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Assessment of Factors that Affect Men's Access and Utilization of Tuberculosis Services in Zululand District in South Africa

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This is to certify that the doctoral dissertation by

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Abstract

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Dissertation Submitted in Partial Fulfillment

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Doctor of Philosophy

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Abstract

Tuberculosis (TB) remains the leading cause of death in South Africa, with higher mortality rates among men compared to women, despite the availability of free TB services and a reduction in TB death rates. However, research on the factors influencing men's access and utilization of TB services is limited. The purpose of this study was to assess the factors affecting men's geographical access and quality utilization of TB services in the Zululand district of KwaZulu Natal province, South Africa. A survey questionnaire was used to collect data from 200 men recruited from selected primary health care facilities. Andersen's model of health services utilization and the social-ecological model were used as theoretical frameworks. Logistic regression was used for inferential statistical analysis. The findings revealed that age, income level of R1 – R3500, and level of TB knowledge were significant factors influencing men's quality utilization of TB services, while travel time to health facilities, and mode of transport influenced geographical access. Age was negatively associated with quality utilization of TB services, with older men having lower quality utilization (OR = .98, p = .037). Level of TB knowledge was a significant predictor of men's quality utilization of TB services, with higher knowledge associated with higher utilization (OR = 3.71, p = .002; OR = 3.6, p = .003 adjusted for age). Recommendations for positive social change include male-targeted community campaigns and health education for early diagnosis, treatment and control, community financial empowerment through public and private partnerships, bringing TB services closer to the community to promote access, and implementing triggers to improve medication adherence and avoid treatment interruptions.

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Dedication

This dissertation is dedicated to my husband Trevor Chengero Sambara Tshabalala for his immense support during the entire period of my studies. Trevor, thank you for loving me unconditionally, changing your sleeping patterns to be part of the journey, your encouragement, prayers, dedication to the kids' programs, and making sure everything is running efficiently and effectively in our home. It made my experience bearable and enjoyable. Mom, your words about this qualification were written in my heart, and it has been done, thank you, my guardian angel. I know you were part of this journey. I clearly remember the way you screamed during my first undergraduate graduation ceremony, and you made everyone laugh. I am certain you will be with me during my graduation ceremony. My children, Trevor Junior, Astrida, Zachary, and Zoe, thank you for your patience and support. I failed you many times, but I pray this qualification inspires you to reach your potential, no matter how farfetched it may seem. Thank you! To the Hara clan, this is for you, the first of this kind!

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Chapter 1: Introduction to the Study

Introduction

Tuberculosis (TB) is a communicable airborne infection and one of the 10 critical causes of mortality globally. It is caused by bacillus *Mycobacterium tuberculosis* and a quarter of the global population has latent TB (World Health Organization [WHO], 2019, 2020). TB commonly affects adults, especially men, more than women. Globally, men aged above 15 years accounted for 56% of the people with TB infection, women at 32%, and children below 15 years at 12%, respectively (WHO, 2020). Almost 90% of all TB cases occur in the 30 high-burden countries, of which South Africa is in the top 10. Although 85% could be cured within 6 months of treatment, some miss diagnosis or are diagnosed late. Despite treating over 60 million cases globally since 2000, many millions still miss diagnosis and proper TB care (WHO, 2020).

In South Africa, more TB deaths were reported in men than women (Loveday et al., 2019). The KwaZulu-Natal (KZN) province and the study district, Zululand in KZN province, had the same situation despite the availability of free TB services nationally (Department of Health [DOH], 2018). Also, a retrospective charts' review of admitted patients with TB infection in one of Zululand district hospitals revealed that most men were diagnosed with advanced TB infection in the hospital (DOH, 2018). Therefore, it was critical to assess factors that affect men's geographical access and quality utilization of TB services, especially in primary health care (PHC) facilities where TB infection is mostly managed according to country guidelines.

TB remains a priority health issue for the entire population, including men, globally, regionally, and nationally (DOH, 2018, 2020; WHO, 2019, 2020). The purpose of this study was to assess the factors that affect men's geographical access and quality utilization of TB services in the Zululand district of KZN province in South Africa. In this chapter, I will discuss the following sections: the background, problem statement, purpose of the study, the research questions, and hypotheses, theoretical framework, nature of the study, the operational definitions, study assumptions, scope and delimitations, limitations, the significance of the study and a summary to transition to the next chapter.

Background

Globally, according to the WHO TB report, an estimated 1,500,000 TB deaths occurred in 2019, of which 64000 were from South Africa, with two-thirds of them being TB/HIV coinfected (WHO, 2019). South Africa is among the seven highly TB-burdened countries in the world (WHO, 2019). TB is the leading cause of natural deaths in South Africa. In 2017, 446,554 deaths were reported nationally, of which 28,678 were due to TB, contributing to 6.4% of total deaths (Statistics South Africa [StatsSA], 2020). Tuberculosis was ranked the number one cause of death for men (17,858 TB deaths) thus 7.6% of total male deaths of 235,697, and number five for women (10,820 TB deaths), thus 5.1% of total female deaths of 210507 (StatsSA, 2020). From this data, men contributed 60.6% of the total TB deaths, and women 39.4% (StatsSA, 2020). Among TB patients nationally, 18.4% died in 2018 (DOH, 2018; StatsSA, 2019). Loveday et al. (2019) analyzed South Africa's national TB data from 2006 to 2016 and found that over

the years TB deaths had reduced from 13% to 6% during this period. Despite this reduction in the 10 years, the TB deaths for men had increased from 55% in 2006 to 62% in 2016 (41,985 to 18,153) than for women, which decreased from 45% in 2006 to 38% in 2016 (34, 896 to 11, 246), respectively. Evidence that more men died due to TB compared to women, respectively (Loveday et al., 2019). Nationally, TB treatment outcomes have remained unsatisfactory (WHO, 2019).

In KZN province, TB was ranked the number one cause of death (DOH, 2018). KZN province was the second-ranked province nationally, with high TB deaths among the nine provinces in South Africa (StatsSA, 2020). In 2017, 76,605 deaths were reported from KZN province, of which 5,663 (7.4%) were due to TB infection. Mostly, 3,487 men (62.4%) died compared to 2,176 (37.6%) women (StatsSA, 2020). In 2016, the TB infection for men aged 15 years and above was 57% compared to 43% for women in KZN province (StatsSA, 2019). In this province, 71% of patients coinfected with multidrug-resistant (MDR) TB and HIV died in 2015 (DOH, 2018).

The Zululand district is one of the 11 districts in the Kwazulu-Natal province. According to the 2018 Zululand district health plan, the Zululand district faced the same difficulty; TB was the leading cause of death, and it contributed 26.3% of total TB deaths, of which 83.8% were TB and HIV coinfected (DOH, 2018). Furthermore, in 2019 a programmatic retrospective chart analysis of 110 TB file records from one of the hospitals in the Zululand district confirmed that patients were diagnosed late with advanced TB infection during their hospitalization (DOH, 2019). However, national DOH guidelines and protocols promote TB diagnosis and management in PHC facilities

and referral of complicated cases only to hospitals (DOH, 2019). In this situation, most male patients were primarily diagnosed in the hospital with drug-susceptible (DS) TB and MDR TB. There were also more TB deaths among men (67%) than women (33%) (DOH, 2019). Although evidence-based solutions to control and prevent TB are offered at no cost nationally, TB outcomes are unsatisfactory, and there is a variation in men's and women's TB outcomes, with more deaths in men (WHO, 2019).

Problem Statement

In South Africa, including the Zululand district, more men are dying due to TB than women despite free TB services for the entire population and a reduction in the overall TB death rate over the years (DOH, 2018; Loveday et al., 2019). Tuberculosis has remained the leading cause of death in South Africa (StatsSA, 2019; WHO, 2019). It is also the leading cause of death in the Zululand district, and the number one cause of mortality in men, compared to women where TB was ranked number three (DOH, 2018; StatsSA, 2019). Subbaraman et al. (2020) evaluated the current national TB outcomes using the TB care cascade's numerous steps and found multiple gaps, which led to the development of multiple research topics, including promoting research on men's TB care. The researchers highlighted the importance of researching men among the groups that experience TB care inequalities at different stages.

Chikovore et al. (2020) analyzed empirical literature and available debates on men's involvement related to TB healthcare. They found that men were over-represented on poorly performing TB indicators and historically excluded in health education and discussions, including TB. In general, men's TB epidemiology and health have been

ignored, especially in TB high-burden low-income countries or settings (Chikovore et al., 2020). Using these findings, there was a need to explore the factors that affect men's access and utilization of TB services to inform the development of appropriate multifaceted strategies that would promote access to TB care and quality utilization of TB services to improve TB outcomes.

Although several researchers provided evidence-based solutions to control and prevent TB, including universal barriers to access and utilization of TB services, it was primarily for the general population. These factors include a level of knowledge, stigma, poverty, long processes at health care facilities (HCFs), prolonged duration of treatment, systemic gaps, health care workers' (HCWs) attitudes, cultural beliefs, and practices (Bashorun et al., 2020; Chikovore et al., 2020; Datiko et al., 2020; Mair et al., 2020; Subbaraman et al., 2020; Trajman et al., 2019; Watermeyer & Penn, 2019; WHO, 2019; Yoshitake et al., 2019; Zein et al., 2017). There was limited information on the factors that affect men’s geographical access and quality utilization of TB services, which potentially lead to increased TB morbidity and mortality in men in the Zululand district. A good understanding of these factors would guide stakeholders to develop relevant, specific TB prevention and control interventions for men. The identified interventions would benefit the entire population, reduce TB morbidity and mortality, reduce public health expenditure, and the savings would profit other public health programs.

Purpose of the Study

The purpose of this quantitative study was to assess the factors that affect men’s geographical access and quality utilization of TB services in the Zululand district of KZN

province in South Africa. Specifically, my goal was to explore any relationship between HCWs' attitudes (like friendliness, respect, and support), HCWs' gender, HCFs processes (waiting time, service hours, referrals to other facilities, and availability of required HCWs), and men's quality of TB services utilization. Secondly, I examined any association between age, level of education, level of income, marital status, level of TB knowledge, cultural beliefs, stigma, TB seriousness, and men's quality of TB services utilization. Lastly, I determined the relationship between travel time to the health facility, mode of transportation, income, and men's geographical access to TB services.

The dependent variables were men's geographical access to TB services, and men's quality of TB services utilization. I used previous studies and the theoretical frameworks to identify the independent variables (see Andersen & Newman, 1973, 2005; Bashorun et al., 2020; Bronfenbrenner, 1977; Chikovore et al., 2020; Chinouya & Adeyanju, 2017; Datiko et al., 2020, Nyasulu et al., 2018; Kilanowski, 2017; Seidu, 2020; Shao et al., 2018). The variables include both societal and individual determinants.

Research Questions and Hypotheses

I used the following research questions and corresponding hypotheses to guide this study:

Research Question 1 (RQ1): Was there an association between HCWs' attitudes (like friendliness, respect, and support), HCWs' gender, HCFs processes (waiting time, service hours, referrals to other facilities, and availability of required HCWs), and men's quality of TB services utilization?

Null Hypothesis ($H_0$1): There was no statistically significant association between HCWs' attitudes (like friendliness, respect, and support), HCWs' gender, HCFs processes (like waiting time, service hours, referrals to other facilities, and availability of required HCWs), and men's quality of TB services utilization.

Alternative Hypothesis (H_a1): There was a statistically significant association between HCWs' attitudes (like friendliness, respect, and support), HCWs' gender, HCFs processes (like waiting time, service hours, referrals to other facilities, and availability of required HCWs), and men's quality of TB services utilization.

Research Question 2 (RQ2): Was there an association between the socio-demographics (age, level of education, level of income, and marital status), level of TB knowledge, cultural beliefs, stigma, TB seriousness, and men's quality of TB services utilization?

Null Hypothesis ($H_0$2): There was no statistically significant association between the socio-demographics (age, level of education, level of income, and marital status), level of TB knowledge, cultural beliefs, stigma, TB seriousness, and men's quality of TB services utilization.

Alternative Hypothesis (H_a2): There was a statistically significant association between the socio-demographics (age, level of education, level of income, and marital status), level of TB knowledge, cultural beliefs, stigma, TB seriousness, and men's quality of TB services utilization.

Research Question 3 (RQ3): Was there an association between health facility distance, mode of transportation, income, and men's geographical access to TB services?

Null Hypothesis ($H_0$3): There was no statistically significant association between health facility distance, mode of transportation, income, and men's geographical access to TB services.

Alternative Hypothesis (H_a3): There was a statistically significant association between health facility distance, mode of transportation, income, and men's geographical access to TB services.

Theoretical Framework for the Study

The theories and concepts that I used to ground this study were Andersen's model of health services utilization and the social-ecological model (SEM). Andersen's model of health services utilization was initially developed in 1968 by Ronald Andersen (Andersen & Newman, 1973). This model highlights societal and individual factors that may accelerate or hinder the utilization of health services. The individual determinants have three main groupings: predisposing, enabling, and need for care factors. The predisposing factors include socio-demographic factors like age, sex (gender), marital status, education, cultural beliefs, attitudes toward health services, and knowledge about the disease and health services (Andersen & Newman, 2005; Seidu, 2020; Shao et al., 2018). The enabling factors include income, the geography of facilities (location and distance), cost of services, region (urban or rural), and the need for care factors, which include symptoms of disease, diagnosis, and complications (Andersen & Newman, 2005; Seidu, 2020; Shao et al., 2018). These factors were included in this study except gender because it was for men only and region because the Zululand district is in a rural setting.

The societal determinants include the health services system, namely, resources (volume and distribution), and organizational factors, namely, access and structure (Andersen & Newman, 1973, 2005). In this study, the resources included the availability of HCWs and TB drugs. Access as an organizational factor included patient waiting time, health facility service hours, and referrals to other facilities. The model promotes outlining the type of service, the purpose of utilization, and the unit of analysis for the health service utilization (Andersen & Newman, 2005; Seidu, 2020; Shao et al., 2018). This model has gone through several modifications, and despite some scholars' critiques, it has been used extensively in various settings and disciplines like public health, including chronic diseases like TB (Seidu, 2020; Shao et al., 2018; Travers et al., 2020).

Additionally, the concepts of the SEM were utilized in conjunction with Andersen's model of health services utilization. Urie Bronfenbrenner introduced the SEM to understand human development in 1977 and formalized it as a theory in the 1980s (Bronfenbrenner, 1977; Kilanowski, 2017. The SEM states that individuals' knowledge, beliefs, and perceptions are determined by their relationship with family, friends, organizational environment, community (cultural beliefs and practices), and policies, including health systems (Bronfenbrenner, 1977; Nyasulu et al., 2018; Kilanowski, 2017). In this study, I explored the individual factors (age, knowledge, education, attitudes, and cultural belief), family and organizational factors (social support, beliefs, socio-economic status), community factors (beliefs, health systems, distances to health facilities, stigma), and policy factors (resources, facility service hours, waiting times, referral systems, facility processes) to determine any influences on men's geographical

access and quality utilization of TB services. Most of these constructs are like those under Andersen's model of health services utilization. The SEM has been used in the public health environment and several other settings and disciplines. Multiple scholars have used it to guide future interventions (Ngwenya et al., 2020, Nyasulu et al., 2018).

In this study, I used the constructs from these models to answer the research questions. By doing so, I created an understanding of the factors that accelerate or hinder men's geographic access and quality utilization of TB services at both societal and individual levels as multilevel theories. I predicted relationships between each independent variable and the dependent variables described earlier and guided strategies and recommendations for improvement. Finally, I used the constructs from these models to determine the distribution of the given variables that led to intermittent TB treatment interruptions among men and provided suggestions to develop proper solutions to avoid these intermittent treatment interruptions, which may lead to lost to follow-up and poor treatment outcomes (Natarajan et al., 2020; Tola et al., 2019). In this study, I examined the factors that affect men's geographical access and quality utilization of TB services in PHC, where TB prevention, early diagnosis, and treatment are crucial. I considered Andersen's model for health services utilization and SEM suitable models for this study.

Nature of the Study

In this quantitative correlational survey, I collected primary data using a validated structured survey instrument with questions derived from existing validated survey instruments (see Challenge TB, n.d., 2011, Daniels et al, 2021; Erlinger et al, 2019; Fink et al, 2020; Natarajan et al., 2020; Sima et al, 2017; Stop TB Partnership, n.d., 2019;

Suleiman, 2021; Tola et al., 2019). Surveys can be used to objectively find relationships in naturally occurring variables and generalize the findings in similar settings (Babbie, 2017; Burkholder et al., 2016; Creswell & Creswell, 2018). I used skip-question patterns, multiple-choice, and Likert-scale question patterns where applicable (see Babbie, 2017). I used the survey to identify any relationships within the selected dependent and independent variables. I analyzed the data statistically using descriptive and inferential statistics like multiple logistic regression analyses to answer the research questions (see Babbie, 2017; Creswell & Creswell, 2018; Frankfort-Nachmias & Leon-Guerrero, 2016). Zululand district is rural; hence, the best mechanism for data collection was in-person self-administration of the questionnaire or in-person (face-to-face) interviews for those who were unable to fill out the questionnaire. I used a private room for this while following and maintaining COVID-19 regulations (masking, social distancing, sanitization, and good ventilation).

The survey took place in the purposively selected high TB burden PHC facilities. The questionnaires were both in English and isiZulu language and the participants chose according to their preferences. I preferred the in-person approach because the setting is a rural district, and other methods like the use of the internet, mail questionnaire, and telephone and internet interviews were not feasible. The participants' inclusion criteria were men aged 18 years and above with TB infection accessing treatment in the selected PHC facilities. All male individuals below 18 years and those above 18 years without TB infection were excluded, including those with TB infection accessing TB treatment in nonelected PHCs. The participants were recruited using convenience sampling in the

selected high-TB burden PHC facilities. This type of sampling technique was appropriate for this study because of the small study population of men with TB disease in this district. However, this method is also essential for simple, low-budget, time-sensitive studies and valuable in pilot studies and hypothesis generation (Babbie, 2017). I used the G*Power calculator, online calculator, and manual calculation to calculate the sample size to promote reliability (see Frankfort-Nachmias & Leon-Guerrero, 2016). When I used the G*Power calculator the sample size was 184 participants, I also used an online calculator, which estimated 180 participants, and I conducted a manual calculation, which estimated 183 participants (see Calculator.net, n.d.; Heinrich Heine Universitat, 2020). I used a population size of 337 men with TB infection seeking TB care in the purposively selected facilities. The population was derived from the district health information system (DHIS) data and facility data. Using these calculations, I sought 185 participants for this study.

Operational Definitions

The following are the operational definitions of the terms used in this study:

Access to TB services is defined as acceptability, suitability (cultural accessibility), affordability (financial accessibility), and geographical accessibility of the services by the men in this district. I derived this definition from the seven dimensions of the access framework: availability, geography, affordability, accommodation, timeliness, acceptability, and awareness (Dassah et al., 2018; Suleiman, 2021). Access means gaining entry to health facilities to receive needed healthcare services, finding the right healthcare givers, and seen as a continuum because of the several factors that promote or

impede access like the cost of service, appointment timing, and transportation costs (National Academy of Sciences, 2018). The definition of access to services has the below three main areas. I focused on geographical access to TB services in the study.

- Cultural accessibility includes acceptable cultural beliefs/taboos and practices that allow access and utilization of TB services (Dassah et al., 2018; Nyasulu et al., 2018; Sima et al., 2017; Suleiman, 2021).
- Financial accessibility is the extent to which people are able or willing to pay for transport to access TB care in the PHCs (Dassah et al., 2018; Suleiman, 2021).
- Geographical accessibility indicates reasonable distances that patients incur to access a health facility, availability of good roads, local transport, and access to referral TB services like advanced PHCs or government hospitals (Dassah et al., 2018; Suleiman, 2021). It was the study focus.

Health care workers' attitudes: good attitude includes being friendly, respectful, and supportive to TB patients (Dapaah, 2017).

High TB burden PHC facilities are defined as those with more than 15 active TB patients.

Intermittent treatment interruption is defined as a missed prescribed dose of TB medication for at least one day (Natarajan et al., 2020; Tola et al., 2019).

Men's quality of TB services utilization means being diagnosed within three weeks of the onset of symptoms, within three clinic visits and TB treatment commenced within two days according to SA guidelines. Utilization happens through knowledge that

the health care services exist, are needed, and one wants to obtain them (Abera et al., 2017; Lyu et al., 2017). Utilization is determined by access, which includes availability, affordability, quality and timeliness of services, cultural beliefs and practices, distance, and the health system itself (Abera et al., 2017). Tuberculosis infection requires a minimum of six months of treatment to be cured and requires on-going utilization of TB services from diagnosis to treatment completion and cure. Utilization can be high or low cost, appropriate or inappropriate, and high or low quality (National Academy of Sciences, 2018). This study focused on men's quality of TB services utilization.

Stigma is defined as feelings of being rejected, excluded, or blamed by others due to being diagnosed with TB (Hatherall et al., 2019).

Tuberculosis is a communicable airborne disease caused by *bacillus Mycobacterium tuberculosis*, and its latent TB affects a quarter of the global population (WHO, 2020).

Assumptions

In this study I assumed that all essential PHC TB services and resources in the selected TB high-burden government PHC facilities were available to those who need them. I assumed that most of the men were familiar with the health system and were aware of the TB services provided by government PHC facilities. Finally, I assumed that the participants would provide accurate and honest responses to minimize bias during data collection, which would affect data analysis and study results. These assumptions were critical to understanding the problem under study, its magnitude and to achieve the desired outcome to guide the correct decision (see Babbie, 2017). My assumptions about

the availability of the essential services, and participants' awareness of TB services were essential in understanding the problem better and answering the research questions.

Scope and Delimitations

I limited the study design to men diagnosed with TB infection, accessing TB care and management in the purposely selected high TB burden government PHC facilities in the Zululand district of KZN province. The inclusion criteria included men aged 18 years and above with TB infection accessing TB services in the chosen facilities. The exclusion criteria included those who did not provide consent, all men with TB infection accessing treatment in non-selected PHC facilities, and those without TB infection. The theories and concepts that I used to ground this study were Andersen's model of health services utilization and SEM. I excluded other potential theories like social cognitive theory (SCT), which describes the effect of personal experiences, others' actions, and environmental factors on personal health behavior (Glanz et al., 2015); the health belief model (HBM), theory of reasoned action, and theory of planned behavior, which offer valuable information for predicting health behaviors to prepare, develop, and implement health promotion and disease prevention programs (Glanz et al., 2015).

