatment regimens which showed how religiosity among other sociodemographic factors may play a significant role in health-seeking behaviours, and treatment initiation, adherence, non-adherence and default (Knutsen, 2010; Sima et al., 2019). It is necessary to strengthen measures for quality communication between the patients and health providers; thus reinforcing the existing implementation of programs at grass root level (Chinenye, 2015). Therefore, a mediating factor between negative and positive attitudes toward TB and treatment is needed. The significance of research findings was to inform interventions, highlight the implications for practice and provide coherence on the topic. This was achievable through the synthesis of data. Review questions were answered throughout this thesis to highlight the common thread regarding the gaps in case detection, mortality and morbidity figures and the need to evaluate the effectiveness of TB treatment regimens at grassroots levels. There is a need for studies, like SRs, that synthesise qualitative and quantitative literature on the topic of beliefs and attitudes about TB causation and treatment in Africa. Community members or leaders should also be educated regarding the disease to aid the transition of negative attitudes to positive attitudinal outcomes rather than resorting to practices that may affect the public health concern of TB. For clinical practices, best practice standards should be considered with careful attention to

health facilities' regulations and patient-centred interventions needed to decrease incidences of ill health within the public (Sima et al., 2019).

5.4 Implications for Research and Practice

The TB epidemic is a curable communicable disease when treated efficiently. However, the prevalence of TB has shown a gap in morbidity and mortality figures although interventions are put forward globally, provincially and locally (WHO, 2018, 2019). Treating patients requires a mutual relationship between the community, healthcare sector and government who are role players in reinforcing beliefs and attitudes about TB causation and treatment in Africa (Knutsen, 2010; Sima et al., 2019). It is important to consider sociodemographic variables that may prevent people actively and positively seeking healthcare, initiating treatment, and practicing treatment adherence rather than non-adherence or default (Adane et al., 2017; Chinenye, 2015; Kigozi et al., 2017; Knutsen, 2010; Sima et al., 2019; Tola et al., 2016, 2017). Research should complement the clinical implementation at grassroots levels for effective use of treatment initiation, treatment regimens and motivational levels needed to endure throughout the course of treatment.



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Appendix A: Identification (Operational step 1)

Title screening and data extraction tool (Systematic search records)

Phase 1

Keywords: Beliefs, Africa, Tuberculosis, HIV/AIDS, Tuberculosis causation, transmission, Treatment adherence, Treatment default, Knowledge, and Vulnerability to tuberculosis

No.	Author	Date	Title and Source	Index keywords	Database	Location where stored	Outcome: Excluded / included
1*	Tola, H. H., Karimi, M., & Yekaninejad, M. S. Duplicate x1 (Medline, Pubmed)	2017	Effects of sociodemographic characteristics and patients' health beliefs on tuberculosis treatment adherence in Ethiopia: a structural equation modelling approach. <i>Infectious diseases of poverty</i> , 6(1), 167. https://doi.org/10.1186/s40249-017-0380-5	Tuberculosis, Health belief, Treatment adherence, Structural equation modelling, Ethiopia	BMC, UWC	BMC	Included: beliefs on TB
2*	Tola, H. H., Shojaeizadeh, D., Tol, A., Garmaroudi, G., Yekaninejad, M. S., Kebede, A., Ejeta, L. T., Kassa, D., & Klinkenberg, E. Duplicate x1 (additional)	2016	Psychological and Educational Intervention to Improve Tuberculosis Treatment Adherence in Ethiopia Based on Health Belief Model: A Cluster Randomized Control Trial. <i>PLoS one</i> , 11(5), e0155147. https://doi.org/10.1371/journal.pone.0155147	No keywords	UWC	UWC	Included
3	Knutsen, A. K.	2010	<i>Perceptions and beliefs on tuberculosis and the influence on health seeking behaviour</i> (Master's thesis).	No keywords	Additional	Additional	Included

Phase 2

Keywords: Attitudes, Africa, Tuberculosis, HIV/AIDS, Tuberculosis causation, transmission, Treatment adherence, Treatment default, Knowledge, and Vulnerability to tuberculosis

No.	Author	Date	Title and Source	Index keywords	Database	Location where stored	Outcome: Excluded / included
4*	Kigozi, N. G., Heunis, J. C., Engelbrecht, M. C., van Rensburg, A. P. J., & van Rensburg, H. C. J. D. Duplicate x1 (Ebscohost)	2017	Tuberculosis knowledge, attitudes and practices of patients at primary health care facilities in a South African metropolitan: research towards improved health education. <i>BMC Public Health</i> , 17,795 DOI 10.1186/s12889-017-4825-3	Tuberculosis, Knowledge, Attitudes, Infection control practices, Free State Province, South Africa	UWC, BMC	BMC	Included for more information

5**	Bati,J., Legesse, M., & Medhin,G. Duplicate x2 (Springer link)	2013	Community's knowledge, attitudes and practices about tuberculosis in Itang Special District, Gambella Region, South Western Ethiopia. <i>BMC Public Health, 13,734</i>	No keywords	Springer link, BMC	BMC	Included
6*	Sima, B. T., Belachew, T., & Abebe, F. Duplicate x1 (biomed)	2019	Health care providers' knowledge, attitude and perceived stigma regarding tuberculosis in a pastoralist community in Ethiopia: a cross-sectional study. <i>BMC Health Services Research, 19,19</i>	Attitude, Control, Health care workers, Kereyu, Knowledge, Pastoralists, Stigma tuberculosis	Springer link, BMC	BMC	Include
7**	Musuka, G., Teveredzi, V., Busang, L., Chingombe, I., Makadzange, P., Mokgweetsinyana, S., Ncube, R., Maradzika, J., Chinamasa, C. F., & Moeti, T. Duplicate x2 (biomed, medline)	2018	Community attitudes on tuberculosis in Botswana: an opportunity for improving the National Tuberculosis Programme outcomes, 2011. <i>BMC Research Notes, 11,499</i>	Tuberculosis, Botswana, HIV, Community, Knowledge, Attitude	Springer link, BMC	BMC	Included for more information
8*	Luba, T.R., Tang, S., Liu, Q., Gebremedhin, S. A., Kisasi, M. D., & Feng, Z. Duplicate x1 (biomed)	2019	Knowledge, attitude and associated factors towards tuberculosis in Lesotho: a population based study. <i>BMC Infectious Diseases, 19,96</i>	Tuberculosis, Knowledge, Attitude, Associated factors, Lesotho	Springer link, BMC	BMC	Included
9	Mclaughlin, J.	2018	<i>Knowledge, Attitudes And Practices Of Tuberculosis Management Among Clinicians Working At Primary Health Care Facilities In The Northern Tygerberg Sub Structure, Cape Town</i> (Master's thesis).	Knowledge Attitudes Practices Tuberculosis Clinicians Primary health care facilities Treatment Health care workers, CPT	Additional	Additional	Included

No.	Author	Date	Title and Source	Index keywords	Databases	Location where stored	Outcome: Excluded / included
10	Best, A. M.	2018	<i>An Evaluation of the Effectiveness of Interventions to Change the Knowledge of, Attitudes towards, and Practices around, TB and HIV of Inmates in the Western and Eastern Cape of South Africa</i> (Master's thesis)	Tuberculosis, TB, HIV, correctional centre, prison, knowledge, attitude, practice, peer education, HCT, condoms, healthcare worker	Additional	Additional	Included for more information
11	Letsie, M.	2011	<i>Knowledge, Attitudes And Perceptions Of Tb Non-Adherent And Adherent 2-3 Years After Their Initial Registration At Botšabelo Clinic, Maseru, Lesotho</i> (Master's thesis).	Assess Attitudes Default Knowledge Maseru District Patients Perceptions Treatment Tuberculosis	Additional	Additional	Included
12	Adane, K., Spigt, M., Johanna, L., Noortje, D., Abera, S. F., & Dinant, G.	2017	Tuberculosis knowledge, attitudes, and practices among northern Ethiopian prisoners: Implications for TB control efforts. <i>PLoS ONE</i> , 12(3), e0174692. https://doi.org/10.1371/journal.pone.0174692	No Keywords	Ebscohost	Ebscohost	Included
13	Musasa, J. I.	2011	<i>Knowledge, Attitude And Practice With Regard To Tuberculosis And Human Immunodeficiency Virus Co-Infection Among Patients With Tuberculosis In Walvis Bay District, Namibia</i> (Master's thesis)	Knowledge Attitude Practice Tuberculosis HIV/Aids Patients Co-infection Stigma Counselling Walvis Bay Namibia	Additional	Additional	Included for more information

14 **	Bisallah, C. I., Rampal, L., Lye, M. S., Mohd Sidik, S., Ibrahim, N., Iliyasu, Z., & Onyilo, M. O. Duplicate x2 (Ebschost, medline)	2018	Effectiveness of health education intervention in improving knowledge, attitude, and practices regarding Tuberculosis among HIV patients in General Hospital Minna, Nigeria – A randomized control trial. <i>PloS ONE</i> , 13(2): e0192276	None	Cochrane	Cochrane	Exclude: HIV patients
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Appendix B: Screening Abstracts (Operational step 2)
Data extraction tool including PIO criteria (Systematic search records)

no.	Study location	Keywords	Databases included	Peer-review	Full text	Abstract, aims objectives results and conclusion	Author, year and title (reference)	Aims and Objectives	Methods and study design	Study population, intervention / treatment and outcomes	Quality or results of study analysis	Limitations, conclusions and recommendation	Include or exclude
Phase 1 keywords: Beliefs, Africa, Tuberculosis, HIV/AIDS, Tuberculosis causation, transmission, Treatment adherence, Treatment default, Knowledge, and Vulnerability to tuberculosis													
1	BMC, UWC	Tuberculosis, Health belief, Treatment adherence, Structural equation modelling, Ethiopia	Yes	Yes	Yes	Yes	Tola, H. H., Karimi, M., & Yekaninejad, M. S. (2017). Effects of sociodemographic characteristics and patients' health beliefs on tuberculosis treatment adherence in Ethiopia: a structural equation modelling approach.	To determine the effect of sociodemographic characteristics and patients' health beliefs on TB treatment adherence based on the HBM concept in Ethiopia	Quantitative methodology. Cross-sectional design	Population: 698 TB patients aged 18 and above were under treatment for 1-2 months from one of 30 health centres that was randomly selected, and 1 hospital was purposely chosen. They had the mental capability to provide consent, and selected from the TB registration book Intervention / treatment: Structured questionnaires were used to collect data. Structural equation modelling was employed to assess the pathway relationship between sociodemographic characteristics, patients' beliefs, and treatment adherence Outcome: Perceived barrier/benefit had a significant direct negative effect on TB treatment adherence ($\beta = -0.124$, $P = 0.032$). The cue to action ($\beta = -0.68$, $P \leq 0.001$) and psychological distress ($\beta = 0.08$, $P < 0.001$) had a significant indirect effect on TB treatment adherence through perceived barrier/benefit	Analysis: Structural equation modelling. Results: Approximately 698 enrolled participants were included comprised of 401 (57.4%) males and 490 (70.2%) were aged 35 years and below. The mean age of participants was $32 (\pm 11.7)$ and the age range was 18–90 years. Perceived barrier/benefit had a significant direct negative effect on TB treatment adherence ($\beta = -0.124$, $P = 0.032$). The cue to action ($\beta = -0.68$, $P \leq 0.001$) and psychological distress ($\beta = 0.08$, $P < 0.001$) had a significant indirect effect on TB treatment adherence through perceived barrier/benefit.	Interventions were to decrease perceived barriers. Maximized perceived benefits were to enhance TB treatment adherence. Therapy with regular DOTs program was effective. Cue to actions (Motivators) like friends, family, healthcare workers, and media could be used to enhance TB treatment adherence	Include: beliefs and treatment
2	UWC	No Keywords	Yes	Yes	Yes	Yes	Tola, H. H., Shojaeizadeh, D., Tol, A., Garmaroudi, G., Yekaninejad, M. S., Kebede, A., Ejeta, L. T., Kassa, D., & Klinkenberg, E. (2016). Psychological and Educational Intervention to Improve TB Treatment Adherence in Ethiopia Based on Health Belief Model: A Cluster Randomized Control Trial.	To evaluate the impact of psychological and educational intervention on tuberculosis (TB) treatment adherence based on Health Belief Model (HBM)	quantitative methodology, cluster randomized control trial	Population: A total of 698 TB patients were enrolled to participate in the study consecutively from 30 randomly selected Health Centers (HCs) (14 HCs intervention and 16 HCs control groups), they were on treatment for 1-2 months Intervention/ treatment: A structured questionnaire was administered to both groups of patients at baseline and endpoint of study. Control participants received routine directly-observed anti-TB therapy. The intervention group received combined psychological counselling and adherence education. Treatment non-adherence level was the main outcome of the study. Outcome: The level of non-adherence among the intervention (19.4%) and control (19.6%) groups were similar. After intervention, non-adherence level decreased among intervention group from 19.4 (at baseline) to 9.5% (at endpoint), while it increased among control group from 19.4% (baseline) to 25.4% (endpoint). Psychological and educational interventions resulted in significant differences regarding non-adherence level between intervention and control groups	Analysis: Multilevel logistic regression was employed to assess the impact of intervention on treatment adherence Results: The level of non-adherence among the intervention (19.4%) and control (19.6%) groups were similar. After intervention, non-adherence level decreased among intervention group from 19.4 (at baseline) to 9.5% (at endpoint), while it increased among control group from 19.4% (baseline) to 25.4% (endpoint). Psychological and educational interventions resulted in significant differences regarding non-adherence level between intervention and control groups (Adjusted OR = 0.31, 95% Confidence Interval (CI) (0.18–0.53), $p < 0.001$).	Psychological and educational interventions, were guided by HBM, significantly reduced non-adherence among the intervention group. Psychological and health education to TB patients who are on regular treatment is recommended. Could be achieved if these interventions are guided by theories and incorporated into the routine TB treatment	Include: beliefs and treatment