I met the quality standards of the study by paying attention to the approved design and method, the research questions, data collection methods, the instrument, sampling, and sample size. This correlational study was not a cause-and-effect study hence it had the potential for multiple biases like selection, information, and confounding biases. The chosen convenient sampling method has an inherent selection bias as the participants are not chosen randomly (see Babbie, 2017). I conveniently sampled the eligible participants

from the selected PHC facilities. I improved external validity by explaining the aim of the study to collect truthful data and participants' selection was done in different facilities spread across the five subdistricts of the Zululand district to avoid selection bias. Despite the usage of convenient sampling due to the nature of the study, improved internal and external validity provided the potential for generalization of results to similar rural settings.

Limitations

I limited the study population to men with TB infection, and convenience sampling had potential internal validity issues. I conveniently selected participants from different facilities spread across the five subdistricts in the district to improve validity. Despite the use of multiple facilities, the research design paused potential threats to external validity, and generalization of results could only apply to similar settings. Another potential limitation was access to patients with TB for recruitment due to COVID-19 regulations, which included reduced visits to PHC clinics. However, by the time I collected data, the government had eased restrictions and patients had resumed their routine monthly consultation visits. Also, I allocated adequate time for data collection, which allowed data gathering from the required sample size.

Significance

This study was significant because the findings from this study have highlighted the factors that affect men's geographical access to TB care and quality utilization of TB services that potentially lead to high TB morbidity and mortality in the Zululand district. The government, especially the DOH and relevant stakeholders will use these identified

factors to find targeted solutions that will promote men's geographical access and high-quality utilization of TB services. The future initiatives would contribute to control TB in men and the general population by improving TB prevention, diagnosis, and treatment, and acquire better outcomes. TB is prioritized as it is the leading cause of death and affects the country on multiple fronts, including substantial public health expenditure. Zululand rural district is one of the most TB-burdened districts in the country, with a TB mortality rate of 26.3% (DOH, 2015, 2018).

Chikovore et al. (2020) indicated the need to provide targeted, comprehensive interventions to control and prevent TB in men. This study's findings complement the current literature on the generalized contributors to the problematic access to TB care and quality utilization of TB services as narrated earlier (see Watermeyer & Penn, 2019). Therefore, this study has the potential to impact positive social change in the Zululand district and beyond. Public health specialists doing TB work will use these findings to include men’s strategies in planning, deciding, executing, and evaluating their TB care programs. Furthermore, these future improvements would eventually lessen public expenditure, reduce the burden of TB, decrease morbidity and mortality, and improve the population's overall health in Zululand district, surrounding districts, and other areas.

Summary

Although there is a general decline in TB incidence and mortality, TB remains a public health threat globally and in South Africa, affecting more men than women (WHO, 2020). Despite evidence-based strategies to prevent and control TB globally and the availability of free TB services in South Africa, more men are dying of TB (Loveday

et al., 2019; WHO, 2020). The Zululand district is no exception. It faces a similar situation (DOH, 2018; StatsSA, 2019). Several kinds of literature included evidence for the need to focus on men to prevent and control TB. Men's susceptibility, exclusion, and marginalization have contributed to poor TB outcomes globally (Chikovore et al., 2020; Chinouya and Adeyanju, 2017; Loveday et al., 2019; Seidu, 2020). Despite the explored barriers that affect the general population in accessing and utilizing TB services, there was a need to identify factors that affect men's geographic access and quality utilization of TB services to guide the development of suitable interventions to avert and control TB.

Therefore, the purpose of this study was to assess the factors that affect men's geographical access and quality utilization of TB services in the Zululand district of KZN province in South Africa. In chapter 2, I will discuss the following sections: the literature review, with summarized and synthesized outcomes of other relevant and related studies on access and utilization of TB services. I will further discuss TB prevalence, diagnosis, treatment, morbidity, and mortality globally, regionally, nationally, provincially, and in the Zululand district. I also included government TB responses and strategies at different levels. I will further discuss literature related to the key variables, their justification, and the chosen theoretical frameworks. My understanding from this review shaped the scholarly narrative and positioned this research to contribute new knowledge on factors that affect men's geographical access and quality utilization of TB services to promote positive social change.

Chapter 2: Literature Review

Introduction

The purpose of this study was to assess the factors that affect men's geographical access and quality utilization of TB services in the Zululand district of KZN province in South Africa. TB is a communicable airborne disease and one of the ten critical causes of mortality globally. TB is caused by bacillus *Mycobacterium tuberculosis* and a quarter of the population has latent TB (WHO, 2020). It commonly affects adults, especially men than women. Globally, almost 90% of all TB cases belong to 30 high-burden countries, of which South Africa is in the top 10. Although 85% could be cured within 6 months of treatment, some are misdiagnosed or diagnosed late. Despite treating over 60 million cases globally since 2000, many millions miss diagnosis and proper TB care (WHO, 2020).

In 2019, an estimated 10 million people had TB, declining slowly in recent years. An estimated 1.2 million HIV-negative people died of TB (1.5 million in 2018), and a further 208,000 people living with HIV died of TB, making a total of 1.4 million TB deaths (WHO, 2019, 2020). Men above 15 years accounted for 56% of the people with TB disease while women accounted for 32% and children below 15 years at 12%. Among these people, 8.2 % were living with HIV. Although TB incidence is declining by 2% annually, multidrug-resistance TB remains a global crisis as the numbers are increasing, notably 186,883 in 2018 and 206,030 in 2019 (WHO, 2020). Therefore, ending TB is crucial, and it is among the targeted 2030 sustainable development goals (SDGs; United Nations [UN], 2018).

South Africa is hugely affected by TB. It is the leading cause of death and contributed to 18.2% of deaths nationally (StatsSA, 2019). South Africa is among the eight countries that account for two-thirds of the TB cases globally, and among four countries that contribute 44% of them despite most of the TB cases being in South-East Asia (44%), then 25% in Africa, 18% in Western Pacific, 8.2% Eastern Mediterranean, 2.9% Americas and 2.5% Europe (WHO, 2020). In 2018, the WHO estimated 301,000 TB active cases (360,000 in 2019), and 11,000 MDR-TB cases (14,000 in 2019). South Africa had TB treatment success rate of 82.1%, TB incidence of 567/100,000 in 2018 and 615/100,000 in 2019, TB mortality of 39/100,000 in 2018 and 38/100,000 in 2019 (Centers for Disease Control and Prevention [CDC], 2019; WHO, 2019, 2020). However, of the 64,000 TB deaths reported in 2018 and 58,000 in 2019, two-thirds had TB/HIV coinfection (WHO, 2019, 2020). HIV infection remains the main contributing factor to TB in South Africa, seconded by poverty, which leads to poor nutrition, immunity, and adherence to long-term medication like TB due to a lack of funds for transportation to clinics (Pedrazzoli et al., 2017). The South African government has prioritized the TB disease and offers free tests, diagnosis, and treatment to consumers in public sector health facilities. The majority (93%) of all TB tests are done in government institutions, and almost all TB treatments are provided there (Naidoo et al., 2017b).

Similarly, TB incidence and mortality in KZN province are very high. TB contributed to 18.4% of total provincial deaths and was rated second in the country, of which 71% of the deaths were patients coinfected with MDR-TB and HIV (StatsSA, 2019). TB burden was higher in men above 15 years at 57% in this province than in

women at 32% (DOH, 2015; StatsSA, 2019). Despite focusing on TB control strategies for the whole population, this finding highlights the need for targeting men and identifying suitable interventions (Chikovore et al., 2020). Likewise, Zululand district was one of the eleven districts in KZN province with a high TB burden, and it was the leading cause of death, contributing 26.3% of total deaths, of which 83.8% were deaths from patients coinfected with TB and HIV (DOH, 2018).

Recent research and global trends have revealed more TB cases and deaths in men (WHO, 2020). These new findings highlighted the need for emerging research focusing on men and TB. Chikovore et al. (2020) indicated that men with TB were missing in healthcare systems, and poorly performing TB indicators and outcomes were common in most men. The researchers highlighted the need to address social and structural determinants and apply targeted multifaceted solutions. Chinouya and Adeyanju (2017) described the stigma encountered by African men with TB in London as a contributing factor to delayed diagnosis and treatment. The findings uncovered men's susceptibility and marginalization in TB prevention programs, confirming the need for the focused inclusion of men in TB care. However, other patient and systems delays in TB management are generic and affect the general population (Datiko et al., 2020; Watermeyer & Penn, 2019).

Although there has been a decrease in TB death mainly due to the enormous antiretroviral treatment program for HIV in South Africa, TB death in men has increased (Loveday et al., 2019). Researchers have recently indicated the need for innovative research to close the numerous gaps in the TB care cascade and highlighted studies

involving men because they experience TB care inequalities (Subbaraman et al., 2020). A literature gap existed in understanding the factors that affect men's access and utilization of services, which potentially contributes to high morbidity and mortality rate despite free TB services for all. Therefore, assessing these factors in the Zululand district was critical.

This chapter includes context on TB, including prevalence, diagnosis, treatment, morbidity, mortality, government responses, and strategies globally, in sub-Saharan Africa, South Africa, KZN province, and the Zululand district. It further includes literature related to the key variables, their justification, and the theoretical framework. This literature review revealed an opportunity for further studies to explore the contributing factors for increased TB morbidity and mortality in men. In this quantitative study, I assessed the factors that affect men's geographical access and quality of utilization of TB services in the Zululand district of KZN province in South Africa.

Literature Search Strategy

I examined peer-reviewed articles and influential materials suitable for this study. These were from multiple databases like Thoreau multi-database, BMC public health, BMJ global health, Google Scholar, MEDLINE, PLoS One, Science Direct, SAGE journals, ProQuest, and PubMed search. The literature included in this study includes peer-reviewed articles published within the last 5 years (2018 to 2023), government websites, articles and materials relevant for the study, documents and reports from reputable organizations like CDC and WHO. I included a few other critical materials published or written before 2018 because of their relevance. A few seminal articles

published a long time ago were relevant, especially for the history and background of the theoretical models used in this study.

I used the following keywords: *men and TB, men's access and utilization of TB services, systemic, structural, and individual barriers to TB services, men's attitudes toward TB services, global TB reports, TB morbidity, and mortality rates, TB and HIV in sub-Saharan Africa, South Africa, and Zululand district, and men's health-seeking behaviors, knowledge, attitudes, and practices on TB, cultural beliefs and practices (masculinities), stigma toward TB,* and *Andersen's model of health services utilization*. Additional other literature review keywords included: *community strategies to control TB, cost of TB services, cultural barriers, government response to TB, South Africa TB guidelines, HCWs attitudes toward TB, the current COVID-19 pandemic and TB,* and *TB treatment interruption.* The search process involved the use of broader terms and narrowing down to specific words.

The Theoretical Framework

For this study, I used Andersen's model for health services utilization and the constructs from the SEM as theoretical frameworks. Andersen's model of health services utilization has been chosen for this study as it explores community and individual factors that may promote or hinder the utilization of any health services (Andersen & Newman, 1973, 2005). The SEM is a multi-layered model consisting of individual, interpersonal, organizational, community and policy level determinants of individuals' behavior on a specific aspect. These determinants guide implementers in framing possible solutions

considering the individuals' complex multi-layered environments (see Bronfenbrenner, 1977; Nyasulu et al., 2018; Kilanowski, 2017).

Andersen's Model of Health Services Utilization

As earlier described, Ronald Andersen initially established the Andersen's model of health services utilization in 1968 (Andersen & Newman, 1973, 2005). Multiple scholars have used this theoretical framework in different fields like public health, sociology, psychology, and medicine (Seidu, 2020). The individual factors or characteristics are critical as they determine the type and number of health services a person may use. They are categorized into three groups, namely, predisposing, enabling, and need for care factors. The predisposing factors include socio-demographic factors like age, sex, marital status, education, cultural beliefs, attitudes toward health services, and knowledge about the disease and the health services, which increase one's need for the particular health service (Andersen & Newman, 1973; Seidu, 2020, Shao et al., 2018).

The Individual Factors

Predisposing Factors. For this study, I used several variables under predisposing factors including age, marital status, education, cultural beliefs, and knowledge about TB. Using predisposing factors, Seidu (2020) conducted a quantitative study and found that Ghanaian men's uptake of HIV testing was low, especially in the unmarried and younger population, those with a low level of education, those without a religious affiliation, and those belonging to a specified ethnic group. Various stakeholders used these findings in identifying areas to strengthen targeted efforts (Seidu, 2020). Researchers conducted a survey to analyze the utilization of health services among migrants in Beijing and found a

health delivery system that was not favorable for migrants, and the predisposing factors, namely age, gender, ethnicity, marital status, and education, were the vital determinants of health-seeking behavior (Shao et al., 2018). Program leaders used these findings to provide direction for policy adjustments to increase insurance and add health promotion activities to change health services utilization behavior (Shao et al., 2018).

The Enabling Factors and the Need for Care Factors (Illness Level). People use the enabling factors to acquire the means to access the services, mostly family resources. These factors include income, health insurance, access to services, the availability and geography of facilities (distance to facilities), cost of services, and region or area (urban or rural) (Andersen & Newman, 2005; Seidu, 2020; Shao et al., 2018). For this study, the enabling variables include income, availability of funds for transportation, and distance to facilities. In this setting, TB services are free in government institutions. Therefore, health insurance or the price of services is not included as commonly done in the described studies. The need for care factors or illness level includes symptoms of disease, diagnosis, and complications. The individual should recognize the need to seek medical care and utilize health services, especially when predisposing and enabling factors promote usage (Andersen & Newman, 2005; Seidu, 2020; Shao et al., 2018).

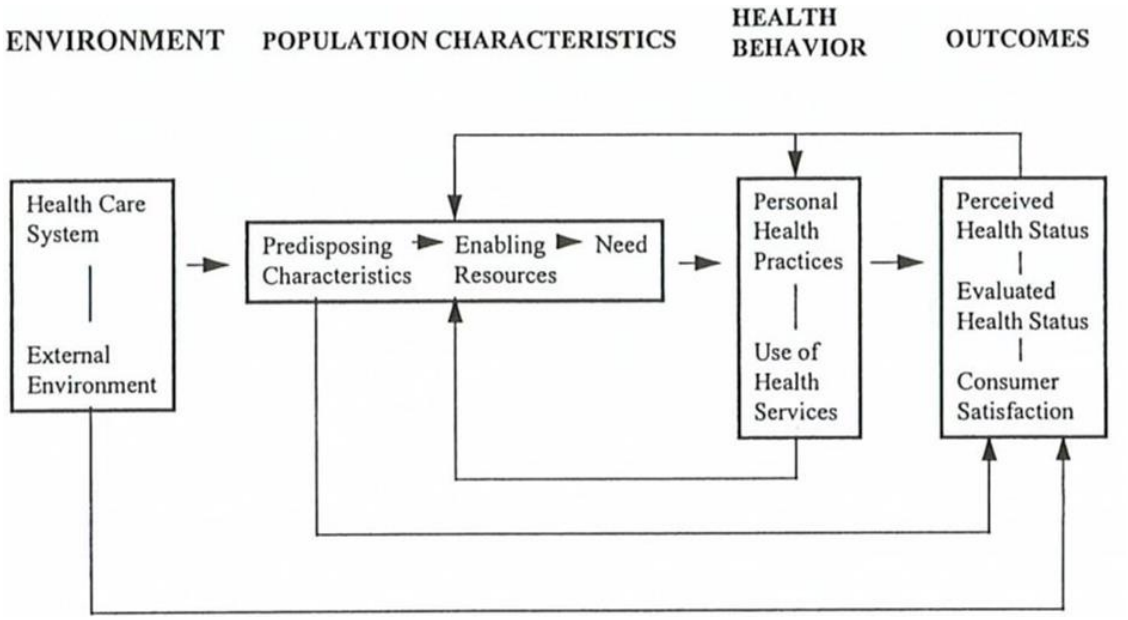
The Societal Determinants

The Health Services System. The societal determinants include the health services system, namely, resources (volume and distribution) and organizational factors (access and structure) (Andersen & Newman, 1973, 2005). In this study, the resources include the availability of relevant HCWs and TB drugs. Access as an organizational

factor includes patient waiting time, health facility service hours, and referral system to other tertiary services. The model promotes outlining the type of service, the purpose of utilization, and the unit of analysis for the health service utilization (Andersen & Newman, 2005; Seidu, 2020; Shao et al., 2018). This model has undergone several modifications, and despite some scholars' critiques, it has been used extensively in various settings and disciplines (Seidu, 2020). Travers et al. (2020) used an expanded format of the same framework to describe additional factors that promote behavioral changes in the utilization of healthcare services for individuals requiring long-term services. For example, availability and accessibility of formal and informal support, their losses (loved ones, independence, and money), and changes (being frail, disabled, or very sick). The expanded format relates to individuals with TB as they mostly require long-term disease management and support. In this study, I assessed the factors that affect men's geographical access and quality utilization of TB services in PHCs, where TB prevention, early diagnosis, and treatment are crucial. Therefore, I considered Andersen’s model for health services utilization a suitable theoretical framework for the study.

Figure 1

Andersen's Model of Health Services Utilization



Note: Ronald Andersen originally produced the Andersen model of healthcare services utilization model in 1968, and this was the fourth adaptation of the model done in 1995. It summarizes the individual and societal determinants of healthcare services utilization. From "Revisiting the Behavioral Model and Access to Medical Care: Does It Matter?" by R. M. Andersen, 1995, *Journal of Health and Social Behavior, 36*(1), p. 8. Copyright 1995 by the American Sociological Association. Reprinted with permission from JSTOR Digital Library.

The Social-Ecological Model

I utilized the concepts of the SEM in conjunction with Andersen's model of health services utilization. In 1977, Urie Bronfenbrenner introduced the SEM to understand human development and formalized it as a theory in the 1980s (Bronfenbrenner, 1977;

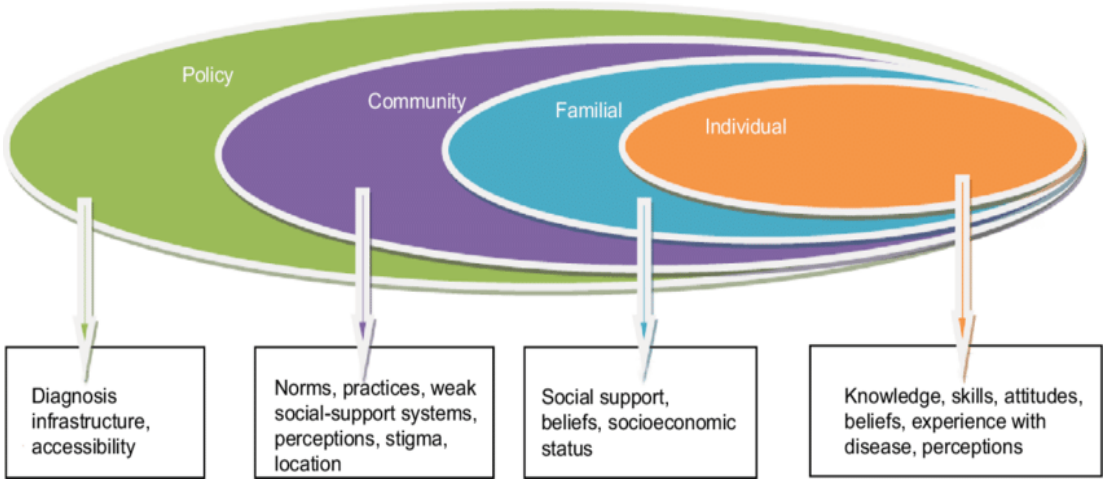
Kilanowski, 2017). The SEM indicates that individuals' knowledge, beliefs, and perceptions are determined by their relationship with family, friends, organizational environment, community (cultural beliefs and practices), and policies, including health systems (Bronfenbrenner, 1977; Nyasulu et al., 2018; Kilanowski, 2017). In this study, I explored the following factors (variables): the individual factors (knowledge, education, and cultural belief), family and organizational factors (social support, beliefs, and socio-economic status), community factors (beliefs, health systems, distances to health facilities, and stigma), and policy factors (resources, facility service hours, waiting times, referral systems, and facility processes) to determine any influences on men's geographical access and quality utilization of TB services. I considered this model relevant for this study because most of its constructs are like Andersen's model of health services utilization.

The public health environment and several other settings and disciplines have used SEM. Multiple scholars used it to guide future interventions (Ngwenya et al., 2020, Nyasulu et al., 2018). Ngwenya et al. (2020) found that socio-ecological and behavioral factors impacted young people's need to use health services. Organizational-level barriers included HCWs' negative attitudes and competencies to deal with the youth. Community-level factors included normative beliefs of stigma, and policy-level factors included structural factors such as physical layout, resource limitations, and health facility service hours. Stakeholders used these factors to guide the formation of proposed future interventions. Nyasulu et al. (2018) identified individual, family, community, and policy-level factors that influenced the level of knowledge, beliefs, and perceptions of TB

among community members and those diagnosed with TB. The researchers used these qualitative findings to suggest a supportive and collective approach to address the barriers of early TB diagnosis and care-seeking behavior. Bamuya et al. (2021) used this model to determine factors that affected the execution of diabetes-structured education programs and proposed an integrated approach inclusive of cultural solutions and the involvement of community leaders, which is applicable to TB program.

Figure 2

Social-Ecological Model



Note: Urie Bronfenbrenner originally introduced the SEM in 1977 and formalized it in the 1980s. A multi-layered framework to understand individuals' behavior related to their microsystem, mesosystem, ecosystem, and macrosystem to guide possible interventions. From "Knowledge, beliefs, and perceptions of tuberculosis among community members in Ntcheu district, Malawi" by P. Nyasulu, S. Sikwese, T. Chirwa, C. Makanjee, M.

Mmanga, J. O. Babalola, J. Mpunga, H.T Banda, A. S. Muula, and A. C. Munthali, 2018, *Journal of Multidisciplinary Healthcare*, *11*, p. 375–389. Reprinted with permission.