3	UWC	None	Yes	Yes	Yes	Yes	Knutsen (2010). <i>Perceptions and beliefs on tuberculosis and the influence on health seeking behaviour</i> (Master's thesis).	To study whether knowledge, beliefs and perceptions of TB can influence the health seeking behaviour in a community in Dar es Salaam, Tanzania	exploratory qualitative design.	Population: Total of 70 informants in three study sites in Kinondoni Municipality from June to September, 2009. Intervention/ treatment: Nine Focus Group Discussions (FGD) and 15 Individual Interviews Outcome: There is a lack of knowledge and a misconception about TB. TB is believed to be caused by hard work and dust. TB is believed to be caused by bad spirits or bewitchments, and is afflicted by God, but can only be treated by prayers or traditional healers. Traditional healers believe injections can kill a patient treated at hospital. Hospital is the most preferred site of seeking care within the professional sector. Some chose the folk sector as a first choice of care or as a second choice if hospital treatment fails. The TB patient would be treated differently within the community through stigma and isolation. Low levels of understanding of TB were connected to seeking care.	Analysis: Systematic Text Condensation. Results: TB was perceived as a normal, common and treatable disease. Symptoms were cough, fever and the same as HIV / AIDS. There was a fear of seeking professional care for TB as the communities believe TB patients will be assessed for HIV. There was a lack of knowledge and a misconception. TB was believed to be caused by hard work and dust. It is believed that TB is caused by bad spirits or bewitchments can only be treated by prayers or traditional healers as it is afflicted by God. Traditional healers believe injections can kill a patient treated at hospital. Hospital is the most preferred site of seeking care within the professional sector. Some chose a folk sector as a first/ second choice of care if hospital treatment fails. TB patients were treated with stigma and isolation by community	The human factor is important for TB control. It would be useful for decision makers to consider the communities' health beliefs when developing educational and control plans for TB. The believed normality and commonality of the disease should be addressed in the plan work for case finding. More research is needed to assess the target populations' health beliefs.	Include: beliefs and causes and treatment
Phase 2 Keywords: Attitudes, Africa, Tuberculosis, HIV/AIDS, Tuberculosis causation, transmission, Treatment adherence, Treatment default, Knowledge, and Vulnerability to tuberculosis													
4	UWC, BMC	Tuberculosis, Knowledge, Attitudes, Infection control practices, Free State Province, South Africa	Yes	Yes	yes	Yes	Kigozi, G. N., Heunis, J. C., Engelbrecht, M. C., van Rensburg, A. P. J., & van Rensburg, H. C. J. D. (2017). Tuberculosis knowledge, attitudes and practices of patients attending PHC facilities. Facilities in a South African metropolitan: research towards improved health education.	To assess TB-related knowledge, attitudes and infection control practices of patients attending PHC facilities.	Cross-sectional survey (Sep to Oct 2015)	Population: A total of 507 patients older than 17 years attending 40 PHC facilities in the Mangaung Metropolitan. Convenience sampling was used to select patients. Intervention: Fieldworker administered questionnaire Outcome: Most of the patients knew that TB transmission is facilitated by crowded conditions (84.6%) and that pulmonary TB is contagious (73.0%). Majority of patients also believed that one can get TB from sharing toothbrushes (85.0%) or kissing (65.0%). Majority of patients perceived TB to be serious (89.7%), and concurred that taking treatment (97.2%) and opening windows to prevent transmission in PHC facilities (97.0%) are important. Being employed (AOR: 11.5; CI: 4.8–27.6), having received TB infection control information from a PHC facility (AOR: 2.2; CI: 1.5–3.4), and being a TB patient (AOR: 1.6; CI: 1.02–2.46) increased the likelihood of adopting good infection control practices	Analysis: Descriptive, inferential and multivariate logistic regression. Results: Statistical significance was at an of alpha <0.05 and 95% confidence interval. Patients knew that TB transmission was facilitated by crowded conditions (84.6%) and that pulmonary TB is contagious (73.0%). Majority of patients also believed that one can get TB from sharing toothbrushes (85.0%) or kissing (65.0%). Patients perceived TB as serious (89.7%), and concurred that taking treatment (97.2%) and opening windows to prevent transmission in facilities (97.0%) as important. Being employed (AOR: 11.5; CI: 4.8–27.6), having received TB infection control information from a facility (AOR: 2.2; CI: 1.5–3.4), and being a TB patient (AOR: 1.6; CI: 1.02–2.46) increased the likelihood of adopting good infection practices	Findings highlight the need for health education efforts to strengthen accurate information dissemination to promote sound TB knowledge and attitudes among patients attending PHC facilities. Health education efforts should also capitalise on the positive finding of this study that information dissemination at PHC facilities increases good infection control practices	Include: attitudes and causes/ treatment

5	Springer link, BMC	No keywords	Yes	Yes	yes	Yes	Bati, J., Legesse, M., & Medhin, G. (2013). Community's knowledge, attitudes and practices about tuberculosis in Itang Special District of the Gambella Region, South Western Ethiopia.	To assess the level of TB knowledge, attitudes and practices of rural communities of Itang Special District of the Gambella Regional State of Ethiopia	community-based cross sectional study	<p>Population: Out of 422 study participants (58.5% males and 41.5% females)</p> <p>Intervention/treatment: Participants were interviewed using pre-tested questionnaire. Knowledge, attitudes and practices of the participants were assessed using the mean score of each outcome as a cut-off value.</p> <p>Outcome: 3.3% mentioned bacteria/germ as a cause of pulmonary TB (PTB) and 9.9% mentioned cough for at least two weeks as the sign of TB. The average knowledge score as the cut-off value, 57.6% (95% CI: 52.7% to 62.3%) of the study participants had good level of knowledge about TB, 40.8% (95% CI: 36.0% to 45.6%) had 85avourable attitude towards TB and 45.9% (95% CI: 41.1% to 50.9%) had good practices.</p>	<p>Analysis: computerized using Epi Data software Version 3.1 and exported into STATA version</p> <p>Results: 3.3% mentioned bacteria/germ as a cause of pulmonary TB (PTB) and 9.9% mentioned cough for at least two weeks as the sign of TB. Taking the mean knowledge score as the cut-off value, 57.6% (95% CI: 52.7% to 62.3%) of the study participants had good level of knowledge about TB, 40.8% (95% CI: 36.0% to 45.6%) had 85avourable attitude towards TB and 45.9% (95% CI: 41.1% to 50.9%) had good practices. Female participants were less likely to have good level of knowledge [adjusted odds ratio (AOR) = 0.33, 95% CI, 0.21 to 0.51, p < 0.001], less likely to have 85avourable attitude and less likely to have good practices compared to males</p>	Majority of the study participants had no correct information about the causative agent of TB and the main symptom of PTB. Moreover, low level of overall knowledge, attitudes and practices about TB was associated with female participants. Hence, TB control strategy in the present study area should include community awareness raising component	Include: attitudes and causes
6	Springer link, BMC	Attitude, Control, Health care workers, Kereyu, Knowledge, Pastoralists, Stigma tuberculosis	Yes	Yes	Yes	Yes	Sima, B. T., Belachew, T., & Abebe, F. (2019). Health care providers' knowledge, attitude and perceived stigma regarding tuberculosis in a pastoralist community in Ethiopia: a cross-sectional study.	To assess healthcare provider (HCP) knowledge, attitude and perceived stigma regarding TB and perception about traditional healers	Quantitative methodology and a descriptive cross sectional design	<p>Population: 108 Health care providers (HCP). The district had 1 district hospital, 4 health centres, and 18 health posts of which all health facilities and HCPs available during the study period in the district were included</p> <p>Intervention/ treatment: semi-structured, self-administered questionnaire.</p> <p>Outcome: About 64% of the HCPs had poor overall knowledge regarding TB, and 67.6 % and 57.6% had poor knowledge regarding TB diagnosis and nature of the disease, respectively. About 66.7% and 55.6% of the HCPs had an unfavourable attitude towards TB and TB control systems, respectively. About 60.2% of HCPs were willingness to collaborate with traditional healers on the TB control activity</p>	<p>Analysis: (SPSS) version 22 and STATA version 14. Results: Majority (64%) of the HCPs had poor overall knowledge regarding TB, and 67.6 and 57.6% had poor knowledge regarding TB diagnosis and nature of the disease, respectively. Moreover, most 66.7 and 55.6% of the HCPs had an unfavourable attitude towards TB and TB control systems, respectively. Slightly under half (49.1%) of the HCPs had a favourable attitude towards TB patients, and the majority (88.9%) had low perceived stigma. The majority (87.0%) of the HCPs indicated the importance of community involvement in TB control activity. Moreover, most (60.2%) of the HCPs showed willingness to collaborate with traditional healers (THs) on TB control activity</p>	Healthcare workers' knowledge gap and unfavourable attitude towards TB control systems reported in this study may cause poor TB care delivery. HCPs' perception of the importance of community involvement in TB control and willingness to collaborate with THs on TB management could be an opportunity to strengthen the WHO component of End TB strategy through community engagement. Training and workshops to address knowledge gap and the unfavourable attitude regarding TB	Include: treatment and attitudes and causes and beliefs

7	Springer link, BMC	Tuberculosis, Botswana, HIV, Community Knowledge, Attitudes	Yes	Yes	yes	Yes	Musuka, G., Teveredzi, V., Busang, J., Chingombe, I., Makadzange, P., Mokgweetsinyana, S., Ncube, R., Maradzika, J., Chinamasa, C. F., & Moeti, T. (2018). Community attitudes on tuberculosis in Botswana: an opportunity for improving the National Tuberculosis Programme outcomes, 2011.	Aim: To assess knowledge, attitudes and practices (KAP) of communities on TB and identify sources of facts on TB and HIV. Objectives: (a) collect baseline facts on KAP about TB treatment seeking and adherence; (b) Identify barriers that discourage TB positive patients from testing; getting treatment and completing treatment	Descriptive cross sectional quantitative and qualitative study, based on methodological triangulation (identified in full text)	Population: Communities in Botswana Intervention/treatment: National Tuberculosis Programme outcomes Outcome: 92% of respondents (n = 2029), reported that having TB was not something embarrassing, while about 97% (n = 2030) were not ashamed of having a family member with TB. 95% (n = 2030) expressed a willingness to accommodate their relatives with TB at their homes or, work with TB patients (n = 2026). 21% of the respondents believed in myths that TB infection is a result of either having sex with women who had miscarried (n = 2028), or food poisoning (n = 2031) while about 17% believed that TB infection is a result of sleeping with a widow or widower (n = 2031).	Analysis: Triangulation. Results: 92% of respondents (n = 2029), reported that having TB was not something embarrassing, while about 97% (n = 2030) were not ashamed of having a family member with TB. 95% (n = 2030) expressed a willingness to accommodate their relatives with TB at their homes or, work with TB patients (n = 2026). 21% of the respondents believed in myths that TB infection is a result of either having sex with women who had miscarried (n = 2028), or food poisoning (n = 2031) while about 17% believed that TB infection is a result of sleeping with a widow or widower (n = 2031).	None	Included: treatment and attitudes and causes and beliefs
8	BMC, Springer link	Tuberculosis, Knowledge, Attitude, Associated factors, Lesotho	Yes	Yes	Yes	Yes	Luba, T.R., Tang, S., Liu, Q., Gebremedhin, S. A., Kisasi, M. D., & Feng, Z. (2019). Knowledge, attitude and associated factors towards tuberculosis in Lesotho: a population based study.	To assess the knowledge, attitude and associated factors towards TB in the general population of Lesotho	Quantitative cross-sectional analysis	Population: 9247 respondents Intervention / treatment: Lesotho Demographic and Health Survey (LDHS) 2014 Outcome: Overall knowledge of TB in the general population of Lesotho was adequate (59.9%). There was a significant difference between female and male respondents regarding knowledge about TB (67.0% vs. 41.8%). Almost 95% of respondents had “heard of an illness called tuberculosis”, and 80.5% knew that TB can be cured. Only 11.5% knew the correct cause of TB (TB is caused by Mycobacterium tuberculosis). Female respondents were relatively aware of TB, knew about the correct cause and mode for transmission of TB and knew that TB is a curable disease compared to male respondents.	Analysis: Multivariate logistic regression Results: sex (adjusted odds ratio [AOR] = 2.45, 95% CI: 2.10–2.86; p < 0.001), age (AOR) = 1.76, 95% CI: 1.29–2.41; p < 0.001), educational level (AOR = 6.26, 95% CI: 3.90–10.06; p < 0.001), formerly married or cohabitated (AOR = 1.42, 95% CI: 1.10–1.85; p = 0.008), mass media exposure (AOR = 1.33, 95% CI: 1.08–1.64; p = 0.008) and occupation (AOR = 1.20, 95% CI: 1.00–1.44; p = 0.049) were strongly associated with respondent knowledge of TB. Sex (AOR = 1.19, 95% CI: 1.01–1.41; p = 0.034), educational level (AOR = 1.661, 95% CI: 0.6–2.60; p = 0.028), mass media exposure (AOR = 1.31, 95% CI: 1.06–1.62; p = 0.012) and occupation (AOR = 1.26, 95% CI: 1.04–1.52; p = 0.016) were strongly associated with respondent attitude towards TB.	Strategies to improve the knowledge of Lesotho’s people about TB should focus on males, young residents, those who are illiterate, those who are unmarried and farmers. Special attention should be given to males, young residents, rural residents, those who are illiterate and farmers to improve their attitude towards TB in Lesotho.	Included: causes and attitudes