The Zululand District

Demographics and District Profile

The Zululand district is a rural district with a population of 892,310 and one of the 11 districts in KZN province. It is situated in the Northeastern part of KZN province. It has five subdistricts: Abaqulusi, eDumbe, Nongoma, uPhongola, and Ulundi (StatsSA, 2016; DOH, 2018). It is the biggest district in the province, covering 16% of the provincial geographical area and contributing 22% of the total provincial population (Department of Cooperative Governance & Traditional Affairs, 2020). The last census had 46.02% males, 53.98% females, the majority being black Africans (98%), and 94.3% from the Zulu clan who speak the isiZulu language (Municipalities of South Africa, 2018; StatsSA, 2016; DOH, 2018). The unemployment rate was 51.02%, and 12.2% was people with no history of having any form of education. Among those with some level of education, only 4% finished primary education, 39.8% attained high school qualifications, and less than 5% attained higher education (DOH, 2018). Medical insurance is inaccessible, only 5.2 % were medically insured, and 94.8% of medically uninsured people accessed health care in public or government facilities. Only 63.6% accessed clean water, 7.8% had no access to sanitation, and 13.7% had no access to electricity (Municipalities of South Africa, 2018; StatsSA, 2016; DOH, 2018). Most of these problems were not only in the Zululand district, but in KZN province, with a population of 11,065,240, it had an unemployment rate of 29%, and 16.6% were without

any form of education (StatsSA, 2018). South Africa has a population of 55,653,654 with a gross domestic product (GDP) of -2% and an unemployment rate of 30.1% with low education accomplishment. For example, 84.04% of men attained primary education, and 7% tertiary/advanced level (Organization for Economic Co-operation and Development [OECD], 2019); StatsSA, 2016, 2020; World Bank; 2015).

TB is known as the disease of the poor with financial difficulty, who are vulnerable, discriminated against, stigmatized, and marginalized (WHO, 2020). Zululand district is one of the disadvantaged districts, and the above describes the situation for most people (see DOH, 2018). Most of the households are in the rural setting comprising 51% formal structures, 32% traditional dwellings, 5.2% informal dwellings, 5% backyard dwellings, and others. In 2019, 83% lived below the upper-bound poverty line and 69.6% below the lower poverty line, making it the third poorest district in South Africa (Department of Cooperative Governance & Traditional Affairs, 2020). Among the working-age population, only 33% were seeking employment or had actual employment. Out of those employed, 71% were in the formal sector and 29% in the informal sector (Department of Cooperative Governance & Traditional Affairs, 2020).

TB Disease and HIV Infection

TB is a critical public health threat and the primary cause of death in the Zululand district. As earlier described, TB contributed to 26.3% of the total deaths in the Zululand district and 16% at the provincial level (DOH, 2015, 2018). TB is primarily worsened or compounded by HIV infection in this district and province. In South Africa, 7.9 million people were living with HIV infection, and over 2.1 million were in KZN province,

which had an HIV prevalence rate of 27.0% (Simbayi et al., 2019). The KZN province was ranked number one with the highest HIV burden among the nine provinces in the country and a TB and HIV coinfection rate of 70%. However, the Zululand district's HIV prevalence was 48.4% and the highest in the country, with TB and HIV coinfection rates of 83.8% (DOH, 2015, 2018; Simbayi et al., 2019). Huge contributors to TB are HIV infection and poverty, which cause compromised immunity, malnutrition (lack of nutritious foods), and poor adherence to TB treatment as access to health facilities is problematic due to lack of money for transportation (DOH, 2015; Pedrazzoli et al., 2017). Also, cultural beliefs and practices like accessing traditional healers before health facilities have contributed to poor TB outcomes in rural communities (Watermeyer & Penn, 2019).

Morbidity and Mortality

Zululand district has huge figures for TB notification, 940 per 100,000 population, 716 TB incidence per 100,000 people, and 83.8% HIV coinfection, with a TB treatment success rate of 85% and a 4% loss to follow-up rate. The treatment success rate for MDR-TB cases was 76.38%, with a 9.5% loss to follow-up rate. Likewise, the rates at the provincial level are high, with drug-resistant TB incidence of 26.8 per 100,000 individuals (DOH, 2015, 2018). This high morbidity causes a high mortality rate, as described earlier. The second cause of death in the Zululand district was HIV at 14.5%, and TB was the first at 26.3%. The KZN province was ranked second among nine provinces, with a TB death rate of 18.4% and 71% for MDR TB & HIV coinfected

patients. Considerably, men above 15 years' TB burden was at 57%, while women at 32% (DOH, 2015; StatsSA, 2019).

South African Government Response to TB

The National Strategic Plan and the Guidelines

The national strategic plan for HIV, TB, and STIs (NSP) is a five-year detailed document that guides all relevant multi-sectoral stakeholders by addressing gaps and up of best practices. The NSP promotes innovation and quality service delivery to reduce morbidity and mortality (South African National AIDS Council [SANAC], 2017). The plenary of the SANAC and parliament approved it. Following a finalized NSP, each provincial DOH creates five-year detailed, tailored provincial implementation plans according to their context and the needs of their communities. Other government departments, civil society, NGOs, and the private sector follow suit (SANAC, 2017). The KZN province leaders use their implementation plans to formulate detailed implementation plans for districts in collaboration with other stakeholders guided by their local context, as seen in the Zululand district (DOH, 2015, 2018, 2020a). The key goals of these plans include the prevention of new TB, HIV, and STIs infections, reduction of morbidity and mortality by providing treatment, care, and adherence support, reaching key and vulnerable populations with targeted solutions, addressing social and structural drivers through multi-sectoral national development plans, promotion of human rights principles, promotion of leadership and shared accountability, resource mobilization and proper monitoring and evaluation using strategic information (DOH, 2018, 2020a; SANAC, 2017).

South Africa is dedicated to achieving the UNAIDS 90-90-90 targets to control TB and HIV epidemic through proper clinical guidance (DOH, 2020a; UNAIDS, 2019). HCWs execution of these guidelines promote access to TB and HIV care services, improve the country's ability to control the epidemic, and accelerate the achievement of the SDGs by 2030 (UN, 2018). The national DOH staff formulate clinical guidelines for clinicians, managers, and trainers for the entire continuum of comprehensive care for TB and HIV prevention, treatment, and support (DOH, 2020b). The staff use WHO recommendations to guide the formulation of these guidelines. The current national guideline is a consolidated guide for managing TB, HIV, and other opportunistic diseases. The guideline has simplified new medication regimens for these diseases and includes the management of children, adolescents, and adults (DOH, 2020b). Clinicians use other complimentary disease-specific guidelines and protocols for clinical direction on complicated cases, such as MDR TB and extensively drug-resistant TB (XDR-TB). Other guidelines and protocols are for investigations, community work, and health promotion. HCWs in the Zululand district use these guidelines and protocols to promote clinical excellence and support clinical decisions (DOH, 2019).

The Community TB Programs

Several community initiatives complement efforts to combat TB. The ward-based primary health care outreach teams (WBPHCOTs) comprise community health workers (CHWs) mainly led by nurses. DOH leaders manage these CHWs contracted by non-governmental organizations (NGOs), and they form a link between communities and health care service delivery in PHCs. The CHWs are allocated or linked to specific PHC

facilities. Their role includes community health assessments on needs, assessing the health status of individuals and communities to mobilize the necessary support from other stakeholders, providing health education on several prioritized programs, including TB and HIV, and health promotion (DOH, 2020a; Murphy et al., 2021). One key role for the CHWs is providing adherence support, counseling, and tracing people living with HIV and TB patients who missed their appointment. They further provide household screening of different conditions, including TB screening of TB contacts, TB testing where allowed and applicable, and referrals to PHC facilities (DOH, 2020a). They refer individuals or families for preventive, curative, and rehabilitation services at relevant PHC facilities. Although these strategies are well documented, in practice, the CHWs have an unmanageable number of households, which makes their support inadequate, missing screening efforts and adherence support visits (see DOH, 2020a).

Murphy et al. (2021) described several challenges to the optimum delivery of these services, including shortage of staff, temporary employment, low wages, and limited resources like uniforms, safety concerns, and poor career development beyond being a CHW. Schneider et al. (2018) further explained the delays in recruitment and scaling up due to the lack of national leadership, political will, financial commitment, and poor governance and support systems. Despite these shortfalls and slow implementation, this program is crucial for PHC service delivery and has been well received by the communities, non-governmental organizations, and the DOH. It has assisted in addressing the massive human resources shortfall country-wide, including support for the TB program nationally, provincial, and at the district level, including in the Zululand

district. KZN province managed to recruit the CHWs permanently. Hence, the Zululand district has permanent CHWs despite the shortages. One CHW supports 250 households in urban and semi-urban areas and 169 households in rural settings (Schneider et al., 2018).

Another strategy is the directly observed treatment short-course (DOTS) Strategy, which WHO staff members have promoted for many years. The DOTS was adopted in South Africa in 1996. The main deliverable by the CHWs is to supervise each TB patient as they take their medication daily and link it to the supervision of taking antiretroviral therapy and counseling people living with HIV (DOH, 2020a). This supervision can be done by nurses in the clinics, and at home by either the CHW or by a selected family member. Despite being a key strategy in combating TB, most TB patients do not get proper DOT support (Howell et al., 2018). The findings of a cross-sectional study in four rural districts similar to the Zululand district setting revealed 14.1% of evidence of home-based DOT support and 10.4 PHC facility-based DOTS support. Those supported at home stated higher HIV counseling rates than the other TB patients (Howell et al., 2018).

However, in the Zululand district, families intermittently support the DOTS program with monitoring support from the CHWs. TB DOTS supervision has proven challenging at HCFs due to long distances travelled by patients and the shortage of HCWs. Similarly, daily supervision of CHWs by nurses is impossible due to the numerous health service competing priorities. Promoting patient and family-centered care (PFCC) is critical for TB treatment adherence and other prevention and control strategies. SANAC (2017) reported a critical challenge of men's delay in accessing health services,

affecting TB and HIV outcomes. Community strategies and PFCC are relevant to support the prevention and control of both diseases.

TB and HIV Integration

Official policies and guidelines on TB and HIV integration are available to support TB and HIV integration (DOH, 2015, 2020b, Naidoo et al., 2017a). Previously, in the South African healthcare system, HCWs promoted separate vertical programs for TB and HIV services. It meant a patient would visit these services on different days and being seen by different HCWs, and most times in different facilities. Because of complicated monitoring systems, the team relied on referrals and linkages to care programs, patients' decisions, and resources to utilize the service (Naidoo et al., 2017a). However, there are different integration models on the ground. Some facilities have fully integrated the services, which means offering both services in the same facility by the same HCW on the same day. Within the health facility, others used different HCWs to ensure same day services to patients (DOH, 2020a). Naidoo et al. (2017a) described functional integration requirements, which require policy and funding to support system changes. Clinical integration offers TB and HIV diagnosis, treatment, retention in care, health education, and promotion activities simultaneously, while organizational integration offers facility-level resources and processes concurrently (Naidoo et al., 2017a). Despite well description of these requirements, they failed to demonstrate how to integrate these services competently.

Combating TB and HIV requires the integration of services at multiple levels and services like community sensitization, health promotion, prevention strategies in the

communities, and proper treatment, management, and care. Comprehensive TB and HIV integration measures are crucial. The implementation of the described community strategies, consolidated clinical guidelines, and protocols requires supportive leadership supervision and quality improvement initiatives to close any implementation gaps (Osman et al., 2021; SANAC, 2017). For example, it is important to conduct TB testing on all people living with HIV when newly diagnosed using protocols. Proper TB screening during every clinic visit is essential, and those with symptoms require TB testing. Those with TB should know their HIV status and be managed appropriately, and if negative, periodic HIV testing is required according to the guidelines (DOH, 2020a, 2020b). Newly diagnosed HIV patients with negative TB results should receive Isoniazid preventive therapy (IPT) or any recommended regimen to prevent active TB. TB and HIV coinfected patients' care should be integrated and managed appropriately using the guidelines for better treatment and disease outcomes (DOH, 2018, 2020b).

Although the guidelines are well articulated and accessible by all PHC facilities in South Africa, including the Zululand district, integration of services and proper implementation have been problematic (Naidoo et al., 2017a; Osman et al., 2021). Integration of services approach is crucial for TB and HIV programs when successfully implemented as it improves health-services delivery, especially in resource-limited settings. Understanding the local system enablers and disablers is, therefore, essential. Sinai et al. (2018) indicated that shifting or reallocation of clinical workload and administrative tasks could quickly and competently allow integration of TB program into an existing HIV program, and guarantee proper infection control measures.

The COVID-19 Pandemic Impact and Implication on TB Disease

South Africa is fearlessly fighting COVID-19 with extraordinary political support and mobilization of resources despite underlying social determinants that intensify communities' susceptibility resulting in diverse mortality outcomes. The improved solidarity has generated wider public participation opportunities, including a focus on TB and HIV care (Keene et al., 2020). Despite political leadership, the COVID-19 vaccine rollout has had its challenges and uptake has been slow. As part of KZN province's response to the epidemic, the Zululand district allocated fifteen quarantine facilities with 184 beds to deal with the epidemic (DOH, 2020b). New evidence indicates that COVID-19 has reversed the progress made in most TB high-burden countries like India, Indonesia, the Philippines, and South Africa, contributing to 44% of global TB cases (Tamuzi et al., 2020). These countries reported fewer numbers of those diagnosed with TB between January and June 2020 compared to the same period in 2019. There was an estimation of additional 0.2-0.4 million deaths (Tamuzi et al., 2020). Some of the key contributing factors include loss of income to access and utilize health services, restricted movement, restricted health facility visits, missed appointments, malnutrition, and unemployment. TB and COVID-19 have been deemed a deadly combination because of all these difficulties (Boffa et al., 2020). Although several strategies have been deployed to resolve this problem, the already burdened health system has been hugely affected by staff shortages due to isolation and sick leave (Loveday et al., 2020; Tamuzi et al., 2020). The situation made HCWs side-line chronic diseases and focus on acute illnesses, including COVID-19 cases.

Behavioral response to prevention had evolved, and individuals prioritized the regular use of face masks to access health facilities, shopping centers, and other services. However, other measures like social distancing, avoiding super spreaders like funerals, churches, or large groups, and staying at home, weakened (Kollamparambil & Oyenubi, 2021). The study results showed increased risk perception among older people, especially those with higher income and education. Marginalized communities responded poorly to social distancing and the use of sanitizers (Kollamparambil & Oyenubi, 2021). The Zululand district has been hugely affected by these behavioral responses as a rural district. The loss of income, poverty, and restricted HCF visits diminished TB case findings, making it more deadly in this rural setting. Loveday et al. (2020) deemed the opportunities to improve the TB program by integrating COVID-19 screening, testing, tracking, and monitoring of TB-similar processes crucial. Furthermore, suggestions emerged to promote TB disease awareness, community treatments and management, self-administration, and develop shorter regimens (Keene et al., 2020). It is critical to understand these implications and incorporate men's needs to plan and implement these strategies.

Global and Africa Region Response to TB

The WHO end TB strategy, the SDGs, and the UN political declarations have made regions and countries prioritize TB. There has been huge political and funding support compared to previous years (UN, 2018; WHO, 2020). The WHO global TB reports include comprehensive global, regional, and country updates on commitments, strategies, assessments, challenges, and recommendations. The WHO mandated countries

to increase their TB funding streams to meet the global targets set for 2030 (WHO, 2020). Most WHO regions and high TB-burden countries were behind in meeting their targets to end TB by 2030. For example, globally between 2015 and 2019, the TB incidence rate was 9% (target 20% by 2020), TB deaths, 14% reduction (target 35%), and 49% of people facing catastrophic costs (target 0%). There were also gaps in TB treatment, universal access (funding of USD 6.5 billion in 2020, target was USD 13 billion), and TB research (USD 906 million in 2018, target USD 2 billion annually) (WHO, 2020). Frick (2017) described the lack of political will and global solidarity to fund TB research. Also, the COVID-19 epidemic has brought global challenges to the TB program, like economic impact, reallocation of TB funds, staff, and other resources to meet COVID-19 needs (Tamuzi et al., 2020). Thirty-five countries reported a reduction of HCFs that provide TB care to cater to COVID-19 patients. These practices have also affected TB diagnosis, treatment, retention in care, and data collection and reporting (WHO, 2020).

Africa region was the second region with the most people with TB cases in 2019, and it contributed to 25% of the new cases (WHO, 2020). Africa is highly affected by TB due to poverty in more disadvantaged communities, and less advancement in research, innovation, and technology (like medication, diagnostics, and vaccines). It is less resourced in human capital and finances, has inadequate support for effective health systems, and failed to fight the TB epidemic (Adu et al., 2020). The WHO recommended traditional approaches to community interventions that had failed due to poor systems, and there is a need for system-thinking approaches to be successful (Adu et al., 2020;

Hartel et al., 2018). Despite these challenges, the TB incidence rate is reducing globally, some regions like the European region met their milestones in 2020, and there was good progress in 78 countries. The WHO recommendations include the promotion of TB preventative treatment in people living with HIV, early TB diagnosis and treatment, contact tracing, home-based interventions in the context of the COVID-19 epidemic, use of digital technologies for remote support, more months of medication supply to stable patients and promotion of international donor funding for low and middle-income countries. Universal health coverage, TB research and innovation, and prioritizing the ten dominant recommendations are crucial (WHO, 2020). Countries should prioritize these recommendations for men as a vulnerable group.

Literature Review Related to Key Variables and Concepts

Justification of Selected Variables and Concepts

In the upcoming sections, I will describe the literature review related to the selected key variables and concepts to determine any influences on men's access and utilization of TB services. I will present findings from previous studies on these factors. These factors include the utilization of health services (including TB services), access, resource availability, and individual and societal determinants of health services utilization. The individual determinants include the socio-demographic factors (age, gender, income, and marital status), social structure (education), beliefs (cultural beliefs and practices), family enabling factors (income and distance to health facilities), community enabling factors (cost and type of transportation, and location of health facilities), and need for care factors (TB knowledge and practices).

Several studies found predisposing and enabling factors like age, gender, marital status, educational level, income, family size, distance, cost, and health insurance as significant predictors of health services utilization (Li et al., 2016 Seidu, 2020; Shao et al., 2018; Travers et al., 2020). A study in rural China found the need factor (chronic disease) as a dominant predictor of utilization of services like physician visits and hospitalization. The enabling factors like travel time to the health facility, distance, cost of healthcare, and transport were crucial. The cost of travel to health facilities and healthcare services was a hindering factor for utilization (Li et al., 2020). For this study, there was a need to understand the factors that affect geographical access and quality utilization of TB services in men in the Zululand district. Researchers explored numerous universal barriers that cause poor utilization of TB services in both genders, which delay TB diagnosis and treatment (Bashorun et al., 2020; Chikovore et al., 2020; Datiko et al., 2020; Mair et al., 2020; Subbaraman et al., 2020; Trajman et al., 2019; Watermeyer et al., 2019; WHO, 2019; Yoshitake et al., 2019; Zein et al., 2017).

Individual Determinants of TB Services Utilization (Predisposing, Enabling and Need for Care Factors)

Gender

Traditionally, most public health programs did not prioritize men because they focused on women's reproductive health programs. Notwithstanding improvements in global health in recent decades, adult men fall behind women in numerous health indicators, which include poorer outcomes in TB and HIV (Chikovore et al., 2020; Subbaraman et al., 2020). Chikovore et al.'s (2020) analysis of empirical literature and

available debates on men's involvement related to TB healthcare revealed men's over-representation on poorly performing TB indicators, and historically excluded in health education and discussions, including TB. In general, country health leaders ignore men's TB epidemiology and health, especially in TB high-burden low-income countries or settings (Chikovore et al., 2020; WHO, 2020). These findings confirmed the need to explore the factors that affect men's geographical access and quality utilization of TB services to inform the development of appropriate multifaceted strategies to improve TB outcomes in Zululand district and similar settings. Men delay in seeking healthcare leading to delayed testing, diagnosis, and treatment. According to several studies, the other findings included low adherence to medication and higher loss to follow-up in men (Chen et al., 2019; Chikovore et al., 2020).

A quantitative study conducted in Gauteng province's urban areas of South Africa indicated 95.7% utilization of health services, and others (4.3%) did not seek the services because of reduced quality of services. Higher chances of utilization were associated with being female (OR = 2.18), being White than African (OR = 2.28), and having medical insurance (OR = 5.41) (Abaerei et al., 2017). Practically, these reasons may not fully apply to the TB program, which is managed by government-funded health facilities, which support most of the uninsured population (>80%) and 94.8% in the Zululand district (StatsSA, 2016; DOH, 2018).

Despite these numerous findings, other studies conducted in diverse settings confirmed the opposite and indicated longer diagnosis delays in women. A study on the utilization of TB DOTS services in rural Nigeria revealed 70.2% utilization by men, of

which 92.4 % were Muslim. The researchers indicated that a high TB prevalence rate and TB symptoms in men were the main reasons for this outcome (Suleiman et al., 2021). In China, a cross-sectional study revealed a higher risk of a long delay in TB diagnosis in rural women, especially between 30-60 years. The researchers concluded that stigma, health literacy, finances, physical and socio-cultural factors (beliefs, practices, and religion) are the main contributing factors to this outcome (Chen et al., 2019).

Age, Income, Level of Education, and TB Knowledge

Multiple studies have revealed that highly educated individuals have more TB knowledge and utilize TB services more than those less educated. Older people utilized services more than the younger ones, those in urban areas were more knowledgeable about TB and had more chance of utilizing TB services than those in rural areas (Bashorun et al., 2020; Gautam et al., 2021; Suleiman et al., 2021). A study in Nepal indicated that a quarter of TB patients, primarily the young age group, from rural areas could not utilize TB DOTS service due to no education, poor living conditions, and poverty (Gautam et al., 2021). Level of TB Knowledge and awareness at the community and individual levels influence health-seeking behavior, stigma, and discrimination toward individuals with TB. Awareness among these groups of the causes, treatment, and prevention is poor (Suleiman et al., 2021). Bashorun et al. (2020) conducted a national survey to assess study participants' knowledge, attitudes, and practice (KAP) toward TB in the Gambia. They found that 66.9% had good TB knowledge, 83.7% seemed to have appropriate health-seeking behavior concerning TB, and 96.5% were keen to seek medical help at a health facility if they had TB symptoms. It was noted that 57% had

some education; however, there was substantial stigma toward TB and people with TB. These universal findings are critical in informing upcoming findings related to men in this proposed study.

Zein et al. (2017) estimated the effect of essential TB knowledge and earlier engagement with pulmonary TB patients in a high-risk pulmonary TB transmission population in Indonesia. The results indicated that older females who previously had contact with TB patients were more knowledgeable than men. These findings promote prioritizing men and the youth in TB awareness and confirm the need to focus on men in TB studies. In another study, men had significant knowledge of TB than women due to low educational levels, and reporting correct TB information was significantly related to age, gender, education, listening to the radio, living conditions, setting, income, frequency of reading newspaper/magazine, and watching television. Women were more likely to hide information about family members' TB infections (Boah et al., 2021). Trajman et al. (2019) conducted a survey on KAPs on TB transmission and prevention among auxiliary HCWs in Brazil. The results indicated knowledge gaps and a need to include TB contact referrals and tracing. This study highlighted an example of a systemic barrier in providing quality TB care services to clients and ultimately contributing to access gaps.

Maharaj et al. (2016) conducted an observational study in rural KZN province on reported knowledge and attitudes. The majority had adequate knowledge of the diagnosis of MDR TB from HCWs, family members, traditional healers, and friends. Some had mistaken beliefs about causes, spread, and treatment duration. Also, some respondents

believed that MDR TB was caused by witchcraft or as a type of punishment from their ancestors (Maharaj et al., 2016). Similarly, Ethiopian researchers conducted a community cross-sectional survey on knowledge, attitudes, and perceived stigma on TB by pastoralists (animal farmers). A few knew that bacteria cause TB, and it is preventable. The majority indicated witchcraft as a cause of TB and would be ashamed if they had TB (Sima et al., 2017). A qualitative study on knowledge, beliefs, and perceptions of TB conducted in a rural district in Malawi revealed that most participants knew that TB was curable and would seek medical help if they had symptoms. Others believed sex caused TB, and if they have HIV infection, they automatically suffer from TB (Nyasulu et al., 2018). There is a variation of TB knowledge among the various studies. However, most studies indicated a gap in adequate TB knowledge. Therefore, critical to explore HCWs' influences on men's access and utilization of TB services in the Zululand district. An adequate level of TB knowledge is crucial for early diagnosis, completion of treatment, and better TB outcomes.

Cultural Beliefs, Practices, and Consumers' Attitudes Toward TB

Culture is critical to the utilization of health services, including TB. Wang et al. (2020) explored factors related to people's health-seeking preferences when they have a cough for over two weeks in Southeast China. The researchers found low levels of appropriate health-seeking preference in individuals with minimal TB knowledge**.** Watermeyer and Penn (2019) conducted a qualitative study to explore a rural community's perceptions and beliefs about TB and perceived enablers and barriers to TB care in a rural district in South Africa. The findings indicated a mix of contextual factors

and community understanding of the disease. Cultural beliefs about the causes of TB and diverse treatment-seeking behavior were highlighted, and TB was confused with HIV, causing stigma, with the effects of poverty contributing to treatment non-adherence.

Various researchers such as Maharaj et al. (2016), Nyasulu et al. (2018), and Sima et al. (2017) indicated that some participants believed that TB was caused by witchcraft, or it was a type of punishment from their ancestors. Hence others used traditional medicine first to cure it. Yoshitake et al. (2019) surveyed the influence of health beliefs, personality traits, and social factors on TB prevention behavior among Japanese adults. The results supported its hypothesis and suggested that TB prevention was influenced by perceived vulnerability to TB disease and social factors. The researchers suggested health messages to incorporate the differences in personality and interpersonal fear. These findings are critical to the current study as they already inform some general cultural barriers to seeking TB care. Culture and cultural beliefs play a massive role in the Zulus. It will be essential to explore if cultural beliefs influence men's quality utilization of TB services to guide possible solutions or strategies.

Masculinity (Men's Cultural Position, Role, and Control and Income-earning)

Globally, TB prevalence is higher in men than women (WHO, 2020). As earlier described, this is aggravated by men's underutilization of TB services and delays in seeking TB care leading to worse outcomes. Daniels et al. (2021) conducted a qualitative study with men who had recently finished TB treatment or were in TB care to understand how masculine social norms affected resources, access, behavior, and involvement in care. The themes included the social structure and support, TB illness, diagnosis,

treatment, and care experiences. The findings included prioritizing work to provide for their families and maintaining power/control and leadership, but delayed seeking care and being involved in their care. Chikovore et al. (2020) described similar actions due to the masculinity elements of fear of TB diagnosis. They failed to negotiate scheduled visits' timing to avoid being labeled weak and could easily access other resources from women's family members. A sense of fatherhood motivated participation in care, but isolation and limited access to resources led to interruptions in care (Daniels et al., 2021). In this study, it is critical to understand masculinity factors like income and employment that would affect geographical access and quality utilization of TB services.

Societal and Organizational Determinants of TB Services Utilization

Stigma Towards TB

Stigma causes global delays in TB diagnosis, treatment, and control leading to high morbidity and mortality. Globally about four million patients are being missed in the TB program, and it is currently getting the necessary global attention to deal with its complexities (Macintyre et al., 2017). Chikovore et al. (2020) described reported fear and anxiety related to the possibility of TB diagnosis leading to delay in seeking care. There is a belief that TB disease is a confirmatory diagnosis for HIV at the family and community level and fuels stigma (Hatherall et al., 2019). Although it affects both men and women, it takes distinctive forms when considering masculinity anticipations for men. A qualitative study on TB stigma and its social impacts was conducted in South Asia (Bangladesh, Nepal, Pakistan). Findings included negative effects on marriage prospects due to the disruptive lifestyle of a wife, daughter-in-law, or mother during TB

illness (Hatherall et al., 2019). Emerging opportunities in South Africa during this COVID-19 pandemic revealed extended stigma to both COVID-19 and TB. Both illnesses affect the respiratory system and have some overlapping symptoms (cough and fever). Individuals with these symptoms feared stigma for both illnesses and delayed seeking health care (Loveday et al., 2020). Chinouya and Adeyanju (2017) described the stigma faced by African men in London, which led to delayed TB diagnosis, depression, and secrecy. It exposed men's susceptibility and exclusion in TB awareness across countries and developed economies. These findings confirmed the need for the focused inclusion of men in TB care. Therefore, health workers must address these misunderstandings and distribute accurate information to patients, families, communities, and organizations, as a lack of knowledge or misinformation promotes stigmatization and social isolation of those with TB (Chikovore et al., 2020; Kigozi et al., 2017).

Income, Finances, Cost of Services

Poverty creates barriers to TB diagnosis and treatment. Three cities in China provided and evaluated an insurance-based approach that improved TB care access and lessened the financial problems of poor TB patients. This initiative increased hospital admission rates, especially in the extreme poverty category, from 48.5% to 70.7%, the moderate poverty category from 45.0% to 68.1%, and the non-poverty category group from 52.9% to 64.3% (Dong et al., 2019). High outpatient visits increased in extreme poverty (4.6% to 5.7%), treatment medication adherence increased by 15%, other categories were at 10.0%, and all had reasonable service satisfaction rates and improved processes aided utilization (Dong et al., 2019). In South Africa, researchers conducted a

cost and cost-effective analysis and concluded that investing in direct and indirect costs to improve TB diagnosis and treatment is highly cost-effective (Foster et al., 2021). Although TB and HIV care is free, patients spend money on transportation to health facilities due to long distances, traditional healers, pharmacies, and private doctors. Patients sold personal possessions and borrowed money to fund health costs leading to financial distress (Foster et al., 2021).

Improving access to diagnosis and treatment services is key to closing gaps in TB care. Shao et al. (2018) described the need to improve health systems and their health insurance structures through policy revisions to improve health-seeking behavior. Mair et al. (2020) conducted a study in Malawi to determine the relationship between TB and HIV screening during the same clinic visit. The study highlighted the existing gaps in early TB and HIV diagnosis, especially in men who sparingly access facilities. In this study, the integration of TB and HIV services was beneficial as it improved services, which is problematic in most health facilities across Africa, including the Zululand district, despite high burden rates on both TB and HIV.

Access to TB Services: Resources (Human and Capital) and Organizational Systems and Structure

Access to TB health services is dependent on multiple factors, including the availability of money to get to the facility, affordability of services, availability of resources, distance to health facilities, service hours, waiting time, and referral systems (Dassah et al., 2018; Suleiman, 2021). There are several systemic reasons for delayed or missed opportunities for TB diagnosis and treatment. These include long distances to

facilities, lack of finances for transportation even when services are free, long waiting times, prolonged health facility processes, unfavorable facility service hours, and lack of resources like HCWs and supplies (Dassah et al., 2018; Oga-Omenka et al., 2020; Osman et al., 2021; Subbaraman et al., 2020; Suleiman, 2021). Many government clinics in South Africa have long waiting times beyond the recommended three hours. A quantitative study in a busy Durban clinic in KZN revealed a long waiting time of over seven hours despite using a single point of care (POC) for TB patients. However, the contact time with clinicians was short (between seven and nine minutes). Other reasons for delayed TB care included missed appointments for additional consultations for further tests due to a lack of funds (Stime et al., 2018).

A qualitative study in Nepal identified several barriers to accessing health facilities like poor road conditions with problematic availability of transport, long-distance, and costs for transport. Additionally, community belief in the use of traditional medicine from traditional healers, a lack of TB awareness. TB early diagnosis was delayed at the health system level due to a lack of trained HCWs, inadequate staff, and resources. TB medication treatment adherence was affected by a lack of finances for ongoing health facility visits, complex treatment regimens, and stigma (Marahatta et al., 2020). Similarly, the lack of skills among auxiliary HCWs in Brazil proved knowledge gaps that compromised the care given to patients with TB and contributed to access challenges (Trajman et al., 2019). A quantitative study in Nigeria proved better access of TB patients (98.5%) to a facility; however, resources for TB diagnosis were inadequate (Suleiman et al., 2021).

A quantitative study in Durban city in KZN found many patients (40%) who delayed seeking TB care despite experiencing TB symptoms for over four weeks. The reason being the long waiting time (six hours and 56 minutes from arrival to departure) to access TB care (Chiposi et al., 2021). From the 40% (74/185) who delayed seeking care, (45%) were married, 41% were male, of which 57% were over 61 years, 43% had a high-school education, 41% were unemployed, 50% were living in an informal settlement, and 43% of them walked to the clinic because they had no other means of transportation (Chiposi et al., 2021). Most females (53%) did not think it was essential to seek TB care, 27% said facilities were far (65% were men), and they feared the long waiting time, about 3% had no money for transportation, another 3% had no time off at work, and 1% feared the HCWs (Chiposi et al., 2021). Datiko et al. (2020) conducted a mixed-method cross-sectional study in Ethiopia to quantify patient and health system delays among patients with TB. The results concluded an over a month's delay (> 33 days) due to low socio-economic status, fees to seek care, long diagnostic and treatment initiation processes, insufficient community-based TB care, and services, including lack of awareness campaigns.

In South Africa, researchers conducted a qualitative study with TB experts to understand how macro-level factors were perceived and resolved in policy activities in a high TB burden country. The findings included economic inequality, poor living conditions, TB governance, the HIV epidemic, the history of colonization, and socio-cultural factors as critical contributors to the TB epidemic. However, the government has little commitment to addressing these issues, including limited budget allocations (Adu et

al., 2021). Researchers in China conducted a mixed-method study to explore the implications of a new service model on TB HCWs. The findings indicated that the national staffing standards were met. However, the TB HCWs were less paid compared to other departments. They concluded a need to improve incentives to attract qualified professionals and motivate staff to offer TB quality services (Wang et al., 2019). Researchers in Colombia conducted a mixed-method exploratory study for the indigenous population. The findings suggested less reported TB cases than expected due to poor quality sputum samples, low-quality lab techniques, limited diagnostic methods, poor identification of TB symptoms, limited TB training of HCWs, and high staff turnover. They indicated a need to identify solutions to close these systemic gaps (Polanco-Pasaje et al., 2021).

Researchers in Mozambique conducted a cross-sectional qualitative study to understand HCWs' perceptions of the poor quality of TB services. The results indicated gaps in the entire TB care cascade, HCWs' lack of TB knowledge, laboratory issues, fear of contracting TB from patients, and inadequate preventative gear like N95 masks. They suggested allocating enough funds to acquire adequate resources, task shifting of TB care and services delivery to well TB trained low category staff, and proper TB diagnosis and treatment (Lisboa et al., 2020). Researchers in South Africa conducted a theory-generating case study to identify problematic contextual factors that affect TB care provision to inform interventions to improve the quality of TB care, promote person-centered care, and reduce TB incidences and deaths (Murdoch et al., 2021). The findings included delayed diagnosis, loss to follow-up, poor infection control measures, and less

support to HCWs and patients on their psychosocial needs. There was a need to reduce the fragmentation of services, provide adequate resources, adequate TB training, and proper program monitoring (Murdoch et al., 2021). These local and global studies provided insights into systemic reasons for delayed access to TB care and under-utilization of TB services. However, key reasons that impact men's geographical access and quality utilization of TB services in the Zululand district of KZN province need further exploration.

Summary and Conclusions

Despite the general reduction of TB incidence and mortality rates, TB remains a public health threat globally and in South Africa, affecting more men than women (WHO, 2020). Although evidence-based strategies to prevent and control TB globally are available, and South Africa offers free TB services, more men die of TB (Loveday et al., 2019; WHO, 2020). The Zululand district faces a similar situation (DOH, 2018; StatsSA, 2019). Several kinds of literature included evidence for the need to focus on men to prevent and control TB. Men's susceptibility, exclusion, and marginalization contribute to poor TB outcomes globally (Chikovore et al., 2020; Chinouya and Adeyanju, 2017; Loveday et al., 2019; Seidu, 2020). Despite the explored barriers that affect the general population in accessing and utilizing TB services, there was a need to identify specific factors that affect men’s geographical access and quality of TB services to develop suitable interventions to avert and control TB.

This chapter summarized and synthesized the outcomes of other relevant and related studies on access and utilization of TB services. It further discussed the

demographics and the profile of the Zululand district, the link between TB and HIV infection, TB and HIV morbidity and mortality in the district and KZN province (DOH, 2015, 2018; Municipalities of South Africa, 2018; OECD, 2019; StatsSA 2016, 2020; World Bank; 2015). It narrated the South Africa government's response to TB, including the NSP, community TB programs, and TB and HIV integration policies and guidelines (DOH, 2018, 2020a; SANAC, 2017; UNAIDS, 2019). The discussion further explored the impact and implication of the COVID-19 pandemic on TB disease in South Africa (Boffa et al., 2020; Keene et al., 2020; Loveday et al., 2020; Kollamparambil & Oyenubi, 2021; Tamuzi et al., 2020). Understanding the Global and Africa region response to TB was critical in this discussion (Adu et al., 2020; Hartel et al., 2018; UN, 2018; WHO, 2020).

Numerous literature reviews included a detailed account of factors that affect TB services access and utilization for the general public (Bashorun et al., 2020; Chikovore et al., 2020; Datiko et al., 2020; Mair et al., 2020; Subbaraman et al., 2020; Trajman et al., 2019; Watermeyer et al., 2019; WHO, 2019; Yoshitake et al., 2019; Zein et al., 2017). Both Andersen’s model of health services utilization and the SEM provided an understanding of multi-level factors (individual, social, organizational, community, and policy) that affect access and utilization of TB services. Although these researchers, as mentioned earlier, found several factors that affect TB services access and utilization, there was little gender-based information describing factors that specifically affect men's access and utilization of TB services.

Therefore, the purpose of this study to assess the factors that affect men's geographical access and quality utilization of TB services in the Zululand district of KZN province in South Africa was crucial. Stakeholders could use the new knowledge to develop interventions to promote positive social change for early TB diagnosis and treatment for men in this district and similar settings. In Chapter 3, I will provide a detailed description of the quantitative methodology I used in this study. I will describe the study processes or procedures, study design, study setting, sample size, data collection, and analysis.

Chapter 3: Research Method

Introduction

Globally, South Africa is among the top 10 highly TB-burdened countries, and TB is the leading cause of death. It contributed to 18.2% of the deaths nationally (StatsSA, 2019; WHO, 2020). Although 85% could be cured within 6 months of treatment, some are not diagnosed or are diagnosed late. Despite treating over 60 million cases globally since 2000, many millions miss diagnosis and proper TB care (WHO, 2020). Men above 15 years accounted for 56% of the people with TB disease than women at 32% and children below 15 years at 12%. Among these people, 8.2 % were living with HIV. Despite a 2% TB incidence decline annually, TB remains a global crisis, and global initiatives are crucial to meet the 2030 SDGs (UN, 2018; WHO, 2020). Similarly, TB incidence and mortality in KZN province were very high and contributed 18.4% of total provincial deaths and rated second in the country, with 71% of the deaths related to MDR-TB and HIV coinfection (StatsSA, 2019). TB burden was high in men above 15 years at 57% in this province than women at 32% (DOH, 2015; StatsSA, 2019).

Likewise, Zululand district was one of the 11 districts in KZN province with a high TB burden and increased deaths in men. TB was the leading cause of death and contributed 26.3% of total deaths, of which 83.8% were deaths from patients coinfected with TB and HIV (DOH, 2018). Several researchers investigated the factors that affect TB services access and utilization in general (Bashorun et al., 2020; Chikovore et al., 2020; Datiko et al., 2020; Mair et al., 2020; Subbaraman et al., 2020; Trajman et al., 2019; Watermeyer et al., 2019; WHO, 2019; Yoshitake et al., 2019; Zein et al., 2017).

Numerous researchers highlighted the need to focus on men to prevent and control TB. Men's susceptibility, exclusion, and marginalization had contributed to poor TB outcomes globally (Chikovore et al., 2020; Chinouya and Adeyanju, 2017; Loveday et al., 2019; Seidu, 2020). Despite the explored barriers that affect the general population in accessing and utilizing TB services, there was a need to identify factors that affect men's geographical access and quality utilization of TB services to develop suitable interventions to avert and control TB.

The purpose of this quantitative study was to assess the factors that affect men's geographical access and quality utilization of TB services in the Zululand district of KZN province in South Africa. Specifically, my goal was to explore any relationship between HCWs' attitudes (like friendliness, respect, and support), HCWs' gender, HCFs processes (waiting time, service hours, referrals to other facilities, and availability of required HCWs), and men's quality of TB services utilization. Secondly, I examined any association between age, level of education, level of income, marital status, level of TB knowledge, cultural beliefs, stigma, TB seriousness, and men's quality of TB services utilization. Lastly, I determined the relationship between travel time to the health facility, mode of transportation, income, and men's geographical access to TB services.

The dependent variables were men's geographical access to TB services, and men's quality of TB services utilization. The findings from this study highlighted new knowledge, which will guide the stakeholders to develop interventions to promote men's geographical access and quality utilization of TB services for better TB outcomes in this district and similar settings and contribute to positive social change. In Chapter 3, I will

provide a detailed description of the quantitative methodology I used in this study. I will describe the study processes or procedures, study design, study setting, sample size, data collection, data analysis, threats to validity, and ethical considerations.

Research Design and Rationale

In South Africa, including the Zululand district, more men are dying due to TB than women despite free TB services for the entire population and a reduction in the overall TB death rate over the years (DOH, 2018; Loveday et al., 2019). There was limited information on the factors that affect men's access and utilization of TB services that could potentially lead to increased TB morbidity and mortality in men. The dependent variables for this study were men's geographical access to TB services, and men's quality of TB services utilization. I used previous studies and the theoretical frameworks (Andersen's model of health services utilization and SEM) to identify the independent variables (see Andersen & Newman, 1973, 2005; Bashorun et al., 2020; Bronfenbrenner, 1977; Chikovore et al., 2020; Chinouya & Adeyanju, 2017; Datiko et al., 2020, Nyasulu et al., 2018; Kilanowski, 2017; Seidu, 2020; Shao et al., 2018). The variables included both societal and individual determinants.

The independent variables under individual determinants included predisposing factors such as age, a continuous/ ratio variable, which had categories for further analysis; 18 to 24, 25 to 34, 35 to 44, 45 to 54, 55 to 65, and >65 years. Marital status as a nominal variable was categorized as single, married, living with a partner, separated, divorced, and widowed. The categories for the level of education as an ordinal variable included no formal education, primary school, junior high school, senior high school, and

tertiary. Categories for occupation variables included unemployed, student, retired, self-employed, part-time employment, and full-time employment. I also included cultural beliefs and stigma as nominal variables.

Enabling factors included income as an ordinal variable, with categories like no income, R1- R3500, R3501 – R6000, R6001 – R9000, and >R9000. Health facility distance was an ordinal variable categorized by the travel time of less than 20 minutes, 20 to 60 minutes, and over 60 minutes (over 1 hour). Transportation as a nominal variable included ox cart, walking, bicycle, personal or family car, and public transport. The independent variables under the need for care (illness level) included TB knowledge as a nominal variable with categories like TB causes, seriousness, symptoms, diagnosis, length of treatment, and whether curable. The independent variables under societal determinants included HCWs' gender (female or male nurses), and HCW attitudes (friendliness, respect, and support), and healthcare facility processes like waiting time in hours (ordinal), service hours (nominal), referral systems, and availability of required HCWs (nominal).

I used a quantitative, correlational research design to examine relationships between variables statistically. Correlational research is nonexperimental research, which examines statistical relationships between two or more variables to estimate the extent to which they relate (Babbie, 2017; Burkholder et al., 2016). Researchers collect descriptive, behavioral, and attitudinal data using surveys (Burkholder et al., 2016). Survey methods are very flexible, cheap, easy to collect data, and collects considerable amount of data widely within a shorter time (Babbie, 2017; Burkholder et al., 2016).

However, a survey does not provide the exact measurement (cannot establish causation) instead estimates relationships. Therefore, the generalization of results should be made with caution (Babbie, 2017; Burkholder et al., 2016; Etikan et al., 2016).