9	Additio nal	Knowledg e, Attitudes, Practices, Tuberculosis, Clinicians , Primary health care facilities, Treatment , Health care workers , Cape Town	Yes	Yes	yes	Yes	Mclaughlin, J. (2018) .Knowledge, attitudes and practices of tuberculosis management among clinicians working at primary health care facilities in the Northern Tygerberg Substructure, Cape Town.	To determine the knowledge, attitude and practices of clinicians in the screening, diagnosis and treatment of tuberculosis in the MHS PHC facilities in the Northern Tygerberg Sub structure, Cape Town between mid-March 2018 and mid- June 2018	Quantitative methodology. A descriptive cross- sectional	Population: 150 clinicians from 6 Primary Health Care facilities were purposively selected and all eligible professional nurses and medical officers working in all departments of these facilities were included (n=169). Intervention/ treatment: Self-administered questionnaire, based on previous studies and literature. Questionnaires elicited information on the knowledge of TB screening, diagnosis and treatment and composite knowledge, attitude and practice scores Outcome: Response rate was 89%. About 78 % of respondents were professional nurses and 22% were medical officers. The knowledge score was 6.9 on a scale of 10 at 95% CI (6.7, 7.1); attitude score was 1.5 on a scale of 10 at 95% CI (1.371, 1.554) and practice score was 5.5 on a scale of 10 at 95% CI (5.105, 5.867). There was a significant negative relationship between practice and attitude. Better knowledge did not necessarily translate into adherence to correct practices. Individual clinicians' practices were not in line with best practice and were positively and strongly related to facility-based practices	Analysis: transcribed into a Microsoft Excel Spreadsheet, and then exported to SPSS version 25 and Amos version 23 for analysis of descriptive and inferential statistics. Results: Response rate was 89%. 78 % of respondents were professional nurses and 22% were medical officers. The knowledge score was 6.9 on a scale of 10 at 95% CI (6.7, 7.1); attitude score was 1.5 on a scale of 10 at 95% CI (1.371, 1.554) and practice score was 5.5 on a scale of 10 at 95% CI (5.105, 5.867). There was a significant negative relationship between practice and attitude. Better knowledge did not necessarily translate into adherence to correct practices. Individual clinicians' practices were not in line with best practice and were positively and strongly related to facility-based practices	Knowledge and practices of clinicians working at PHC facilities in the Northern Tygerberg Sub-structure to TB screening, diagnosis and treatment were above average. Positive attitudes towards TB were reported but attitudes towards TB screening; diagnosis and treatment were low and impact on treatment. Recommendations: need TB-related training, and 87avourable87 change interventions in PHC facilities. Need more in-depth studies to uncover barriers to effective TB management	Excluded: Not peer- reviewed thesis
10	Additio nal	Tuberculosis, TB, HIV, correctional centre, prison, knowledge , attitude, practice, peer education, HCT, condoms, healthcare worker	Yes	Yes	yes	Yes	Best, A. M. (2018). An Evaluation of the Effectiveness of interventions to Change the Knowledge of, attitudes towards, and Practices around, TB and HIV of Inmates in the Western and Eastern Cape of South Africa.	Assessed the effectiveness of the three interventions in correctional centres within the Eastern and Western Cape in changing TB and HIV-related knowledge, attitudes and practices of male inmates	Quantitative cross- sectional survey.	Population: 336 sentenced, randomly selected male inmates over aged 18 old in 6 correctional centres in Western and Eastern Cape. Intervention/treatment: questionnaire evaluating TB and HIV-related knowledge, attitudes and practices. Interviewed one-on-one and then completed a self-administered questionnaire evaluating their TB and HIV-related knowledge, attitudes and practices Outcome: Inmates exposed to Kick TB/HIV had 1,64 (1,04-2,58) times greater odds of being able to name three of four symptoms of TB (p=0,03); 2,64 (1,55-4,50) times greater odds of knowing how TB is cured greater odds of being willing to care for a family member with TB (p=0,04); and 10,45 (1,33-81,99) times greater odds of being willing to care for a family member with HIV than those not exposed. Sociodemographic that were independently associated with TB/HIV was age, race, education, employment status, and HIV status. Inmates who reported easy access to healthcare workers in a correctional centre had greater odds of reporting that after release they would be highly likely to adhere to TB treatment and HIV treatment	Multivariate analysis. Inmates exposed to Kick TB/HIV greater odds of being able to name three of four symptoms of TB (p=0,03); 2,64 (1,55-4,50) times greater odds of knowing how TB is cured (p=0,0004); 3,87 (1,05-14,28) times greater odds of being willing to care for a family member with TB (p=0,04); and 10,45 (1,33-81,99) times greater odds of being willing to care for a family member with HIV than those not exposed. Factors significantly associated with TB/HIV related knowledge, attitudes and practices included age, race, education, employment status, and HIV status. Inmates who reported easy access to healthcare workers in a correctional centre had greater odds of reporting that after release they would be highly likely to adhere to TB treatment and HIV treatment	'Kick TB/HIV' was associated with increased TB knowledge. Both HCT and 'Kick TB HIV' were associated with a more accepting attitude towards TB. Peer education was the only intervention to have an impact on practices, being associated with decreased sharing of tattoo needles. Other sociodemographic (race, age, education, employment status, HIV status) and structural factors were significantly associated with the TB- and HIV-related outcomes.	Excluded: Not peer- reviewed thesis

11	Additio- nal	Assess, Attitudes, Default, Knowledge, Maseru District, Patients, Perceptions, Treatment, Tuberculosis	Yes	Yes	yes	Yes	Letsie, M. (2011). Knowledge, attitudes and perceptions of tb non-adherent and adherent 2-3 years after their initial registration at Botšabelo Clinic, Maseru, Lesotho.	Describe knowledge, attitudes and perceptions to TB as a disease and its treatment among non-adherent and adherent at Botšabelo Clinic in the Maseru district of Lesotho, in order to identify contributing factors related to defaulting treatment	Quantitative. Cross-sectional descriptive study	<p>Population: 283 TB patients -131(46%) were non-adherent and 152 (54%) were adherent registered at Botšabelo Clinic in 2007 were included in the study. Simple random sampling was used to select both groups of participants.</p> <p>Intervention/ treatment:</p> <p>Outcome: Non-adherent and adherent showed good knowledge of symptoms, prevention and transmission of TB. They were also knowledgeable about duration of treatment. 98% non-adherent and 100% adherent knew that TB is curable. 93% non-adherent and 93% adherent visited a health facility when TB symptoms occurred. Less than half of the respondents (47% non-adherent and 47% adherent) smoked. 47% non-adherent and 43% adherent drank alcohol. Many non-adherent and adherent experienced support from the community. A large number mentioned that TB did not affect their marriage negatively. Alcohol intake was moderate.</p>	Non-adherent and adherent showed good knowledge of symptoms, prevention and transmission of TB. They were also knowledgeable about duration of treatment. 98% non-adherent and 100% adherent knew that TB is curable. 93% non-adherent and 93% adherent visited a health facility when TB symptoms occurred. Less than half of the respondents (47% non-adherent and 47% adherent) smoked. 47% non-adherent and 43% adherent drank alcohol. Many non-adherent and adherent experienced support from the community. A large number mentioned that TB did not affect their marriage negatively	Non-adherent and adherent had good knowledge of symptoms, prevention, disease transmission and definition of TB. Misconceptions: TB is caused by poison. Need to strengthen health education on TB in communities. They Knew TB is curable. Attitudes and perceptions towards the TB disease were positive. 93% of TB patients went to a health facility for treatment, while others went to traditional healers.	Include: attitude, causes and treatment
12	Ebsco- host	No keywords	Yes	Yes	yes	Yes	Adane, K., Spigt, M., Johanna, L., Noortje, D., Abera, S. F., & Dinant, G. (2017). Tuberculosis knowledge, attitudes, and practices among northern Ethiopian prisoners: Implications for TB control efforts	Assessed the level of knowledge, attitudes, and practices (KAP) of prisoners about TB in eight northern Ethiopian prisons.	Quantitative Data were collected by means of cross-sectional research design.	<p>Population: 615 prisoners in eight Northern Ethiopian prisons.</p> <p>Intervention/treatment: Standardized questionnaire between March and May 2016</p> <p>Outcome: There was no significant difference with respect to socio-demographic characteristics, KAP of the respondents in the intervention and control group at baseline. There was significant improvement in attitude, group main effect ($p = 0.001$, $d = 1.26$) and time ($p = 0.001$, $p, d = 0.65$). Similarly, there was improvement in practice, group main effect, time, and interaction of group with time ($p < 0.05$).</p>	Analysis: EpiData version 3.1 software and the analysis was performed using SPSS version 20.0. Results: 37.7% mentioned that bacteria were a cause of TB, while 21.7% related TB to exposure to cold wind. 88% correctly mentioned the aerial route of TB transmission. 27.3% had perceived stigma towards TB. 63.7% was not aware of the possibility of getting multi-drug-resistant strains when they would not adhere to treatment. Overall, 24% knew the basic elements about TB, 41% had 88avourable attitudes, and 55% had a good practice. Prisoners who were urban residents knew than rural residents (adjusted OR = 2.16; 95% CI = 1.15–4.06). Illiterates had less knowledge, less likely to have a 88avourable attitude, and less good practice	Knowledge of prisoners regarding the cause of TB and consequences of non-adherence to TB treatment was low. Knowledge on the transmission, symptoms, and prevention was fairly high. Health education interventions, focused on the cause and the translation of the knowledge to appropriate practices, are needed in all the study prisons. Special attention should be given to less educated prisoners, and to prisons with a high number of prisoners and those in remote areas	Include: Attitudes and causes and treatment

Appendix C- Critical Appraisal Tool

CRITICAL APPRAISAL CHECKLIST FOR A SYSTEMATIC REVIEW

Bibliographic Details	Author	Title	Source

Title		Year

Purpose	Yes (1)	No (0)
1. Is there evidence that literature has been consulted in providing context or background?		
2. Is there clear problem statement?		
3. Is there a clear rationale for the study?		
4. Are the aims of the study clearly stated?		
5. Are the aims explicitly related to the problem statement?		
Total points for this section (5)		

Study Design	Yes (1)	No (0)
1. Is there theoretical orientation of the study reported?		
2. Was there theoretical orientation described in detail?		
3. Is the design of the study reported?		