In future, use of other research designs like experimental designs or observational designs, for example, cross-sectional studies would supplement the study findings. In cross-sectional studies data collection involves many participants and compares many variables during the same period to describe a social problem in a population (Babbie, 2017). Experimental designs would involve the manipulation of independent variables through interventions and observing the effects of those interventions on the dependent variable (Burkholder et al., 2016). Finally, use of qualitative designs will be crucial to acquire in-depth information on an identified phenomenon from the results.

Methodology

Population

The population survey involved men aged 18 and above diagnosed with TB disease and seeking care in public or government PHC facilities. According to the district health information system (DHIS), the district had 980 active TB cases, of which 571 (58.2%) were men (Zululand Health District, 2021). These men were from all five subdistricts of Zululand district, namely Abaqulusi, eDumbe, Nongoma, Pongola, and Ulundi subdistricts (see map in Figure 1). The Zululand district has a deprived rural community with a high unemployment rate and low educational levels, as described earlier in chapter 2 (DoH, 2015; StatsSA, 2018). Half of the area is under traditional leaders, and the other half is private land with commercial farms or protected areas. It has

six towns. However, Vryheid is a commercial town, whereas Ulundi is the administrative town for the district. Economic sectors include government departments (22%), transport and communication (16%) retail and accommodation (15%), financial institutions (11%), agriculture (10%), manufacturing (10%), community and social services (6%), mining (5%), construction (3%), energy and water (2%).

This district is hugely affected by TB, and the general contributing factors include poverty, HIV, and cultural practices like accessing traditional healers and using herbs before seeking medical care (Maharaj et al., 2016). According to DOH data and reports, most TB patients are men above 16 years (DoH, 2015). The characteristics of the sample population were gender, age, TB disease, and utilizing TB services in the selected government PHC facilities. I selected men above 18 years of age because they provide consent on their own.

Figure 3

Map of the Zululand District Municipality

Note: Map of the Zululand district with its subdistricts and the towns. It was copied from KZN Online website, which is the KZN provincial government communication portal.

Sampling and Sampling Procedures

Site Selection

In this study, I purposively selected high TB burden PHC facilities from all the five subdistricts in the Zululand district using the DHIS data. Purposive sampling is a nonprobability sampling technique (does not use any random mathematical methods) used in specific situations where the population under study is difficult to identify (Babbie, 2017). Purposive sampling selects sites, individuals, or cases with a defined purpose or criteria (possessed qualities) using experts' decisions or proven systems (Burkholder et al., 2016; Etikan et al., 2016). This sampling method was relevant as the TB high-burden facilities would provide most men with TB disease, although it did not give the PHC facilities equal chances of being selected. This sampling method is time-effective, easy, and the least expensive, and generalization of results is tricky and limited (Burkholder et al., 2016; Etikan et al., 2016). The Zululand district has 71 PHC facilities (Zululand Health District, 2021). I selected 18 high TB burden facilities from all the five subdistricts, which had a sample population of 337 men with TB disease. The whole district had 571 men with TB disease, and the 337-sample population offered a population proportion of 59% (Zululand Health District, 2021).

Table 1

Zululand's High TB Burden Facilities

Sub-district Name	High TB Burden PHC Facility Name	Total Number of Individuals on TB Treatment	Number of Men on TB Treatment
Abaqulusi SD	1	19	10
	2	19	10
	3	43	23
	4	67	31
Pongola SD	1	38	20
	2	41	21
	3	49	29
Ulundi SD	1	17	5
	2	23	14
	3	32	19
	4	34	20
eDumbe SD	1	25	15
	2	57	23
Nongoma SD	1	18	8
	2	19	8
	3	33	16
	4	37	20
	5	58	45
Total		629	337

Note: a range of two to five facilities were identified in each subdistrict in the Zululand district using the DHIS (Zululand Health District, 2021). The names were hidden for privacy and confidentiality purposes. Using the population size of men with TB disease (337), the confidence level of 95%, and the margin of error at 5%, the sample size was estimated at 185 male participants.

Participants Sampling Strategy

This study focused on men with TB disease. I recruited them using convenience sampling in the TB high-burden PHC facilities in this rural district. Convenience sampling is a non-probability sampling technique where the envisioned participants meet specific criteria like access, availability, geographical allocation and proximity, and willingness to participation (Babbie, 2017; Etikan et al., 2016). It is essential as it is cheap, simple, time-sensitive, and valuable in pilot studies and hypothesis generation (Babbie, 2017). Study results could be generalized to a similar group that shares the same characteristics (Babbie, 2017; Burkholder et al., 2016). This type of sampling technique was appropriate for this study. The participants' inclusion criteria included:

- Men aged 18 years and above.
- Diagnosed with TB disease and were accessing TB treatment in the selected PHC facilities.
- I excluded all males below 18 years, those above 18 years without TB disease, those above 18 years with TB disease who did not provide consent, and those accessing TB treatment in non-selected PHC facilities.

Sample Size Calculation

A larger sample size provides greater statistical power as it provides a narrower distribution or spread. The statistical power is affected by effect size, alpha, and sample size reliability (Frankfort-Nachmias & Leon-Guerrero, 2016; Kang, 2021). A small sample size increases the margin of type 1 and 11 errors, reduces its power, and makes the study worthless (Kang, 2021). It is critical to adjust the sample size based on the

required confidence level, the margin of error, and expected deviations among each outcome (Kang, 2021). A sample size calculation and power analysis depend on significant levels of alpha (α) value (normal is $p = .05$), power level (normally accepted at 80% or .8, calculated from type II error (1- β)) and effect size (0.2 = small effect, 0.5 = medium effect and 0.8 = large effect) (Kang, 2021; Kyonka, 2018).

I used G*Power calculator to calculate the sample size to promote reliability (see Frankfort-Nachmias & Leon-Guerrero, 2016; Kang, 2021). I set the type II error (1- β) at 20% (0.2), and the statistical power level at 80% (0.8) for the calculation. The parameters were set to test *z* test using logistic regression as the statistical test. Using the G*Power calculator, the minimum sample size required for this study was 184 participants (see Table 1). I also used an online sample size calculator and manual calculation to compare and get a statistically acceptable large sample size. An online sample size calculator using a population of 337, a confidence level of 95%, a population proportion of 50% and a margin of error of 5%, estimated a sample size of 180 participants (see Calculator.net, n.d.). The manual calculation ($N/1+N*e^2$) estimated 183 participants (see Frankfort-Nachmias & Leon-Guerrero, 2016). For details, see the upcoming description on the next page. The three methods I used estimated a range of 180-184 participants, and I sought a final sample size of 185 participants.

Table 2

A G Power Calculator Showing the Sample Size*

z tests - Logistic regression			
Options:	Large sample z-Test, Demidenko (2007) with var correlation		
Analysis:	A priori: Compute required sample size		
Input:	Tail(s)	=	Two
	Odds ratio	=	1.7
	Pr(Y=1|X=1) H0	=	0.2
	α err prob	=	0.05
	Power (1-β err prob)	=	0.80
	R^2 other X	=	0
	X distribution	=	Normal
	X parm μ	=	0
	X parm σ	=	1
Output:	Critical z	=	1.9599640
	Total sample size	=	184
	Actual power	=	0.8028456

Note: G*Power is a tool to calculate statistical power analyses for multiple t-tests, *F* tests, χ2 tests, *z* tests, and some exact tests. It also calculates effect sizes and provides a power analysis graphic display. The above graphic was calculated using G*Power calculator 2020 version 3.1.9.7 for Windows downloaded from the Heinrich Heine Universitat website (https://www.psychologie.hhu.de/arbeitsgruppen/allgemeine-psychologie-und-arbeitspsychologie/gpower)

Manual Calculation

Manual calculation formula for sample size = $(N/1+N*e^2)$ (Frankfort-Nachmias & Leon-Guerrero, 2016).

N = Population size (337)

e = Margin of error (0.05)

Sample size = $(N/1+N*e^2)$

$= (337/ 1=+337*0.05^2)$

$= \frac{337}{1+337\ (0.05^2)}$

$= \frac{337}{1 + 337\ (0.0025)}$

$= \frac{337}{1 + 0.845}$

$= \frac{337}{1.845}$

Sample size = 182.65 rounded to 183

Procedures for Recruitment, Participation, and Data Collection

Primary Data Collection

I collected the primary data using a structured survey instrument with close-ended questions in the English and isiZulu languages according to the participant's preferences. A structured questionnaire gathers numerical data for statistical analysis and is critical to use a known language (Wenz et al., 2020). I derived the questions from existing validated survey instruments to objectively find relationships in naturally occurring variables and generalize the findings in similar settings (see Babbie, 2017; Burkholder et al., 2016; Creswell & Creswell, 2018). The experts validated the questionnaire using face validity. It had skip-question patterns, multiple-choice, and Likert-scale question patterns where applicable (Babbie, 2017). This design aligned with the proposed research questions to

identify any relationships within the selected dependent and independent variables.

Data Collection Method

Zululand district is rural; hence, the best mechanism for data collection was a blended approach. I distributed the questionnaires in person to eligible participants for self-administration. I conducted in person (face to face) interviews to collect data using the same questionnaire with participants who indicated that self-administration of the questionnaire was not favorable. Burkholder et al. (2016) described other ways of data collection such as the use of verbal surveys over the telephone, internet (web-based), face-to-face, and mail self-administered questionnaires, which were not feasible for this setting. For this study, I preferred the in-person self-administration of the questionnaire or in person interviews because the Zululand district is rural, with problematic telephone and internet access. I used suitable allocated private rooms (areas) within the facilities to primarily maintain confidentiality while following TB infection control measures and maintaining COVID-19 regulations (masking, social distancing, sanitization, and good ventilation). The survey took place in the purposively selected high TB burden PHC facilities. The questionnaire had English and isiZulu languages' versions and participants chose according to their preference for self-administration. Wenz et al. (2020) described the importance of using the correct language to collect good-quality data. I checked the completed questionnaires before the participants left the room to avoid missing values of questions they did not deliberately omit.

Recruitment and Participation

The initial steps involved getting letters of consent to conduct the research from the KZN DOH provincial office and Zululand district DOH office before initiating the ethical standards' processes with all relevant institutions. I received a tentative ethics approval from Walden university's institutional review board (IRB) after I met the standards to pursue local country approval processes. I used this tentative approval to submit the ethics application form to the Human Sciences Research Council (HSRC) in South Africa. Once the HSRC committee approved the study, I made another submission to the KZN Provincial Health Research and Ethics Committee (PHREC) and obtained their ethics approval, which included authorization to conduct the study in the selected government PHC facilities in the Zululand district. Finally, I obtained a final ethical approval from Walden University's IRB after meeting all the requirements to begin data collection for the study. These processes were essential to observe Walden university's requirements and South Africa's ethical needs.

Prior to the recruitment process, the district leadership informed all selected facilities' operational managers and staff about the study. Prior communication with the target population about the study was through information leaflets (flyers) which were distributed by the nurses, and other leaflets were placed in a visible area for easy access. I recruited participants in the selected clinics using convenient sampling and the inclusion criteria described earlier. I used a private room to maintain privacy, and I provided the detailed information about the study, processes, and used the participant's consent form (read, acknowledged, understood, and signed) before data collection. I obtained written

consent (signature) from all the participants and followed all ethical requirements. These processes promoted voluntary participation, privacy, confidentiality, and safety to promote fairness or justice, beneficence or goodness, and respect or dignity for the people (see Babbie, 2017; Creswell & Creswell, 2018). I included measures to offset the vulnerability of participants to reduce the risk of harm. As earlier described, I collected data through a paper-based self-administered questionnaire. Where an in-person self-administered questionnaire was not favorable, I conducted an in-person (face-to-face) interview to collect data using the same questionnaire.

Instrumentation and Operationalization of Constructs

I collected primary data using a survey questionnaire, which I developed using existing validated structured survey instruments (see Challenge TB, n.d., 2011; Daniels et al, 2021; Erlinger et al, 2019; Fink et al, 2020; Sima et al, 2017; Stop TB Partnership, n.d., 2019; Suleiman, 2021; Tola et al., 2019). The study committee, Walden IRB and the local IRB reviewed and approved the questionnaire after the necessary changes. Initially it had more questions beyond the research questions, and I removed them. The experts deemed the questionnaire reliable after conducting face and content validity. Table 3 shows the codes and operational definition of the outcome variables.

Table 3

Outcome Variables' Coding and Operational Definition

Dependent Variable	Coding	Operational Definition
Men's quality of TB services utilization	0 = Sum score above 3 = Low-quality TB services utilization 1 = Sum score of 3 = High-quality TB services utilization	A combination of three factors from three questions as described below: Low-quality TB services utilization • Any combination of the three questions' responses above the sum score of 3. High-quality TB services utilization: • A combination of three questions' responses with a sum score of 3. o Diagnosed within three weeks of onset of symptoms (score of 1) o One to three visits before TB diagnosis confirmation (score of 1) o Started TB treatment within two days after diagnosis (score of 1)
Men's geographical access to TB services	0 = poor geographical access 1 = good geographical Access	Yes/No Poor access: Health facility is not easy to reach. Good access: Health facility is easy to reach.

Data Analysis Plan

I analyzed the data using the IBM SPSS Version 27 Statistics to simplify, organize, analyze, and interpret the data orderly. The selected software complied with Walden University's established guidelines. The statistical analysis involved both descriptive (frequency tables, proportions, and percentages) and inferential statistics (univariable and multivariable logistic regression). Descriptive data synthesize the population sample's characteristics, opinions, and conclusions or findings, while

inferential statistics offer estimates, predictions, or inferences about the entire population and permit regression analysis to define or describe the relationships between variables (Burkholder et al., 2016; Frankfort-Nachmias & Leon-Guerrero, 2016). Researchers' data editing and cleaning processes are crucial stages in data processing before data analysis as it promotes data quality. This process identifies data errors and allows corrections, exclusions, and helps to avoid similar problems in future data collection (see Babbie, 2017; Burkholder et al., 2016).

I conducted data cleaning processes by first looking for any data errors in the filled questionnaire, and where necessary, I made clarifications before the participant left the room. The questionnaire had some sensitive questions, and I informed participants to skip any question that they did not want to respond. I used a Google form for data entry and validated the data to correct any identified errors. I used all relevant variables to align with the specified level of measurement. I recoded other variables to aid the data analysis process, for example, the use of three factors to define quality of TB services utilization.

I used the following research questions and corresponding hypotheses to guide this study:

RQ1: Was there an association between HCWs' attitudes (like friendliness, respect, and support), HCWs' gender, HCFs processes (waiting time, service hours, referrals to other facilities, and availability of required HCWs), and men's quality of TB services utilization?

$H_0$1: There was no statistically significant association between HCWs' attitudes (like friendliness, respect, and support), HCWs' gender, HCFs processes (like waiting time, service hours, referrals to other facilities, and availability of required HCWs), and men's quality of TB services utilization.

H_a1: There was a statistically significant association between HCWs' attitudes (like friendliness, respect, and support), HCWs' gender, HCFs processes (like waiting time, service hours, referrals to other facilities, and availability of required HCWs), and men's quality of TB services utilization.

RQ2: Was there an association between the socio-demographics (age, level of education, level of income, and marital status), level of TB knowledge, cultural beliefs, stigma, TB seriousness, and men's quality of TB services utilization?

$H_0$2: There was no statistically significant association between the socio-demographics (age, level of education, level of income, and marital status), level of TB knowledge, cultural beliefs, stigma, TB seriousness, and men's quality of TB services utilization.

H_a2: There was a statistically significant association between the socio-demographics (age, level of education, level of income, and marital status), level of TB knowledge, cultural beliefs, stigma, TB seriousness, and men's quality of TB services utilization.

RQ3: Was there an association between health facility distance, mode of transportation, income, and men's geographical access to TB services?

$H_0$3: There was no statistically significant association between health facility distance, mode of transportation, income, and men's geographical access to TB services.

H_a3: There was a statistically significant association between health facility distance, mode of transportation, income, and men's geographical access to TB services.

Descriptive statistics

I chose frequency tables, proportions, and percentages because they are valuable in describing the number of occurrences (distribution) and ratios of a specific type of measure/variable. Other measures included measures of central tendency (mean, mode and median) to describe data behavior in a distribution. These items visually display descriptive statistics and easily interpret obvious trends (see Wagner, 2016).

Logistic Regression

I used logistic regression to get inferential data analysis. It is necessary when analyzing a single dichotomous outcome (dependent variable) with more than one independent variable (Frankfort-Nachmias & Leon-Guerrero, 2016). It determines the predictive relationship using the calculated statistical significance and odd ratios between independent variables and the outcome (Frankfort-Nachmias & Leon-Guerrero, 2016; Wagner, 2016). When the relationship was statistically significant, I interpreted the odds ratio (likelihood) related to a given independent variable. The outcome variables were binary (two), for example, yes or no outcomes. In this study, only age was a continuous independent variable.

Stepwise Regression

I used a stepwise regression model to identify independent variables that significantly influenced the outcome variable to assess the effect. It is a step-by-step iterative construction of a regression model, which chooses independent variables for final regression model analysis (Wagner, 2016). It adds or removes independent variables according to statistical significance after each iteration (Frankfort-Nachmias & Leon-Guerrero, 2016).

Threats to Validity

It is crucial to meet the set quality standards for a study. If quality standards are not met, it may result in misleading or inaccurate research (Burkholder et al., 2016). Validity and reliability are methods of signifying that the research procedures and findings are honest or truthful, and credible (Burkholder et al., 2016). Validity measures the level to which a measure correctly represents the notion or variable it asserts to measure (Burkholder et al., 2016). Reliability, which refers to the dependability or consistency of the findings from the research instrument and the study approach, was crucial in this study. It made sure the findings were credible (see Burkholder et al., 2016). I met the quality standards of the study by paying attention to the approved design and method, the research questions, data collection methods, the instrument, sampling, and sample size. Quantitative studies have internal and external validity.

Internal Validity

Internal validity estimates truths about cause-and-effect relationship inferences or findings relevant in such studies only (Burkholder et al., 2016). This correlational study

was not a cause-and-effect study, and the internal validity measure was inappropriate. However, focusing on external validity, it had the potential for multiple biases like selection, information, and confounding as described below.

External validity

External validity is the degree to which the findings, conclusions, or assumptions would be generalized in other similar settings and at other times (Babbie, 2017; Burkholder et al., 2016). The chosen convenient sampling method has an inherent selection bias as the participants are not chosen randomly. Selection bias refers to an error in choosing the research participants from the target population (Babbie, 2017). In this study, I avoided selection bias by making sure that I select only men aged 18 years and above with TB disease. I selected the participants from multiple health facilities from all five subdistricts in the district to ensure a balanced sample.

Information bias or measurement bias may occur when the main study variables are inaccurately classified or measured. It also includes inaccurate data collection tools leading to errors in data collection and information supplied by the participant (Babbie, 2017; Burkholder et al., 2016). In this study, I classified the key study variables and defined the measures. I verified the questionnaire and used verified survey questions. All participants used the same questionnaire, and I was available to clarify any questions from participants during data collection. Another potential bias is confounding bias, where there is a systematic distortion in the measure of association (the quantifiable relationship) between any factors associated with an outcome of interest due to other

extraneous factors (Babbie, 2017). In this study, the variables are objective, specific, and clearly defined to promote standardization and avoid extraneous factors.

I used construct validity, which measures the degree to which findings from the operationally defined constructs are accurate or valid according to the definitions (see Babbie, 2017; Burkholder et al., 2016). Construct validity ensured that the test measured the concept it was envisioned to measure. Content validity ensured that the test represented what it aimed to measure. Face validity ensured that the content of the test was appropriate for the goals. For this study, Walden university and HSRC guiding research experts conducted both face and content validity. Criterion validity confirmed whether the findings resembled a different test of a similar thing. I adequately explained the aim of the study to collect truthful data and followed the defined inclusion and exclusion criteria to potentially generalize the study results to similar settings.

Ethical Considerations

I acquired all the relevant approvals from Walden University's IRB, the HSRC, and KZN PHREC before beginning the study processes like recruitment of government PHC facilities, participants' recruitment, and data collection. The study began once I met all required ethical standards. This study involved direct engagement with the participants. I obtained informed consent from each participant. The questionnaires had no personal identifiable information because I used unique personal identifiers (code). I made sure the participants understood the reasons for the study (provided relevant information), the need for their voluntary participation, confidentiality (privacy and hidden identities), and their right to privacy. I provided all relevant information and

promoted freedom of choice. I avoided potential ethical issues such as compulsory participation, harm, and deception or dishonesty by following these actions (see Babbie, 2017). I provided the participants with my personal contact details and those of the institutions for communication purposes, for example, to ask questions or share their concerns.

I stored the data in a database, in a secure Cloud storage with unrecognizable information of the participants to promote anonymity. Access to the data was password controlled on my laptop using a password known only by me. The research committee members got access to the data on request. I stored all paper-based notes, questionnaires, and other data-related materials in a locked bag. I will keep the data and only discard them after five years from the time data collection was completed. It gives ample time to respond to any queries that may arise. I used aggregated data for the final study results and presentations with no identifiable individual information, and the names of the selected PHC facilities remain anonymous. Any future presentations, reports, and publications would follow the same process.

Summary

In Chapter 3, I provided a detailed description of the quantitative design, rationale, and methodology that I used in this study. It included narratives of the study processes or procedures, study design, study setting, population, sample size, recruitment, data collection, analysis, validity, and ethical considerations. In chapter 4, I will describe the collected data, present the results, and discuss it. In chapter 5 (final chapter), I will

interpret the results, discuss the limitations of the study, make recommendations, explore implications, and conclude the findings.

Chapter 4: Results

Introduction

In this chapter, I present the study results based on the study research questions and data analyses, which included descriptive statistics and logistic regression models. The purpose of this quantitative study was to assess the factors that affect men's geographical access and quality utilization of TB services in the Zululand district of KZN province in South Africa. Specifically, my goal was to explore any relationship between HCWs' attitudes (like friendliness, respect, and support), HCWs' gender, HCFs processes (waiting time, service hours, referrals to other facilities, and availability of required HCWs), and men's quality of TB services utilization. Secondly, I examined any association between age, level of education, level of income, marital status, level of TB knowledge, cultural beliefs, stigma, TB seriousness, and men's quality of TB services utilization. Lastly, I determined the relationship between travel time to the health facility, mode of transportation, income, and men's geographical access to TB services.