4. Did the authors motivate their design choices?		
5. Were the elements of the designs reported on?		
6. What is the relationship of the design to the aim of the study? a) Minimal to no relevance (0) b) Moderate relevant (1) c) Highly relevant (2)		
Total points for this section (7)		

Ethics	Yes (1)	No (0)
1. Was ethics approval obtained from an identifiable committee?		
2. Was informed consent obtained from the participants of the study?		
3. Have ethical issues been reported on? a) Confidentiality (1) b) Anonymity (1) c) Withdrawal (1) d) Informed consent (1)		
Total points for this section (6)		

Data Collection	Yes (1)	No (0)
1. Were data collection methods clearly indicated?		
2. Was choice of data collection methods motivated?		
3. Were methods of collection appropriate for the outcome identified?		
4. For quantitative studies: a) Did they report on psychometric properties?		

b) Did they report on psychometric properties of the scale for this sample? c) Did the authors report on the type of data produced by the instruments? d) Did the instruments produce data that supported the data analysis?		
5. For qualitative studies: Did they report on a) Trustworthiness b) Credibility c) Reflexivity d) Respondent validation		
Total points for this section (7)		

Data Analysis	Yes (1)	No (0)
1. Was the method of analysis made explicit?		
2. Was the method of analysis motivated?		
3. Was the method of analysis appropriate/relative to the research question?		
4. Were the conclusions drawn appropriate and supported by the data?		
5. Were the inferences drawn supported by the type of sampling?		
Total for this section (5)		

Sample	Yes (1)	No (0)
1. Was the source population clearly identified?		
2. Were the inclusion/exclusion criteria specified?		

3. Was the sampling choice motivated?		
4. Was the sampling method appropriate?		
5. How was the size of the study sample determined? a) Not reported (0) b) Using threshold numbers (1) c) Formulas (2) d) Statistical requirements (3) e) Saturation (3)		
6. Were techniques used to ensure optimal sample size?		
Total points for this section (8)		

Results	Yes (1)	No (0)
For Quantitative studies: 1. Were alpha levels reported? 2. Were results correctly interpreted? 3. Were the results clearly linked to the research questions?		
For Qualitative studies: 1. Was saturation reached? 2. Were multiple reviewers used? 3. Were the results clearly linked to the research questions?		
Total points for this section (3)		

Conclusion	Yes (1)	No (0)
1. Was a clear conclusion drawn?		
2. Was the conclusion supported by the findings?		

3. Were relevant recommendations made based on the findings?		
4. Were limitations identified?		
Total points for this section (4)		

Total Score/Score (%)

Score

Score%

Weak (0-40%)

Moderate (41-70%)

Strong (71-80%)

Excellent (>80%)

Overall Appraisal: Include _____

Exclude _____

Seek Further info _____



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Appendix D: Critical appraisal summary sheet for Eligible Full-text studies (Operational step 3)
(Systematic search records)

Reference no.	Author	Title	Purpose (5)	Study Design (7)	Ethics (6)	Data collection (7)	Data analysis (5)	Sample (8)	Result (3)	Conclusion (4)	Final appraisal score (%)
Phase 1: Beliefs about TB causation and treatment in Africa											
1.	Tola, H. H., Karimi, M., & Yekaninejad, M. S. (2017).	Effects of sociodemographic characteristics and patients' health beliefs on tuberculosis treatment adherence in Ethiopia: a structural equation modelling approach	4	4	3	6	4	5	3	3	32/45= 71.1% Included
2.	Tola, H. H., Shojaeizadeh, D., Tol, A., Garmaroudi, G., Yekaninejad, M. S., Kebede, A., Ejeta, L. T., Kassa, D., & Klinkenberg, E. (2016).	Psychological and Educational Intervention to Improve Tuberculosis Treatment Adherence in Ethiopia Based on Health Belief Model: A Cluster Randomized Control Trial	4	4	4	5	4	5	3	4	33/45= 73.3% Included
3.	Knutsen, A. K. (2010).	Perceptions and beliefs on tuberculosis and the influence on health seeking behaviour.	4	7	6	2	5	7	2	4	37/45= 82.2% Included

Phase 2: Attitudes about TB causation and treatment in Africa

Reference no.	Author	Title	Purpose (5)	Study Design (7)	Ethics (6)	Data collection (7)	Data analysis (5)	Sample (8)	Result (3)	Conclusion (4)	Final appraisal score (%)
4.	Kigozi, G. N., Heunis, J. C., Engelbrecht, M. C., van Rensburg, A. P. J., & van Rensburg, H. C. J. D. (2017).	Tuberculosis knowledge, attitudes and practices of patients at primary health care facilities in a South African metropolitan: research towards improved health education. BMC Public Health , 17:795.	5	3	3	4	4	6	3	4	31/45= 71% Included
5.	Bati, J., Legesse, M., & Medhin, G. (2013).	Community's knowledge, attitudes and practices about tuberculosis in Itang Special District, Gambella Region, South Western Ethiopia. BMC Public Health , 13:734.	5	4	3	5	4	6	3	3	33/45= 73.3% Included
6.	Musuka, G., Teveredzi, V. Busang, J., Chingombe, I., Makadzange, P., Mokgweetsinyana, S., Ncube, R., Maradzika, J. Chinamasa, C. F., & Moeti, T. (2018) .	Community attitudes on tuberculosis in Botswana: an opportunity for improving the National Tuberculosis Programme outcomes, 2011.	4	3	6	3	2	4	1	1	24/45= 53.3% Excluded

7.	Letsie, M. (2011).	Knowledge, attitudes and perceptions of tb non-adherent and adherent 2-3 years after their initial registration at Botšabelo Clinic, Maseru, Lesotho (Master's thesis).	5	5	4	4	1	7	1	3	30/45= 66.7% Excluded
8.	Adane, K., Spigt, M., Johanna, L., Noortje, D., Abera, S. F., & Dinant, G. (2017).	Tuberculosis knowledge, attitudes, and practices among northern Ethiopian prisoners: Implications for TB control efforts	4	4	3	5	4	6	3	3	32/45= 71.1% Included
9.	Sima, B. T., Belachew, T., & Abebe, F. (2019).	Health care providers' knowledge, attitude and perceived stigma regarding tuberculosis in a pastoralist community in Ethiopia: a cross-sectional study. Note: TB control systems was about the management and treatment of TB	4	4	6	6	4	4	2	2	31/45= 71.1% Included
10.	Luba, T.R., Tang, S., Liu, Q., Gebremedhin, S. A., Kisasi, M. D., & Feng, Z. (2019).	Knowledge, attitude and associated factors towards tuberculosis in Lesotho: a population based study.	4	4	4	5	4	2	2	2	27/45= 60% Excluded

Appendix E: Identification

Title And Keyword Screening: Records for Reference Mining

No.	Author	Date	Title and Source	Index keywords	Databases	Location where stored	Outcome: Excluded / included
REFERENCE MINING							
RECORD FROM: Adane et al. (2017)							
1	Esmael A, Ali I, Agonafir M, Desale A, Yaregal Z, Desta K	2013	Assessment of patients' knowledge, attitude, and practice regarding pulmonary tuberculosis in eastern Amhara regional state, Ethiopia: cross-sectional study. <i>The American Society of Tropical Medicine and Hygiene</i> .	None	Pubmed	Pubmed	Included
2	Chinenye, N. M.	2015	Evaluation of Knowledge, Attitude and Practices of TB Diagnosed Patients in Rwanda towards TB Infection. Case of TB Diagnosed Patients in Kigali Urban and Rural Health Facilities. <i>International Journal of Scientific and Research Publications</i> .	Knowledge, Attitude, TB Diagnosed Patients, TB infection, Urban and Rural Health Facilities and Practices	BMC	BMC	Included
3	Tolossa, D., Medhin, G., & Legesse, M.	2014	Community knowledge, attitude, and practices towards tuberculosis in Shinile town, Somali regional state, eastern Ethiopia: A cross-sectional study. <i>BMC public health</i> .	Tuberculosis, KAP, Shinile town	Pubmed, BMC	Pubmed	Included
4*	Bati J, Legesse M, Medhin G. Duplicate	2013	Community's knowledge, attitudes and practices about tuberculosis in Itang special district, Gambella region, south western Ethiopia. <i>BMC public health</i> . 13(1):1.	None	Springer link, BMC	BMC	Included
5	Ferreira Junior, F. S., Oliveira H. B, Marin-Leon L.	2013	Knowledge, attitudes and practices on tuberculosis in prisons and public health services. <i>Revista Brasileira de Epidemiologia</i> . 16(1):100–113.	Tuberculosis; Prisons; KAP; Knowledge; Attitudes; Practices; Public Health Service	Pubmed	Pubmed	Included
RECORD FROM: Bati et al. (2013)							
6	Haasnoot, P.J., Boeting, T.E., Kuney, M.O., & Roosmalen, J.V.	2010	Knowledge attitude and practice of tuberculosis among Maasai in Simanjiro District, Tanzania. <i>The American Society of Tropical Medicine and Hygiene</i> .	None	Pubmed, BMC	Pubmed	Included

Appendix F: Screening Abstracts (Operational step 2)
Data extraction tool including PIO criteria (Reference mining records)

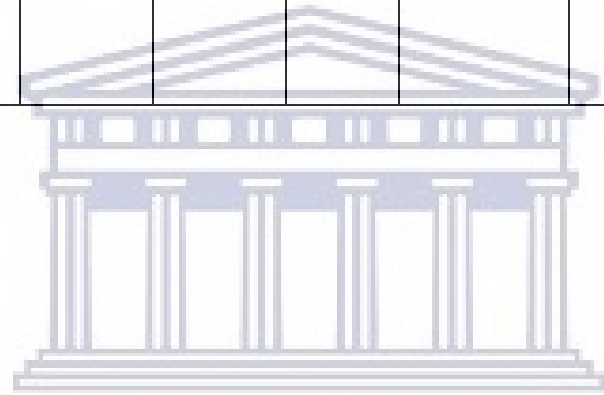
no.	Study location	Keywords	Databases included	peer-review	full text	Abstract, aims objectives results and conclusion	Author, year and title	Aims and Objectives	Methodology and study design	Study population, intervention / treatment and outcomes	Quality or results of study analysis	Limitations, conclusions and recommendation	Include or exclude
1	Pubmed	None	Yes	Yes	Yes	Yes	Esmael, A., Ali, I., Agonafir, M., Desale, A., Yaregal, Z. & Desta, K. (2013). Assessment of patients' knowledge, attitude, and practice regarding pulmonary tuberculosis in eastern Amhara regional state, Ethiopia: cross-sectional study. <i>The American Society of Tropical Medicine and Hygiene</i> .	To assess the knowledge, attitude, and practice of patients toward TB in the Eastern Amhara region of Ethiopia	Quantitative methodology; Cross-sectional survey	Population: 422 suspected and confirmed TB patients who were 18 years old + Intervention / treatment: Structured and pre-validated questionnaire was used to collect data about the knowledge, attitudes and health-seeking behaviour regarding TB, diagnoses and treatment. This was to improve the case detection rate Outcome: Majority of participants had misconceptions about the infectious form of TB. Half of the participants did not know that the TB diagnosis and treatment were free of charge.	A multivariate logistic regression analysis was used to see an association with different variables. Approximately 69.9% of respondents claimed that assumption of paying for TB treatment was the main reason for not seeking care. Thus, effects were non-adherence, a gap in undiagnosed cases and increased death rates.	The majority of respondents had several misconceptions about TB. The TB control program needs to consider advocacy, communication, and social mobilization for addressing the gap in the study sites.	Need more facts on attitudes about causes of TB and treatment
2	NCBI	Knowledge, Attitude, TB Diagnosed Patients, TB infection, Urban and Rural Health Facilities and Practices	Yes	Yes	Yes	Yes	Chinenye, N. M. (2015). Evaluation of Knowledge, Attitude and Practices of TB Diagnosed Patients in Rwanda towards TB Infection. Case of TB Diagnosed Patients in Kigali Urban and Rural Health Facilities. <i>International Journal of Scientific and Research Publications</i> .	To evaluate knowledge, attitude and practices towards TB infection among TB diagnosed patients.	cross-sectional quantitative study	Population: Sample of 411 TB patients were randomly and proportionately drawn for the study. Intervention/ treatment: Questionnaires comprised of participants' sociodemographic characteristics, 11 items Knowledge questions, 13 item attitudes questions and 10 practices questions. Trained community health workers at health center, interviewed participants face to face during their routine daily treatment at the health Centre. Data from the field were sorted out, arranged and analysis with SPSS based on analysis plan. Outcome: Diagnosis of TB led to increased anxiety / tension & participants also had worries on prolonged treatment, fear of spread, stigma, threatened self-esteem and quality of life. There were some stigmatization attitude and resentful behaviour of the community members towards most of the participants, most people rejects him/her (53.8%) and most people are friendly but they generally try to avoid him / her (44.5%).	Study result showed that 59.9% participants had good TB knowledge, while 40.1% participants had poor TB knowledge. The poor knowledge was most predominant on knowledge of who can be infected with TB infection, especially homelessness, People living with HIV/AIDS and people who has been to prison (8.3%, 23.4% and 6.3%) respectively. Also there were poor responses on some of the symptoms regards coughing up blood and shortness of breath (37.2% and 25.1). Diagnosis of TB led to increased anxiety / tension & participants also had worries on prolonged treatment, fear of spread, stigma, threatened self-esteem and quality of life. There were some stigmatization attitude and resentful behaviour of the community members towards most of the participants, most people rejects him/her (53.8%) and most people are friendly but they generally try to avoid him / her.	Practices of covering mouth and nose when coughing and sneezing, personal hygiene, immunization of family were poor among study participants. Determinants of knowledge and practices were education, profession, residence. Knowledge effects on practices were significant. There is a need to Strengthen TB awareness and new interventions that contributes to stigma reduction.	Include: attitude of treatment and TB patients