The dependent variables were men's geographical access to TB services, and men's quality of TB services utilization. I used the following research questions and corresponding hypotheses to guide this study:

RQ1: Was there an association between HCWs' attitudes (like friendliness, respect, and support), HCWs' gender, HCFs processes (waiting time, service hours, referrals to other facilities, and availability of required HCWs), and men's quality of TB services utilization?

$H_0$1: There was no statistically significant association between HCWs' attitudes (like friendliness, respect, and support), HCWs' gender, HCFs processes (like waiting time, service hours, referrals to other facilities, and availability of required HCWs), and men's quality of TB services utilization.

H_a1: There was a statistically significant association between HCWs' attitudes (like friendliness, respect, and support), HCWs' gender, HCFs processes (like waiting time, service hours, referrals to other facilities, and availability of required HCWs), and men's quality of TB services utilization.

RQ2: Was there an association between the socio-demographics (age, level of education, level of income, and marital status), level of TB knowledge, cultural beliefs, stigma, TB seriousness, and men's quality of TB services utilization?

$H_0$2: There was no statistically significant association between the socio-demographics (age, level of education, level of income, and marital status), level of TB knowledge, cultural beliefs, stigma, TB seriousness, and men's quality of TB services utilization.

H_a2: There was a statistically significant association between the socio-demographics (age, level of education, level of income, and marital status), level of TB knowledge, cultural beliefs, stigma, TB seriousness, and men's quality of TB services utilization.

RQ3: Was there an association between health facility distance, mode of transportation, income, and men's geographical access to TB services?

$H_0$3: There was no statistically significant association between health facility distance, mode of transportation, income, and men's geographical access to TB services.

H_a3: There was a statistically significant association between health facility distance, mode of transportation, income, and men's geographical access to TB services.

In this chapter, I describe the data collection process and the results of the completed data analysis.

Data Collection

As described earlier, I met all the required ethical approval standards from Walden University's IRB, the HSRC, and KZN PHREC before the study processes, like recruitment of government PHC facilities, participants' recruitment, and data collection began. I received the Walden University IRB approval on April 25th, 2022, with IRB approval number 04-25-22-1009023. I received the HSRC approval on August 29th, 2022, and the KZN PHREC approval on September 7th, 2022. The Walden University IRB approved the commencement of data collection on September 16th, 2022. Data collection processes began on September 19th, 2022, and data collection ended on December 16th, 2022**.** During data collection, I followed the plan described in Chapter 3, and there was no notable discrepancy. I collected the data from men aged 18 years and above, with TB disease, accessing TB services in the selected facilities. I kept the questionnaires and consent forms separately in securely locked boxes and stored the data set in a password-protected Cloud storage folder on my laptop.

Results

Descriptive Statistics

Descriptive Statistics on Socio-demographics, TB Knowledge, Cultural Beliefs, Stigma, and TB Seriousness

The socio-demographic characteristics of the study participants (N = 200) included age, level of education, occupation (employment status), level of income, and marital status, which I summarized in Table 4, had no missing values. Using the Shapiro test of normality, age was non-normally distributed (p = <0.001); hence I used median of 39 and an interquartile range of 15.5 in the analysis. Age showed a positively skewed distribution with a mean of 40.18 and a standard deviation of 12.76 in the histogram (Figure 4). On the age categories, most men (37.5%) were in the age category of 35 to 44 years. Most men attained secondary education (70.0%), while 12.5% attained tertiary level, 10.0% primary level, and 7.5% had no formal education. Most men were single (54.5%), while 32.0% were married or living with a partner, and 13.5% were separated or divorced. Most men were unemployed (49.0%), while 42.0% were employed, 6.5% were retired, and 2.5% were students. Most participants had no income (51.5%), 30.0% indicated an income of R3500 and below, 11.5% were between R3501 to R6000, 4.0% indicated R6001 to R9000, and only 3.0% had an income of above R9000. Most respondents had high TB knowledge (80.0%), only 14.5% had cultural beliefs on causes of TB, 25.0% had experienced stigma, and most respondents considered TB disease a severe illness (88.0%).

Table 4

Descriptive Data for the Socio-demographic Characteristics of the Sample and Other Variables

Variable	Category/level	Frequency	Percentage
Age group	18 – 24 years	20	10.0
	25 – 34 years	45	22.5
	35 – 44 years	75	37.5
	45 – 54 years	35	17.5
	55 – 64 years	15	7.5
	+65 years	10	5.0
Marital status	Single	109	54.5
	Married	64	32.0
	Separated/Widowed	27	13.5
Education completed	None	15	7.5
	Primary	20	10.0
	Secondary	140	70.0
	Tertiary	25	12.5
Occupation	Unemployed	98	49.0
	Employed	84	42.0
	Student	5	2.5
	Retired	13	6.5
Income level	No income	103	51.5
	R1 - R3500	60	30.0
	R3501 – R6000	23	11.5
	R6001 – R9000	8	4.0
	+R9000	6	3.0
Level of TB knowledge	Low	40	20.0
	High	160	80.0
Cultural Beliefs	No	171	85.5
	Yes	29	14.5
Stigma	No	150	75.0
	Yes	50	25.0
TB Seriousness	Not very serious	9	4.5
	Somewhat serious	15	7.5
	Very serious	176	88.0

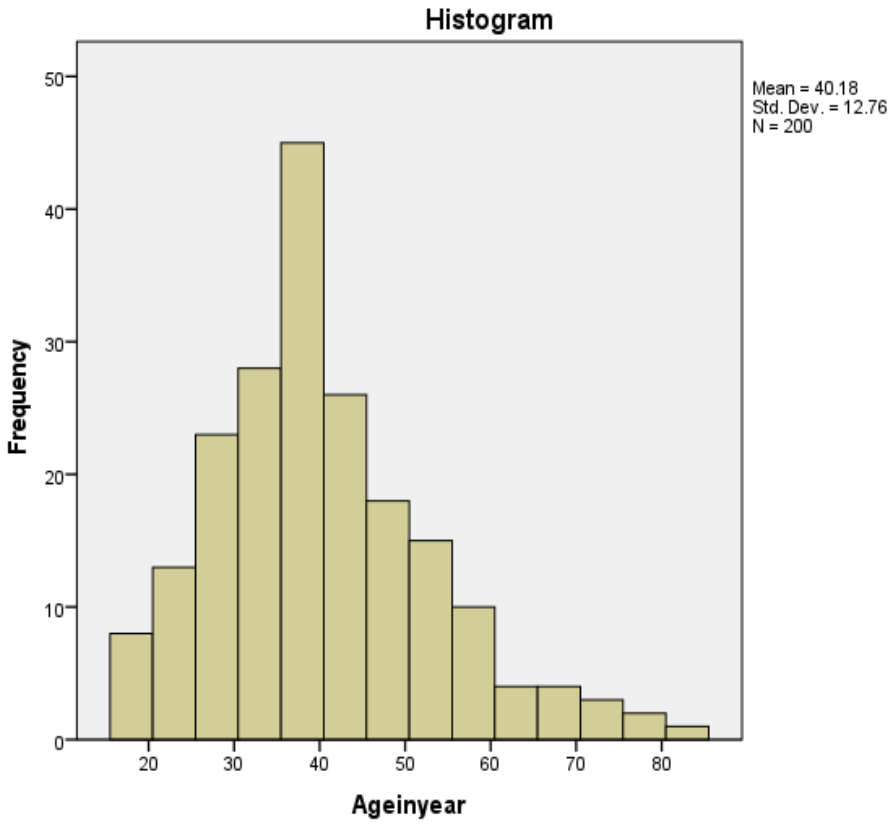
Continuous variables

	Mean	Median	Interquartile range	Standard deviation
*Age (years)	40	39	15.5	12.8

Note: N = 200, using the Shapiro-Wilk test of normality, age was found to be non-normally distributed (*p*-value <0.001); hence the researcher used median and interquartile range instead of mean and standard deviation.

Figure 4

Histogram Showing Non-normally Distributed Age



Note: Figure 4 shows the positively skewed non-normal distribution of age.

Descriptive Statistics on Travel Time to the Facility, Mode of Transport and Other Demographic Characteristics of the Sample

In Table 5, most respondents' travel time to the health facility was between 20-60 minutes (42.5%), 41.5% was less than 20 minutes, and 16.0% for over 60 minutes.

Regarding modes of transportation, the majority used public transport like mini-buses (taxis) and buses (52.0%), walking (33.0%), use of a personal or family car (8.5%), bicycle (5.5%), and oxcart (1.0%). Most respondents felt supported by their communities (38.5%), 34.0% felt the community members were friendly although they tried to avoid them, and 27.5% felt rejected by the community. Of the respondents that experienced stigma, 22.5% were stigmatized by the community, 7.5% by family members at home, 6.0% by co-workers at work, and 6.0% by the HCWs (N = 200 on each character). On TB and HIV integration, 85.0% indicated that HIV patients should be concerned about TB because they are most likely to get it (75.5%), 15.0% gave other responses, and 9.5% didn't know the reason for concern. Most respondents felt that the stigma levels of TB and HIV were the same (40.5%), while 39.5% felt that TB was more stigmatized, and 19.0% thought it was less stigmatized. Most men were stigmatized by the community, and most respondents (68.5%) were on six months treatment regimen.

Table 5

Description Statistics for Travel Time to the Facility, Mode of Transport, and Other Demographic Characteristics

Variable	Level	Frequency	Percentage
Travel time to the facility in minutes	< 20 minutes	83	41.5
	20 - 60 minutes	85	42.5
	> 60 minutes	32	16.0
	Bicycle	11	5.5
	Ox cart	2	1.0
Mode of transport	Personal or family car	17	8.5
	Public transport	104	52.0
	Walking	66	33.0
How TB patients are regarded/treated in the community	Most people reject them	55	27.5
	Most people are friendly, but they generally try to avoid them	68	34.0
	The community mostly supports and helps them.	77	38.5
HIV patients should be concerned about TB	Not sure	22	11.0
	No	8	4.0
	Yes	170	85.0
Reasons for the concern	HIV patients most likely to develop TB	151	75.5
	Other responses	30	15.0
	Don't know	19	9.5
TB stigma level relative to HIV	Less	38	19.0
	Same	81	40.5
	More	79	39.5
	Don't know	2	1.0
Length of TB treatment	Six months	137	68.5
	> Six months	42	21.0
	Do not know	21	10.5
TB diagnosis after the onset (start) of symptoms	Within three weeks	137	68.5
	Three to eight weeks	49	24.5
	More than eight weeks	14	7.0
Facility visit frequency until TB was confirmed	Once	81	40.5
	Two to three times	78	39.0
	Multiple times	41	20.5
	Within two days	143	71.5
Treatment initiation after diagnosis	Within one week	43	21.5
	More than one week	14	7.0
Experienced stigma at the health facility	No	188	94.0
	Yes	12	6.0
Experienced stigma from the neighbors	No	155	77.5
	Yes	45	22.5
Experienced stigma at home	No	185	92.5
	Yes	15	7.5
Experienced stigma at work	No	188	94.0
	Yes	12	6.0

Descriptive Statistics on Health Care Workers' Attitudes, Health Care Workers' Gender, and Healthcare Facility Processes

The descriptive statistics in Table 6 shows that most patients felt that the HCWs were respectful (98.5%), supportive (98.0%) and friendly (97.5%). Given a choice, most patients (61.5%) would prefer to be seen by male HCWs. Regarding acceptable waiting time, 49.0% indicated it was always acceptable, 20.0% usually acceptable, 15.5% sometimes acceptable, and 15.5% found the waiting time unacceptable (Table 6). On clinic service time convenience, 48.5% found it convenient, 28.5% found it usually convenient, 8.0% indicated it was sometimes convenient, while 15.0% found it was not convenient (Table 11). Most men were never referred to another HCF (87.0%), 10.0% were sometimes referred, 2.0% indicated they were always referred, and 1.0% usually referred (Table 6). Regarding the availability of required staff, 29.5% indicated they were always available, 28.5% were sometimes available, 25.0% were usually available, and 17.0% indicated they were never available (Table 6).

Table 6

Descriptive Statistics on Health Care Workers' Attitudes, Health Care Workers' Gender, and Healthcare Facility Processes

Variable	Category/Level	Frequency	Percentage
Friendliness	No	5	2.5
	Yes	195	97.5
Respect	No	3	1.5
	Yes	197	98.5
Support	No	4	2.0
	Yes	196	98.0
Choice of HCW's gender	Female	77	38.5
	Male	123	61.5
	Always	98	49.0
	Never	31	15.5
Waiting time	Sometimes	31	15.5
	Usually,	40	20.0
	Always	97	48.5
Service time convenient	Never	30	15.0
	Sometimes	16	8.0
	Usually,	57	28.5
	Always	4	2.0
Referrals	Never	174	87.0
	Sometimes	20	10.0
	Usually,	2	1.0
	Always	89	29.5
Availability of required HCWs	Never	47	17.0
	Sometimes	78	28.5
	Usually,	71	25.0

The Distribution of Men Whose TB Treatment was Intermittently Interrupted

I examined the distribution of men whose TB treatment was intermittently interrupted. In Table 7, out of the 200 men, 49 self-reported TB treatment intermittent interruption. Table 7 shows the distribution by age and by each reason for intermittent treatment interruption. Most of the men (46.9%) were between 35 - 44 years of age. The

reasons for intermittent treatment interruption were forgetfulness (51.0%), travel (49.0%), high transportation cost (12.2%), medication side effects (8.2%), and improved symptoms (4.1%). The most common factors of intermittent treatment interruption were being forgetful and travelling.

Table 7

Descriptive Statistics for Frequencies of Men Whose TB Treatment was Intermittently Interrupted

Variable	Level	Frequency	Percentage
Intermittent TB treatment interruption among men	No	151	75.5
	Yes	49	24.5
Age	18 – 24 years	6	12.2
	25 – 34 years	7	14.3
	35 – 44 years	23	47.0
	45 – 54 years	8	16.3
	55 – 64 years	2	4.1
	+65 years	3	6.1
Medication side effects	No	45	91.8
	Yes	4	8.2
Forgetfulness	Did not forget	24	49.0
	Forgot	25	51.0
High transportation cost for medication	No	43	87.8
	Yes	6	12.2
Improved symptoms	No	47	95.9
	Yes	2	4.1
Traveled	No	25	51.0
	Yes	24	49.0

Note: Only 49 men out of 200 self-reported treatment interruption. The table shows the distribution of these 49 men by age and then by each reason of interruption.

Descriptive Statistics on the Outcome Variables for All Questions

Table 8

Frequency Table for Outcome Variables

Variable	Level	Frequency	Percentage
Men's quality of TB services utilization	Low-quality TB services utilization	115	57.5
	High-quality TB services utilization	85	42.5
Men's geographical access to TB services Travelled	Poor geographical access	61	30.5
	Good geographical Access	139	69.5

Note: Refer to page 13 for the definitions of the outcome variables

Inferential Statistics

Research Question 1: Univariable Logistic Regression Model Analysis: Association Between Health Care Workers' Attitudes, Health Care Workers' Gender, Healthcare Facilities Processes and Men's Quality of TB Services Utilization

Table 8 data shows that 85 men (42.5%) had high-quality TB services utilization. Men's quality of TB services utilization outcome variable used three parameters as described earlier under definitions. High-quality utilization refers to being diagnosed within three weeks of the onset of symptoms, within three health facility visits, and starting TB treatment within two days. Further individual parameter analysis using descriptive data in Table 5 shows that 68.5% were diagnosed within three weeks of the onset of symptoms, 79.5% were diagnosed within three health facility visits, and 71.5% were initiated on TB treatment within two days.

In RQ1, I used a univariable logistic regression model by entering each independent variable in the equation individually to allow the identification of statistically significant independent variables at 0.1 level of significance. The results in Table 9 showed that none of the variables were significantly associated with men's quality utilization of TB services at 0.1 level of significance. The variables' values were as follows; friendliness (p = .423), respect (p = .748), support (p = .760), choice of healthcare worker's gender (p = .831), waiting time (*sometimes* p = .961, *usually* p = .823, *always* p = .669), service time convenience (s*ometimes* p = .419, *usually* p = .308, *always* p =. 520), referrals (*sometimes* p = .756, *usually* p = .807, *always* p =. 214), and availability of required HCWs (*sometimes* p = .894, *usually* p = .730, *always* p =. 242) were not significantly associated with men's quality utilization of TB services. These findings suggest that these factors may not play a significant role in determining men's quality utilization of TB services. However, further research is needed to confirm these results and explore other potential factors that may influence men's utilization of TB services.

Table 9

Research Question 1: Univariable Logistic Regression Model Analysis: Association Between Health Care Workers' Attitudes, Health Care Workers' Gender, Healthcare Facilities Processes, and Men's Quality Utilization of TB Services

Variable	Level	Low-quality utilization; n (%)	High-quality utilization; n (%)	OR (95% CI)	P-value
Friendliness	No	2 (1.74)	3 (3.53)	1	
	Yes	113 (98.26)	82 (96.47)	0.48 (0.08 – 2.96)	0.423
Respect	No	2 (1.74)	1 (1.18)	1	
	Yes	113 (98.26)	84 (98.82)	1.49 (0.13 – 16.67)	0.748
Support	No	2 (1.74)	2 (2.35)	1	
	Yes	113 (98.26)	83 (97.65)	0.73 (0.10 – 5.32)	0.760
Choice of HCW's gender	Female	45 (39.13)	32 (37.65)	1	
	Male	70 (60.87)	53 (62.35)	1.06 (0.60 -1.90)	0.831
Waiting time	Never	17 (14.78)	14 (16.47)	1	
	Sometimes	17 (14.78)	14 (16.47)	1 (0.37 -2.72)	1.000
	Usually,	23 (20.00)	17 (20.00)	0.90 (0.35 -2.31)	0.823
	Always	58 (50.43)	40 (47.06)	0.84 (0.37 – 1.89	0.669
Service time convenient	Never	15 (13.04)	15 (17.65)	1	
	Sometimes	10 (8.70)	6 (7.06)	0.6 (0.17 – 2.07)	0.419
	Usually,	35 (30.43)	22 (25.88)	0.63 (0.26 – 1.53)	0.308
	Always	55 (47.83)	42 (49.41)	0.76 (0.34 – 1.74)	0.520
Referrals	Never	102 (88.70)	72 (84.71)	1	
	Sometimes	11 (9.57)	9 (10.59)	1.16 (0.46 – 2.94)	0.756
	Usually,	1 (0.87)	1 (1.18)	1.42 (0.09 – 23.02)	0.807
	Always	1 (0.87)	3 (3.53)	4.25 (0.43 – 41.68)	0.214
Availability of required HCWs	Never	21 (18.26)	13 (15.29)	1	
	Sometimes	36 (31.30)	21 (24.71)	0.94 (0.39 – 2.26)	0.894
	Usually,	29 (25.22)	21 (24.71)	1.17 (0.48 – 2.85)	0.730
	Always	29 (25.22)	30 (35.29)	1.67 (0.71 – 3.95)	0.242

Note. At 0.1 level of significance, no variable was significant for inclusion for a multivariable logistic regression model to determine associations. However, a multivariable logistic regression model will be used to assess the null hypothesis.

Research Question 1: Multivariable Logistic Regression Model Analysis to Assess the Null Hypothesis: Association Between Health Care Workers' Attitudes, Health Care Workers' Gender, Healthcare Facilities Processes and Men's Quality of TB Services Utilization

In Table 10, I used a multivariable logistic regression model to assess the null hypothesis. At 0.05 level of significance, no variable was associated with men's quality of TB services utilization, therefore, the null hypothesis was retained.

Table 10

Research Question 1: Multivariable Logistic Regression Model Analysis to Assess the Null Hypothesis: Association Between Health Care Workers' Attitudes, Health Care Workers' Gender, Healthcare Facilities Processes, and Men's Quality Utilization of TB Services

Variable	Level	Low-quality utilization; n (%)	High-quality utilization; n (%)	OR (95% CI)	P-value
Friendliness	No	2 (1.74)	3 (3.53)	1	
	Yes	113 (98.26)	82 (96.47)	0.29 (0.04 – 2.39)	0.251
Respect	No	2 (1.74)	1 (1.18)	1	
	Yes	113 (98.26)	84 (98.82)	4.90 (0.18 - 135.11)	0.347
Support	No	2 (1.74)	2 (2.35)	1	
	Yes	113 (98.26)	83 (97.65)	0.47 (0.03 -7.24)	0.589
Choice of HCW's gender	Female	45 (39.13)	32 (37.65)	1	
	Male	70 (60.87)	53 (62.35)	1.12 (0.60 – 2.07)	0.728
	Never	17 (14.78)	14 (16.47)	1	
	Sometimes	17 (14.78)	14 (16.47)	1.14 (0.39 – 3.37)	0.809
Waiting time	Usually,	23 (20.00)	17 (20.00)	1.18 (0.42 – 3.30)	0.754
	Always	58 (50.43)	40 (47.06)	0.89 (0.36 – 2.20)	0.809
Service time convenient	Never	15 (13.04)	15 (17.65)	1	
	Sometimes	10 (8.70)	6 (7.06)	0.54 (0.15 – 2.00)	0.360
	Usually,	35 (30.43)	22 (25.88)	0.56 (0.21 – 1.51)	0.253
	Always	55 (47.83)	42 (49.41)	0.66 (0.26 – 1.65)	0.373
Referrals	Never	102 (88.70)	72 (84.71)	1	
	Sometimes	11 (9.57)	9 (10.59)	1.24 (0.44 – 3.48)	0.687
	Usually,	1 (0.87)	1 (1.18)	1.83 (0.06 – 54.74)	0.726
	Always	1 (0.87)	3 (3.53)	3.32 (0.31 – 35.77)	0.323
Availability of required HCWs	Never	21 (18.26)	13 (15.29)	1	
	Sometimes	36 (31.30)	21 (24.71)	0.80 (0.31 – 2.03)	0.638
	Usually,	29 (25.22)	21 (24.71)	0.90 (0.34 – 2.35)	0.830
	Always	29 (25.22)	30 (35.29)	1.43 (0.57 – 3.57)	0.441

At 0.05 level of significance, no variable was significant.

Research Question 2: Univariable Logistic Regression Analysis: Association Between Socio-demographic Factors, Level of Knowledge, Cultural Beliefs, Stigma, TB Seriousness, and Men's Quality of TB Services Utilization

I used a univariable logistic regression model to identify statistically significant independent variables at 0.1 level of significance to run a multivariable analysis for effect. From the univariable logistic regression model analyses in Table 11, the results showed that age had a statistically significant negative association with men's quality utilization of TB services (OR = .98, 95% CI [.95 – 1.00], p = .037). This means that one year increase in age was associated with only 2% odds to high quality utilization. As age increases, the odds of men having low quality utilization of TB services also increase. Income level of R1 – R3500 (approximately $195) was found to be a statistically significant predictor of men's quality utilization of TB services (OR = 2.18, 95% CI [1.14 - 4.17], p = .019). Men with an income of R1-R3500 had higher odds (118.0% increase) of having high quality utilization of TB services relative to those with zero income.

Level of TB knowledge was found to be a statistically significant predictor of men's quality utilization of TB services (OR = 3.71, 95% CI [1.61 – 8.55], p = < .01). Men with high level of TB knowledge had higher odds (271.0% increase) of having high quality utilization of TB services relative to those with low level of TB knowledge. Marital status, education level, cultural beliefs, stigma, and TB seriousness were not found to be statistically significant predictors of men's quality utilization of TB services.

Table 11

Research Question 2: Univariable Logistic Regression Model Analysis: Association Between Socio-demographic Factors, Level of TB Knowledge, Cultural Beliefs, Stigma, TB Seriousness, and Men's Quality Utilization of TB Services

Variable	Level	Low-quality utilization	High-quality utilization	OR (95% CI)	P-value
Age in years, median (IQR)		39 (19)	38 (13)	0.98 (0.95 – 1.00)	0.037*
	Single	62 (53.91)	47 (55.29)	1	
Marital status	Married	36 (31.30)	28 (32.94)	1.03 (0.55 - 1.91)	0.936
	Separated/widowed	17 (14.78)	10 (11.76)	0.78 (0.33 – 1.85)	0.567
Education level completed	None	7 (6.09)	8 (9.41)	1	
	Primary	12 (10.43)	8 (9.41)	0.58 (0.15 – 2.26)	0.435
	Secondary	82 (71.30)	58 (68.24)	0.62 (0.21 - 1.80)	0.379
	Tertiary	14 (12.17)	11 (12.94)	0.69 (0.19 – 2.49)	0.568
Level of income	No income	66 (57.39)	37 (43.53)	1	
	R1 – R3500	27 (23.48)	33 (38.82)	2.18 (1.14 – 4.17)	0.019*
	R3501 – R6000	11 (9.57)	12 (14.12)	1.95 (0.78 – 4.84)	0.152
	>R6000	11 (9.57)	3 (3.53)	0.49 (0.13 – 1.86)	0.291
Level of TB knowledge	Low	32 (27.83)	8 (9.41)	1	
	High	83 (72.17)	77 (90.59)	3.71 (1.61 – 8.55)	0.002**
Cultural beliefs	No	97 (84.35)	74 (87.06)	1	
	Yes	18 (15.65)	11 (12.94)	0.80 (0.36 – 1.80)	0.591
Stigma	No	83 (72.17)	67 (78.82)	1	
	Yes	32 (27.83)	18 (21.18)	0.70 (0.36 – 1.35)	0.284
	Not very serious	4 (3.48)	5 (5.88)	1	
TB seriousness	Somewhat serious	4 (3.48)	11 (12.94)	2.2 (0.38 – 12.57)	0.375
	Very serious	107 (93.04)	69 (81.18)	0.52 (0.13 – 1.99)	0.336

* = 0.1 level of significance; ** = statistically significant at $p = < .01$ level

Research Question 2: Multivariable Logistic Regression Model Analysis to Assess the Null Hypothesis: Association Between Socio-demographic Factors, Level of Knowledge, Cultural Beliefs, Stigma, TB Seriousness, and Men's Quality of TB Services Utilization

I used a multivariable logistic regression model to assess the null hypothesis (see Table 12). At 0.05 level of significance, income level and TB knowledge were associated with men's quality utilization of TB services. The income level of R1-R3500 had a statistically significant positive association with men's quality utilization of TB services. Men with an income of R1 – R3500 had higher odds (128.0% increase) of having high quality utilization relative to those with zero income after adjusting for age, marital status, education levels, TB knowledge, cultural beliefs, stigma, and TB seriousness (OR = 2.28, 95% CI [1.09 - 4.75], p = .028). Level of knowledge was found to be a statistically significant predictor of men's quality utilization of TB services. Men with high level of TB knowledge had higher odds (306.0%) of having high quality utilization of TB services relative to those with low TB knowledge after adjusting for age, marital status, education levels, income levels, cultural beliefs, stigma, and TB seriousness (OR = 4.06, 95% CI [1.61 – 10.19], p = < .01). Therefore, the null hypothesis was rejected.

Table 12

Research Question 2: Multivariable Logistic Regression Model Analysis to Assess the Null Hypothesis: Association Between Socio-demographic Factors, Level of TB Knowledge, Cultural Beliefs, Stigma, TB Seriousness, and Men's Quality Utilization of TB Services

Variable	Level	Low-quality utilization	High-quality utilization	OR (95% CI)	P-value
Age in years, median (IQR)		39 (19)	38 (13)	0.97 (0.94 – 1.00)	0.075
Marital status	Single	62 (53.91)	47 (55.29)	1	
	Married	36 (31.30)	28 (32.94)	1.34 (0.60 - 2.99)	0.474
	Separated/widowed	17 (14.78)	10 (11.76)	0.81 (0.27 – 2.47)	0.715
Education level completed	None	7 (6.09)	8 (9.41)	1	
	Primary	12 (10.43)	8 (9.41)	0.40 (0.08 – 1.99)	0.265
	Secondary	82 (71.30)	58 (68.24)	0.61 (0.18 – 2.03)	0.420
	Tertiary	14 (12.17)	11 (12.94)	0.54 (0.12 – 2.39)	0.418
Level of income	No income	66 (57.39)	37 (43.53)	1	
	R1 – R3500	27 (23.48)	33 (38.82)	2.28 (1.09 – 4.75)	0.028*
	R3501 – R6000	11 (9.57)	12 (14.12)	1.90 (0.70 – 5.20)	0.208
	>R6000	11 (9.57)	3 (3.53)	0.59 (0.13 – 2.69)	0.493
Level of TB knowledge	Low	32 (27.83)	8 (9.41)	1	
	High	83 (72.17)	77 (90.59)	4.06 (1.61 – 10.19)	0.003**
Cultural beliefs	No	97 (84.35)	74 (87.06)	1	
	Yes	18 (15.65)	11 (12.94)	1.15 (0.45 – 2.95)	0.774
Stigma	No	83 (72.17)	67 (78.82)	1	
	Yes	32 (27.83)	18 (21.18)	0.74 (0.36 – 1.56)	0.433
TB seriousness	Not very serious	4 (3.48)	5 (5.88)	1	
	Somewhat serious	4 (3.48)	11 (12.94)	1.99 (0.29 – 13.58)	0.480
	Very serious	107 (93.04)	69 (81.18)	0.37 (0.08 – 1.67)	0.194

* = 0.05 level of significance; ** = statistically significant at $p = < .01$ level

Research Question 2: Multivariable Logistic Regression Model Analysis to Assess the Effect: Association Between Age, Level of Knowledge, and Men's Quality of TB Services Utilization

I used a stepwise approach to do a multivariable logistic regression model analysis to assess the effect. I selected the independent variables that were considered significant at univariable stage in Table 11 (at 0.1 level of significance) to build a stepwise multivariable logistic regression model. Any independent variable that did not improve the model fit between the study outcome and the first independent variable (one with smallest *p*-value at univariable stage) was removed from the model. Although income level of R1 – R3500 in Table 11 was statistically significant at $p = 0.019$, it did not improve the model between TB knowledge, and men's quality of TB services utilization, hence it was excluded from the analysis.

The results in Table 13 showed that age was not a statistically significant predictor of men's quality of TB services utilization adjusted for knowledge (OR = 0.98, 95% CI [0.95 – 1.00], $p = 0.056$). Thus, one year increase in age was associated with 0.98 odds (2%) to high quality utilization of TB services adjusted for TB knowledge. However, level of TB knowledge was a significant predictor of high-quality utilization of TB services after adjusting for age (OR = 3.59, 95% CI [1.55 – 8.32], $p = <0.01$). These results suggest that men with higher levels of TB knowledge had higher odds (259% increase) of having high-quality utilization of TB services relative to men with low TB knowledge in the Zululand district of KZN province, South Africa.

Table 13

Research Question 2: Multivariable Logistic Model Analysis to Assess the Effect: Association Between Age, Level of TB Knowledge, and Men's Quality Utilization of TB Services

Variable	Level	Low-quality utilization	High-quality utilization	OR (95% CI)	P-value
Age in years, median (IQR)		39 (19)	38 (13)	0.98 (0.95 – 1.00)	0.056
Level of TB knowledge	Low	32 (27.83)	8 (9.41)	1	
	High	83 (72.17)	77 (90.59)	3.59 (1.55 – 8.32)	0.003**

* = 0.05 level of significance; ** = statistically significant at p = < .01 level

Research Question 3: Univariable Logistic Regression Model Analysis: Association Between Health Facility Distance, Mode of Transportation, Income, and Men's Geographical Access to TB Services

I used a univariable logistic regression model to analyze the data and entered each independent variable in the equation individually (univariable analysis). In Table 14, the participants' age median (IQR) was 39 (17) in the poor geographical access group and 38 (15) in the good geographical access group, with no statistically significant difference found between the two groups (OR = .99, 95% CI [0.96 – 1.01], p = .279). In terms of travel time to facility, those who had a travel time of 20-60 minutes (OR = .37, 95% CI [0.16 – 0.87], p = .022) and over 60 minutes (OR = .00, 95% CI [0.00 – 0.03], p < 0.001) had lower odds of accessing TB services relative to participants who had a travel time of less than 20 minutes. Regarding the mode of transport, participants who used public transport had lower odds of accessing TB services (OR = .33, 95% CI [0.16 – 0.69], p = .003) relative to those who walked. There was no statistically significant difference in TB

service access between those who used an ox cart, bicycle, or personal car relative to those who walked.

In terms of income, those in the R1 - R3500 income level had a significant trend of higher odds (92.0%) of accessing TB services (OR = 1.92, 95% CI [0.94 – 3.95], p = .075) relative to those with no income. Those >R6000 income level had a non-significant trend of higher odds (251.0%) of accessing TB services (OR = 3.51, 95% CI [0.74 – 16.52], p = .112) relative to those with no income. There was no statistically significant difference in TB service access between those in the R3501 - R6000 income level relative to those with no income.

Table 14

Research Question 3: Univariable Logistic Regression Model Analysis: Association Between Travel Time to Facility, Mode of Transport, Income, and Men's Geographical Access to TB Services

Variable	Level	Poor Geographical access	Good Geographical access	OR (95% CI)	P-value
Age in years, median (IQR)		39 (17)	38 (15)	0.99 (0.96 – 1.01)	0.279
Travel time to the facility	< 20 minutes	9 (14.75)	74 (53.24)	1	
	20 – 60 minutes	21 (34.43)	64 (46.04)	0.37 (0.16 – 0.87)	0.022*
	+60 minutes	31 (50.82)	1 (0.72)	0.00 (0.00 – 0.03)	<0.001 **
Mode of transport	Walking	12 (19.67)	54 (38.85)	1	
	Ox cart	1 (1.64)	1 (0.72)	0.22 (0.01 - 3.81)	0.300
	Bicycle	3 (4.92)	8 (5.76)	0.59 (0.14 – 2.57)	0.484
	Public transport	42 (68.85)	62 (44.60)	0.33 (0.16 – 0.69)	0.003*
	Personal car	3 (4.92)	14 (10.07)	1.04 (0.26 – 4.18)	0.959
Income Level	No income	38 (62.30)	65 (46.76)	1	
	R1 - R3500	14 (22.95)	46 (33.09)	1.92 (0.94 – 3.95)	0.075*
	R3501 – R6000	7 (11.48)	16 (11.51)	1.34 (0.50 – 3.54)	0.560
	>R6000	2 (3.28)	12 (8.63)	3.51 (0.74 – 16.52)	0.112

* = 0.1 level of significance; ** = statistically significant at p = < .01 level

Research Question 3: Multivariable Logistic Regression Model Analysis to Assess the Null Hypothesis: Association Between Health Facility Distance, Mode of Transportation, Income, and Men's Geographical Access to TB Services

I used a multivariable logistic regression model in Table 15 to assess the null hypothesis. At 0.05 level of significance, travel time to facility of 20-60 minutes (OR = .36, 95% CI [0.13 – 0.96], p = .042) and over 60 minutes (OR = .00, 95% CI [0.00 – 0.03], $p < 0.001$) had lower odds of accessing TB services relative to participants who had a travel time of less than 20 minutes to the facility adjusted for age, mode of transport and income level. There was no statistical significance difference in TB services geographical access between the different modes of transport (ox cart, bicycle, public transport, personal car), relative to participants who walked adjusted for age, travel time, and income levels. There was no statistically significant difference in TB service geographical access between the different levels of income relative to participants with no income adjusted for age, travel time, and mode of transport. Therefore, the null hypothesis was rejected.

Table 15

Research Question 3: Multivariable Logistic Regression Model Analysis to Assess the Null Hypothesis: Association Between Travel Time to Facility, Mode of Transport, Income, and Men's Geographical Access to TB Services

Variable	Level	Poor Geographical access	Good Geographical access	OR (95% CI)	P-value
Age in years, median (IQR)		39 (17)	38 (15)	0.99 (0.97 – 1.03)	0.943
Travel time to the facility	< 20 minutes	9 (14.75)	74 (53.24)	1	
	20 – 60 minutes	21 (34.43)	64 (46.04)	0.36 (0.13 – 0.96)	0.042*
	+60 minutes	31 (50.82)	1 (0.72)	0.00 (0.00 – 0.03)	<0.001*
Mode of transport	Walking	12 (19.67)	54 (38.85)	1	
	Ox cart	1 (1.64)	1 (0.72)	0.09 (0.00 – 1.82)	0.117
	Bicycle	3 (4.92)	8 (5.76)	0.25 (0.04 – 1.61)	0.145
	Public transport	42 (68.85)	62 (44.60)	0.49 (0.17 – 1.39)	0.180
	Personal car	3 (4.92)	14 (10.07)	0.71 (0.13 – 3.85)	0.689
Income Level	No income	38 (62.30)	65 (46.76)	1	
	R1 - R3500	14 (22.95)	46 (33.09)	2.12 (0.78 – 5.76)	0.139
	R3501 – R6000	7 (11.48)	16 (11.51)	0.96 (0.29 – 3.14)	0.111
	>R6000	2 (3.28)	12 (8.63)	10.04 (0.59 – 171.48)	0.111

* = 0.05 level of significance; ** = statistically significant at $p = < .01$ level

Research Question 3: Multivariable Logistic Regression Model Analysis to Assess the Effect: Association Between Health Facility Distance, Mode of Transportation, Income, and Men's Geographical Access to TB Services

I used a stepwise logistic regression approach to assess the effect. Although income level of R1 – R3500 in Table 14 was statistically significant at $P = .075$ during univariable analysis, it did not improve the model fit between the first independent variable with the smallest value and the outcome variable (travel time of > 60 minutes with $p = <0.01$), and the outcome (geographical access of TB services), therefore, it was excluded in the analysis. The results in Table 16 showed that age was not a significant predictor of men's geographical access to TB services after adjusting for travel time and mode of transport (OR = 1.01, 95% CI [0.97 – 1.04], p .696). However, as age increases, the odds of men accessing the facilities were lower.

In terms of travel time to facility, participants who had a travel time of 20-60 minutes (OR = .36, 95% CI [0.14 – 0.96], $p = .041$) and over 60 minutes (OR = .00, 95% CI [0.00 – 0.03], $p < 0.001$) had lower odds of accessing TB services relative to those who had a travel time of less than 20 minutes, adjusted for age and mode of transport. The participants with > 60 minutes travel time were associated with 99.6% decrease in odds to access to TB services relative to those with < 20 minutes travel time adjusted for age and mode of transport. Regarding the mode of transport, there was no statistically significant difference in TB services access between those who used an ox cart, bicycles, public transport, or personal car relative to those who walked adjusted for age and travel time.

Table 16

Research Question 3: Multivariable Logistic Regression Model Analysis to Assess the Effect: Association Between Age, Travel Time to Facility, Mode of Transport, and Men's Geographical Access to TB Services

Variable	Level	Poor Geographical access	Good Geographical access	OR (95% CI)	P-value
Age in years, median (IQR)		39 (17)	38 (15)	1.01 (0.97 – 1.04)	0.696
Travel time to the facility	< 20 minutes	9 (14.75)	74 (53.24)	1	
	20 – 60 minutes	21 (34.43)	64 (46.04)	0.36 (0.14 – 0.96)	0.041 *
	+60 minutes	31 (50.82)	1 (0.72)	0.00 (0.00 – 0.03)	<0.001**
Mode of transport	Walking	12 (19.67)	54 (38.85)	1	
	Ox cart	1 (1.64)	1 (0.72)	0.08 (0.00 -1.71)	0.107
	Bicycle	3 (4.92)	8 (5.76)	0.33 (0.05 – 2.00)	0.229
	Public transport	42 (68.85)	62 (44.60)	0.53 (0.19 – 1.44)	0.213
	Personal car	3 (4.92)	14 (10.07)	0.80 (0.15– 4.35)	0.797

* = 0.05 level of significance; ** = statistically significant at p = < .01 level

Summary

In descriptive statistics, most patients felt that HCWs were friendly, respectful, and supportive. Given a choice, most of them would prefer to be seen by a male HCW. The majority indicated waiting times were acceptable, and service time being convenient. Only a few were referred to other HCFs for TB care and relevant staff were mostly available. Indicative of good attitudes from the HCWs and acceptable processes and systems.

Forty-nine of the respondents self-reported TB treatment intermittent interruption. The reasons for intermittent treatment interruption were mainly forgetfulness and travel. The Patients require the establishment of different triggers as reminders when home and during travel.

Several variables including HCW's attitudes, HCW gender preference, and facility processes were tested for any association with men's quality utilization of TB services. The results showed that none of the variables were significantly associated with men's quality utilization of TB services. These findings suggest that these factors may not play a significant role in determining men's quality utilization of TB services. However, further research is needed to confirm these results and explore other potential factors that may influence men's utilization of TB services.

The results suggest that age, income level of R1 – R3500, and level of TB knowledge are important factors that affect men's quality utilization of TB services in the Zululand district of KZN province in South Africa. Healthcare providers and policymakers should take these factors into consideration when designing TB program interventions and research aimed at improving men's quality utilization of TB services.

Furthermore, the results suggested that those who had a travel time to the facility of 20-60 minutes and over 60 minutes had lower odds of good geographical access to TB services than those who had a travel time of less than 20 minutes. The DOH should consider partnering with other local TB-related community organizations to offer most of the TB services in the community where people live to promote access.

Regarding the mode of transport, participants who used public transport had lower odds of accessing TB services compared to those who walked. There was no statistically significant difference in TB service access between those who used an ox cart, bicycle, or personal car compared to those who walked.

In Chapter 5, I will discuss the results and interpret them according to the literature reviewed and the theoretical frameworks, share the study's limitations, make recommendations, describe the implications for positive social change, and provide the study's conclusion.

Chapter 5: Discussion, Conclusions, and Recommendations

Introduction

In Chapter 5, I will discuss the results and interpret them according to the literature reviewed and the theoretical framework. I will share the study's limitations, make recommendations, describe the implications for positive social change, and provide the study's conclusion. Although there is a general decline in TB incidence and mortality, TB remains a public health threat globally and in South Africa, affecting more men than women (WHO, 2020). Despite evidence-based strategies to prevent and control TB globally and the availability of free TB services in South Africa, more men are dying of TB (Loveday et al., 2019; WHO, 2020). The Zululand district faces a similar situation (DOH, 2018; StatsSA, 2019). Several kinds of literature included evidence for the need to focus on men to prevent and control TB. Men's susceptibility, exclusion, and marginalization have globally contributed to poor TB outcomes (Chikovore et al., 2020; Chinouya and Adeyanju, 2017; Loveday et al., 2019; Seidu, 2020).

The purpose of this quantitative study was to assess the factors that affect men's geographical access and quality utilization of TB services in the Zululand district of KZN province in South Africa. Specifically, my goal was to explore any relationship between HCWs' attitudes (like friendliness, respect, and support), HCWs' gender, HCFs processes (waiting time, service hours, referrals to other facilities, and availability of required HCWs), and men's quality of TB services utilization. Secondly, I examined any association between age, level of education, level of income, marital status, level of TB knowledge, cultural beliefs, stigma, TB seriousness, and men's quality of TB services

utilization. Lastly, I determined the relationship between travel time to the health facility, mode of transportation, income, and men's geographical access to TB services.

In this study, I collected and analyzed data from a total of 200 participants using descriptive and inferential statistics. The results for RQ1 showed that none of the variables were significantly associated with men's quality utilization of TB services at the $p < .05$ level of significance. The variables' values were as follows; friendliness (p = .423), respect (p = .748), support (p = .760), choice of healthcare worker's gender (p = .831), waiting time (*sometimes* p = .961, *usually* p = .823, *always* p = .669), service time convenience (s*ometimes* p = .419, *usually* p = .308, *always* p =. 520), referrals (*sometimes* p = .756, *usually* p = .807, *always* p =. 214), and availability of required HCWs (*sometimes* p = .894, *usually* p = .730, *always* p =. 242) were not significantly associated with men's quality utilization of TB services. These findings suggest that these factors may not play a significant role in determining men's quality utilization of TB services. However, further research is needed to confirm these results and explore other potential factors that may influence men's utilization of TB services.