3	Pubmed	None	Yes	Yes	Yes	Yes	Haasnoot, P.J., Boeting, T.E., Kuney, M.O., & Roosmalen, J.V. (2010). knowledge, Attitudes, and Practice of Tuberculosis among Maasai in Simanjiro District, Tanzania. The American Society of Tropical Medicine and Hygiene	To determine knowledge, attitudes, and practice among Maasai concerning tuberculosis (TB), and to gain insight into the role of traditional healers in diagnosis and treatment	Descriptive-explorative study	Population: Maasai population of Kenya Intervention/ treatment: questionnaires, semi-structured interviews collating information to assess and compare TB knowledge, attitudes, and practice Outcome: The Maasai believe TB is manifest as a punishment from god and is treatable with herbs, roots, and bark. The Maasai have numerous other erroneous health assumptions and beliefs concerning TB. Traditional healers act as family doctors and play a key role in TB treatment initiation and adherence. Traditional healers have substantial influence over primary diagnosis and treatment of TB.	The Maasai have insufficient understanding concerning TB. Schooling has a significant positive effect on knowledge. The Maasai believe TB is manifest as a punishment from god and is treatable with herbs, roots, and bark. The Maasai have numerous other erroneous health assumptions and beliefs concerning TB. Traditional healers act as family doctors and play a key role in TB treatment initiation and adherence. Traditional healers have substantial influence over primary diagnosis and treatment of TB.	Education could positively affect initiation of diagnosis and treatment, resulting in better TB control.	Include: belief and attitude about TB and treatment
4	Pubmed	Tuberculosis, KAP, Shinile town	Yes	Yes	Yes	Yes	Tolossa, D., Medhin, G., & Legesse, M. (2014). Community knowledge, attitude, and practices towards tuberculosis in Shinile town, Somali regional state, eastern Ethiopia: A cross-sectional study. <i>BMC public health</i> .	Objective was to assess the communities' knowledge, attitude and practices towards TB	Community-based cross-sectional survey	Population: 410 randomly selected individuals, was conducted in Shinile town, Ethiopia Intervention: Logistic regression technique was used to determine the association between socio-demographic characteristics and communities' knowledge of TB Outcome: 94.9% of the respondents said that they ever heard about TB, only 22.9% knew that TB is caused by bacteria. Eighty percent have awareness that TB can be transmitted from a patient to another person and 79.3% know that transmission of TB can be preventable. Persistence cough (72.4%) was the most commonly stated symptom of TB and modern drugs used in health institutions (68.1%) was the preferred choice of treatment. Two hundred and ninety one respondents (71.0%) said that they would seek treatment at health facility if they realized that they had symptoms related to TB. Two hundred and twenty seven respondents (55.4%) considered TB as a very serious disease and 284 (69.3%) would experience fear if they themselves had TB. Individuals with educational level of grade 8 up to grade 12 had increased odds of having good level of overall TB knowledge compared to illiterate individuals	94.9% of the respondents said that they ever heard about TB, only 22.9% knew that TB is caused by bacteria. Eighty percent have awareness that TB can be transmitted from a patient to another person and 79.3% know that transmission of TB can be preventable. Persistence cough (72.4%) was the most commonly stated symptom of TB and modern drugs used in health institutions (68.1%) was the preferred choice of treatment. Two hundred and ninety one respondents (71.0%) said that they would seek treatment at health facility if they realized that they had symptoms related to TB. Two hundred and twenty seven respondents (55.4%) considered TB as a very serious disease and 284 (69.3%) would experience fear if they themselves had TB. Individuals with educational level of grade 8 up to grade 12 had increased odds of having good level of overall TB knowledge compared to illiterate individuals (OR = 2.3; 95% CI: 1.2 to 4.6).	The communities in Shinile town have basic awareness about TB which is not translated into the knowledge about the cause of the disease. Therefore, health education directed towards bringing a significant change in the knowledge of TB must be stepped-up within the TB control program.	Include: attitudes of treatment and causes

Appendix G: Critical appraisal summary sheet for Eligible Full-text studies (Operational step 3)
(Reference mining records)

Reference no.	Author	Title	Purpose (5)	Study Design (7)	Ethics (6)	Data collection (7)	Data analysis (5)	Sample (8)	Result (3)	Conclusion (4)	Final appraisal score (%)
1.	Esmael, A., Ali, I., Agonafir, M., Desale, A., Yaregal, Z. & Desta, K. (2013).	Assessment of patients' knowledge, attitude, and practice regarding pulmonary tuberculosis in eastern Amhara regional state, Ethiopia: cross-sectional study	4	3	4	5	4	4	2	4	30/45=66.6 % Excluded
2.	Chinenye, N. M. (2015).	Evaluation of Knowledge, Attitude and Practices of TB Diagnosed Patients in Rwanda towards TB Infection. Case of TB Diagnosed Patients in Kigali Urban and Rural Health Facilities	5	6	6	5	5	6	2	3	38/45= 84.4% Included
3.	Haasnoot, P.J., Boeting, T.E., Kuney, M.O., & Roosmalen, J.V. (2010).	Knowledge, Attitudes, and Practice of Tuberculosis among Maasai in Simanjiro District, Tanzania	4	3	3	5	3	3	3	3	27/45=60% Excluded

Reference no.	Author	Title	Purpose (5)	Study Design (7)	Ethics (6)	Data collection (7)	Data analysis (5)	Sample (8)	Result (3)	Conclusion (4)	Final appraisal score (%)
4.	Tolossa, D., Medhin, G., & Legesse, M. (2014).	Community knowledge, attitude, and practices towards tuberculosis in Shinile town, Somali regional state, eastern Ethiopia: A cross-sectional study	4	4	6	6	5	6	2	2	35/45=77% Included



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Appendix H: Student registration



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UNIVERSITY OF THE WESTERN CAPE

MISS CAL PETERSEN

Student number: 3057587

Dear Student

This serves to confirm that your Online Registration for 2020 has been successful. A summary of the modules that you have selected for this year is presented below.

Please ensure that you keep this document as proof of your registration for 2020. Note that you will be billed for all the modules listed and that you are required to familiarise yourself with the rules and administrative deadlines of the University as published in the General Calendar Part 1 (see University website).

NOTICE

Please note that by submitting the online registration form you have agreed and undertaken to:

1. Pay all the prescribed fees in full;
2. Abide by the rules of the university;
3. Ensure that all the information supplied herein is true and correct;
4. Only attend classes in those subjects for which I am registered;
5. Select my home address set out above as my *domicilium citandi et executandi*;
6. Read your UWC designated email on a regular basis as this is the primary form of formal communication between the university and its students;
7. Consent to the university disclosing your results to persons or parties who are responsible, in whole or in part, for the payment of your studies

STUDENT CARDS

Student Cards will be issued at the Student Administration Helpdesk.

COMMENCEMENT OF CLASSES

Please note that classes will commence on 03 February 2020.

Please check your official myuwc email account on a regular basis as future correspondence will be sent via email as far as possible.

CONTACT DETAILS

Enquiries can be directed to the University Contact Centre during office hours (08h30-18h30) at +27 21 959 3900/01.

We wish you everything of the best in your studies.

Yours sincerely

DR NITA LAWTON-MISRA
REGISTRAR

Appendix I: Ethics clearance



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06 November 2019

Ms C Petersen
Psychology
Faculty of Community and Health Sciences

Ethics Reference Number: BM19/5/1

Project Title: Beliefs and attitudes about tuberculosis causation and treatment in Africa: A systematic review.

Approval Period: 14 June 2019 – 14 June 2020

I hereby certify that the Biomedical Science Research Ethics Committee of the University of the Western Cape approved the scientific methodology and ethics of the above mentioned research project.

Any amendments, extension or other modifications to the protocol must be submitted to the Ethics Committee for approval.

Please remember to submit a progress report in good time for annual renewal.

The Committee must be informed of any serious adverse event and/or termination of the study.

A handwritten signature in black ink, appearing to read 'Patricia Josias'.

*Ms Patricia Josias
Research Ethics Committee Officer
University of the Western Cape*