The results for the RQ2 showed that age had a statistically significant negative association with men's quality utilization of TB services (OR = .98, 95% CI [.95 – 1.00], p = .037). This means that as age increases, the odds of men having low quality utilization of TB services also increase. Income level of R1 to R3500 (approximately $195) was found to be a statistically significant predictor of men's quality utilization of TB services (OR = 2.18, 95% CI [1.14 - 4.17], p = .019). Men with an income of R1-R3500 had higher odds of having high quality utilization of TB services compared to

those with zero income. Level of TB knowledge was found to be a statistically significant predictor of men's quality utilization of TB services (OR = 3.71, 95% CI [1.61 – 8.55], *p* = < .01). Men with high level of TB knowledge had higher odds of having high quality utilization of TB services compared to those with low level of TB knowledge. Marital status, education level, cultural beliefs, stigma, and TB seriousness were not found to be statistically significant predictors of men's quality utilization of TB services.

A multivariable logistic regression model for RQ2 to assess the null hypothesis showed that income level and TB knowledge were associated with men's quality utilization of TB services. The income level of R1-R3500 had a statistically significant positive association with men's quality utilization of TB services. Men with an income of R1-R3500 had higher odds (128.0% increase) of having high quality utilization relative to those with zero income after adjusting for age, marital status, education levels, TB knowledge, cultural beliefs, stigma, and TB seriousness (OR = 2.28, 95% CI [1.09 - 4.75], *p* = .028). Level of knowledge was found to be a statistically significant predictor of men's quality utilization of TB services. Men with high level of TB knowledge had higher odds (306.0% increase) of having high quality utilization of TB services relative to those with low TB knowledge after adjusting for age, marital status, education levels, income levels, cultural beliefs, stigma, and TB seriousness (OR = 4.06, 95% CI [1.61 – 10.19], *p* = < .01). Therefore, the null hypothesis was rejected.

I used a stepwise logistic regression approach in RQ2 to assess the effect of the associated variables. Although income level of R1-R3500 was statistically significant at *p* = 0.019 during the univariable analysis, it did not improve the model between TB

knowledge and men's quality of TB services utilization hence it was excluded from the analysis. The results showed that age was not a statistically significant predictor of men's quality of TB services utilization adjusted for knowledge (OR = 0.98, 95% CI [0.95 – 1.00], p = 0.056). Thus, one year increase in age was associated with 0.98 odds (2.0%) to high quality utilization of TB services adjusted for TB knowledge. However, level of TB knowledge was a significant predictor of high-quality utilization of TB services after adjusting for age (OR = 3.59, 95% CI [1.55 – 8.32], p = <0.01). These results suggest that men with higher levels of TB knowledge had higher odds (259.0% increase) of having high-quality utilization of TB services relative to men with low TB knowledge in the Zululand district of KZN province, South Africa.

For RQ3, I used a univariable analysis and the participants' age median (IQR) was 39 (17) in the poor geographical access group and 38 (15) in the good geographical access group, with no statistically significant difference found between the two groups (OR = .99, 95% CI [0.96 – 1.01], p = .279). In terms of travel time to facility, those who had a travel time of 20-60 minutes (OR = .37, 95% CI [0.16 – 0.87], p = .022) and over 60 minutes (OR = .00, 95% CI [0.00 – 0.03], p < 0.001) had lower odds of accessing TB services than those who had a travel time of less than 20 minutes. Regarding the mode of transport, participants who used public transport had lower odds of accessing TB services (OR = .33, 95% CI [0.16 – 0.69], p = .003) relative to those who walked. There was no statistically significant difference in TB service access between those who used an ox cart, bicycle, or personal car relative to those who walked. In terms of income, those in the R1-R3500 income level had a significant trend of higher odds of accessing TB

services (OR = 1.92, 95% CI [0.94 – 3.95], p = .075) relative to those with no income. Those >R6000 income level had a non-significant trend of higher odds (251.0%) of accessing TB services (OR = 3.51, 95% CI [0.74 – 16.52], p = .112) relative to those with no income. There was no statistically significant difference in TB service geographical access between those in the R3501 - R6000 income levels relative to those with no income.

In RQ3, I used a multivariable logistic regression model to assess the null hypothesis. At 0.05 level of significance, travel time to facility of 20 to 60 minutes (OR = .36, 95% CI [0.13 – 0.96], p = .042) and over 60 minutes (OR = .00, 95% CI [0.00 – 0.03], $p < 0.001$) had lower odds of accessing TB services relative to participants who had a travel time of less than 20 minutes to the facility adjusted for age, mode of transport and income level. There was no statistical significance difference in TB services geographical access between the different modes of transport (ox cart, bicycle, public transport, and personal car) relative to participants who walked adjusted for age, travel time, and income levels. There was no statistically significant difference in TB service geographical access between the different levels of income relative to participants with no income adjusted for age, travel time, and mode of transport. Therefore, the null hypothesis was rejected.

Finally, in RQ3, I used a stepwise logistic regression approach to assess the effect of the associated variables, and although income level of R1-R3500 was statistically significant at p = .075 during univariable analysis, it was excluded in the analysis because it did not improve the model. The results showed that age was not a significant predictor

of men's geographical access to TB services after adjusting for travel time and mode of transport (OR = 1.01, 95% CI [0.97 – 1.04], *p* .696). However, as age increases, the odds of men accessing the facilities were lower. In terms of travel time to facility, participants who had a travel time of 20-60 minutes (OR = .36, 95% CI [0.14 – 0.96], *p* = .041) and over 60 minutes (OR = .00, 95% CI [0.00 – 0.03], *p* < 0.001) had lower odds of accessing TB services relative to those who had a travel time of less than 20 minutes, adjusted for age and mode of transport. The participants with > 60 minutes travel time were associated with 99.6% decrease in odds to access to TB services relative to those with < 20 minutes travel time adjusted for age and mode of transport. Regarding the mode of transport, there was no statistically significant difference in TB services access between those who used an ox cart, bicycles, public transport, or personal car relative to those who walked adjusted for age and travel time.

Interpretation of findings

Interpretation of findings in Relation to Literature Reviewed

The socio-demographic characteristics of the study participants included age, level of education, employment status, level of income, and marital status. On the age categories, most men (37.5%) were in the age category of 35 to 44 years, confirming the most affected age group by TB and HIV disease burden (WHO, 2020). In a previous study, advanced age and level of education were associated with the utilization of health services as people tend to be more knowledgeable about TB (Bashorun et al., 2020; Gautam et al., 2021; Suleiman et al., 2021). Suleiman et al. (2021) indicated that the level of knowledge and awareness influenced health-seeking behavior toward TB. Bashorun et

al. (2020) further suggested that the level of education and TB knowledge led to 83.7% of respondents appropriate health-seeking behavior concerning TB. Literature also highlighted barriers to early diagnosis and treatment due to poverty (Dong et al., 2019; Gautam et al., 2021). The findings in this study showed that age, income level of R1-R3500, and level of knowledge were significantly associated with the quality utilization of TB services, supporting earlier findings of other studies as above. These findings may have influenced their health-seeking behavior.

In this study, most men attained secondary education (70.0%), 12.5% tertiary level, 10.0% primary level, and 7.5% had no formal education. These results support earlier findings that educated people are more likely to seek and utilize TB services than those less educated (Bashorun et al., 2020; Gautam et al., 2021; Suleiman et al., 2021). The Zululand district data indicated that 39.8% attained secondary school level. Although most of the men were single (54.5%), while 32.0% were married or living with a partner, and 13.5% were either separated or divorced, marital status had no relationship with the quality utilization of TB services. Most men were unemployed (49.0%), while 42.0% were employed, 6.5% were retired, and 2.5% were students. The finding on unemployment rate was like the district's earlier results of 51.0% (DOH, 2018).

Most participants had no income (51.5%), while 30.0% indicated R3500 and below, 11.5% R3501 to R6000, 4.0% R6001 to R9000, and only 3.0% indicated more than R9000. Generally, lack of income affects several factors, including transportation to HCF and nutrition for TB patients. This finding supports the 2019 findings that 83.0% lived below the upper-bound poverty line in this district and 69.9% below the lower-

bound poverty line (Department of Cooperative Governance & Traditional Affairs, 2020). It confirms that TB is a disease of the poor with financial difficulty (WHO, 2020). Poverty contributes to TB and HIV, as poor nutrition leads to compromised immunity and access to HCF (DOH, 2015; Pedrazzoli et al., 2017).

Chen et al. (2019) indicated that socio-cultural factors contribute to delayed diagnosis and may affect treatment. In this study, 14.5% of the respondents believed that TB is caused by witchcraft or it's a form of ancestral punishment, which could have affected their timing to access TB services, as 7.0% were diagnosed after more than 8 weeks of the onset of TB symptoms. The delay in this instance could have been both at the individual and health facility levels. Although TB is preventable and curable, the TB care cascade is complex from diagnosis, treatment, retention in care, and cure (Naidoo et al., 2017a). Pai and Temesgen (2018) indicated that the public health systems missed 40.0% of TB-affected people annually, with compromised quality of care and poor access to quality diagnostic services, treatment, and care.

Distance is a significant predictor of health services utilization (Seidu,2020; Shao et al., 2018; Travers et al., 2020). Most respondents indicated travel time to the health facility of between 20 and 60 minutes (42.5%), 41.5% were less than 20 minutes, and 16.0% for over 60 minutes. Those who had a travel time of 20-60 minutes and over 60 minutes had lower odds of accessing TB services than those who had a travel time of less than 20 minutes. Regarding the mode of transport, participants who used public transport had lower odds of accessing TB services compared to those who walked. Although most respondents used public transport, most were unemployed and without income. Li et al.

(2020) indicated that the cost of travel to health facilities hindered utilization of services. It was essential to know that 41.5% took less than 20 minutes to get to the facility on different modes of transport, and 33.0% walked, and these groups had high odds of accessing the health facilities. Although walking might be time-consuming, and depends on how sick one is, it is cheap as it does not require money.

Adherence to TB medication is crucial for good TB outcomes. In this study, 49 men (24.5%) self-reported that they missed a dose of TB treatment (intermittent treatment interruption), which might be a bigger problem than reported. The most common factor was that they forgot (51.0%), followed by those that traveled (49.0%). Pedrazzoli et al. (2017) found high transportation costs to collect medication as a main cause of treatment interruption. For this study, descriptive data showed that only 12.4% indicated high transportation costs as a cause despite having a high unemployment rate (49.0%) and no income (51.5%). Lack of funds to collect medication, side effects, and improved symptoms were important factors (Pedrazzoli et al., 2017). Other previous studies indicated low adherence to TB medication with increased loss to follow-up in men (Chen et al., 2019; Chikovore et al., 2020). In this study, medication side effects contributed 8.2%, and improved symptoms 4.1%. Therefore, it is critical to develop functional adherence support systems, including trigger systems.

In this study, most of the respondents felt supported by their communities (38.5%), 34.0% felt the community members were friendly although they tried to avoid them, and 27.5 felt stigmatized by the community. Fifty (25.0%) respondents experienced stigma in different settings; 22.5% were from the community, 7.5% from home, 6.0%

from work, and 6.0% from the health care facility. Earlier findings indicated that delayed TB diagnosis, treatment, and control were associated with stigma (Chikovore et al., 2020; Macintyre et al., 2017). In this study, most respondents felt that the stigma levels of TB and HIV were the same (40.5%), 39.5% felt that TB was more stigmatized, and 19.0% thought it was less stigmatized. This finding relates to a belief that TB disease is a confirmatory diagnosis for HIV, and it fuels stigma in the community (Hatherall et al., 2019). There is a cultural belief that TB is confused with HIV (Watermeyer & Penn, 2019). Another study found that stigma delayed diagnosis and lead to secrecy and depression (Chinouya & Adeyanju, 2017). In this study, 75.0% of the participants did not experience stigma.

Many respondents (85.0%) indicated that HIV patients should be concerned about TB because they are most likely to get it (75.5%), 15.0% gave other responses, and 9.5% didn’t know the reason for concern. The respondents' understanding of the importance of TB and HIV integration is crucial. The Zululand district HIV prevalence was 48.4% and ranked number one in the country, with a TB and HIV coinfection rate of 83.8% and with 71.0% mortality rate in MDR TB patients coinfected with TB (DOH, 2018; Simbayi et al., 2019; StatsSA, 2019). Therefore, understanding both TB and HIV diseases is crucial for this community.

Despite having no statistically significant relationship between HCWs' attitudes (like friendliness, respect, and support), HCWs' gender, HCFs processes (waiting time, service hours, referrals to other facilities, and availability of required HCWs), and men's quality of TB services utilization, the respondent's descriptive data were positive. They

highly felt supported and indicated that the HCWs were friendly and respectful. The health facilities' processes like waiting time, service hours, referrals, and availability of required HCWs, were acceptable at different levels, with minority numbers finding these parameters unacceptable. Previous studies indicated that access and quality utilization of TB services depends on money for transportation, staff attitudes, availability of resources, distance, HCWs' level of knowledge, service hours, waiting time, and referral systems (Dassah et al., 2018; Suleiman, 2021).

Many respondents also said that given a choice, they would prefer to be seen by male HCWs (61.5%), which fits into the Zulu culture of listening more to fellow men than women (see Daniels et al', 2021). It is a masculine social factor where men feel safe and respected when supported by fellow men (see Daniels et al., 2021). Mbokazi et al. (2020) stipulated the need to increase male involvement by hiring male HCWs, creating male-friendly services like male-only clinics, and integrating services with other dominant areas of male care like TB, HIV, substance abuse, and voluntary circumcision. The researcher further indicated that these interventions would increase male involvement and motivation but requires cost-effective analyses determination before implementation (Mbokazi et al., 2020). Further studies are required to explore this subject.

Interpretation of Findings in Relation to Theoretical Framework

The theories and concepts that grounded this study were Andersen's model of health services utilization and the SEM. Andersen's model of health services utilization highlights societal and individual factors that may accelerate or hinder health services

utilization (Andersen & Newman, 1973). The individual determinants have three main groupings: predisposing, enabling, and need for care factors. The predisposing factors included in this study were the socio-demographic factors like age, marital status, income, education, cultural belief, and TB knowledge levels. These factors were crucial (Andersen & Newman, 2005; Seidu, 2020; Shao et al., 2018). Many of these factors provided critical, descriptive analyses. However, age, income, and level of TB knowledge had statistically significant relationships with men's quality utilization of TB services. The enabling factors include income, the geography of facilities (location and distance), cost of services, region (urban or rural), and the need for care factors, which include symptoms of disease, diagnosis, and complications (Andersen & Newman, 2005; Seidu, 2020; Shao et al., 2018). These factors were included in this study, except the cost of service and region, as TB services are free in SA, and the Zululand district is in a rural setting. The analyses verified the poverty in this rural district, and the distances traveled using public transport despite being unemployed with no income. Use of public transport, travel time of 20-60 minutes and travel time of above 60 minutes were found to be predictors to men’s geographical access to TB services.

The societal determinants include the health services system, namely, resources (volume and distribution), and organizational factors, namely, access and structure (Andersen & Newman, 1973, 2005). In this study, the resources included HCWs and TB medication availability, and access as an organizational factor included patient waiting time, health facility service hours, and referrals to other facilities. These factors were included in this study and had no statistically significant relationship with the men's

quality of TB services utilization. However, the descriptive analyses brought important contributions to this study as most respondents confirmed HCWs' availability and friendliness. They also felt respected and supported. The facility processes were accepted at different levels, as earlier described in the previous section. These factors were critical for chronic diseases like TB (see Andersen & Newman, 2005; Seidu, 2020; Shao et al., 2018; Travers et al., 2020).

Additionally, the researcher utilized concepts of the SEM in conjunction with Andersen's model of health services utilization. It indicates that individuals' knowledge, beliefs, and perceptions are determined by their relationship with family, friends, organizational environment, community (cultural beliefs and practices), policies, and health systems (Bronfenbrenner, 1977; Nyasulu et al., 2018; Kilanowski, 2017). In this study, I explored these individual factors, namely, knowledge, education, and cultural beliefs. Family and organizational factors included social support, cultural beliefs, and socio-economic status. The community factors were beliefs, health systems, distances to health facilities, and stigma, and the policy factors were resources, facility service hours, waiting times, referral systems, and facility processes. I explored these factors to determine any influences on men's geographic access and quality of TB services utilization. Most of these constructs are like Andersen’s model of health services utilization and have already been described above. Both these multilayered theories were relevant to answer the research questions. The results have provided an understanding of the factors that accelerate or hinder men's geographic access and quality utilization of TB services at both societal and individual levels.

Limitations of the Study

I limited the study population to men with TB infection, and convenience sampling had potential internal validity issues. I conveniently selected participants from different facilities spread across the five subdistricts in the district to improve validity. Despite using multiple facilities, the research design paused potential threats to external validity, and the generalization of results could only apply to similar settings. Another potential limitation was access to patients with TB for recruitment due to COVID-19 regulations, which included reduced visits to PHC clinics. However, by the time I collected the data, the government had eased restrictions and patients had resumed their routine monthly consultation visits. Also, I allocated adequate time for data collection and managed to gather data from the required sample size.

Recommendations

The study results are crucial with a need for future research in men. Future researchers could use qualitative or mixed methods to acquire more information about men's needs for optimal TB care and outcomes, quality of services, other forms of access, stigma, and socio-economic support. Masculinity issues require further exploration. Although TB and HIV integration guidelines are available, different models are being used on the ground, some providing fragmented care to coinfected patients (see Naidoo et al., 2017a). TB and HIV integration requires further exploration to identify suitable models that optimally support male patients and the public. Suggestions to promote community treatments and management, self-administration of medication, and development of shorter regimens have emerged and require further exploration (see

Keene et al., 2020). These crucial ideas require further research to understand their implications and incorporate men's needs to plan and implement these strategies.

Although TB services are free, other external costs require support from the DOH, Department of Social Development, Department of Agriculture, and Department of Education, especially in rural districts like the Zululand district. It would be imperative to develop socio-economic forums to support these rural communities with food programs and other activities with financial benefits. For example, teaching and funding communities to cultivate their own fruits, vegetables, other staple foods, especially in the first year would promote food security and avert infections like TB. Mobilizing resources from private institutions and other stakeholders is required since COVID-19 has exacerbated the financial situation of many people (see Keena et al., 2020). These initiatives would empower the community and they should be led by themselves for sustainability.

Despite the DOH's current outreach programs, men with chronic diseases like TB require more support. One idea would be to incorporate more male CHWs to support men in the community and deal with issues of masculinity. More TB services are required in the community for easy access for treatment adherence support, counseling, TB contact tracing, screening, and testing (see DOH, 2020a). Although complex, recruiting more male HCWs would potentially deal with other male needs and issues of masculinity. It would require improved incentives to attract male students and qualified male professionals to offer TB services (see Wang et al., 2019). There are recruitment delays

due to a lack of political will, financial commitment, and poor governance and support systems, which are crucial for service delivery (see Schneider et al., 2018).

Proper TB and HIV integration of services at all levels is necessary (see Osman et al., 2021). Health promotion that targets men is crucial in this community, considering their TB and HIV prevalence rates and coinfection high figures. Well-informed men as heads of families should lead these discussions in their households. The involvement of traditional leaders and healers in health promotion is crucial as they are respected in the community. They could hugely help control issues of stigma at all levels. Stakeholders to leverage existing local community men-only meetings for these discussions. Promoting patient-family-centered care is critical. Mobilizing other stakeholders to support income-generating activities, health education, and promotion is necessary (see Murphy et al., 2021). These activities would potentially promote early diagnosis, treatment, and control of TB disease.

At the facility level, promote men-only clinic days, and where applicable, consultations with fellow male HCWs should be encouraged. The HCF should coordinate with community organizations that support TB programs in their area and identify those with medical personnel (clinicians) who could conduct door-to-door patient reviews and deliver their monthly medication. It could reduce loss to follow-up and intermittent treatment interruption. It could prevent other monthly travel to the clinic. However, it would require proper planning. Provide health education about TB to all HCF staff members so that TB patients are not stigmatized. Using the current systems, triggers are required to remind patients about taking their medication. The HCWs should discuss and

share ideas with patients to avoid missing their TB medication doses at home or when they travel, for example, by using family members as treatment buddies or alarm system of their phones.

Implications

There was a statistically significant relationship between age, income level of R1-R3500, TB knowledge, and men's quality of TB services utilization. Those with advanced age, income level of R1-R3500, and more TB knowledge had higher odds of good quality utilization of TB services. For this study, good quality of TB services utilization meant that these men accessed TB services early, were diagnosed within three weeks of the onset of TB symptoms, diagnosed within three clinic visits, and started TB treatment within two days. For this community, positive social changes are critical and include promoting targeted health education to communities, especially to the younger people to seek medical help early once they have TB symptoms to promote early diagnosis and treatment. The Zululand district should create public and private partnerships to introduce community-led poverty-alleviating programs that would provide financial gain to the public. The community would be able to access facilities and utilize services on time. The DOH staff to promote targeted community campaigns to educate communities on TB symptoms, treatment, control, and expectations from the HCFs. Early TB diagnosis and treatment are critical for better TB outcomes and control (see WHO, 2020).

Having 68.5% of respondents diagnosed within three weeks of the onset of symptoms should motivate and encourage HCWs to provide quality care. Proper screening and testing of male patients with TB symptoms are crucial for early diagnosis,

treatment, and control (see Murphy et al., 2021). Early TB diagnosis and treatment would require linkages with other services like laboratory services to find solutions for any issues that may delay diagnosis. Some areas of focus could be training HCWs on quality sputum samples, discussing any sample rejections, finding solutions, where applicable, and referring to other laboratories when specimen volumes are high. Tracing of TB patients for treatment adherence and completion is critical in TB management. Therefore, training and using CHWs to provide other TB care and trace patients in the community is critical.

There were also statistically significant associations between travel time to the health facility of between 20-60 minutes, travel time of > 60 minutes, use of public transport, and men's geographical access to TB services. These travel times were compared to travel time of less than 20 minutes, and use of public transport was compared to walking. These associations highlighted lower odds of good geographical access. Another positive social change would require the community and HCFs' to develop strategies to bring most of the TB services to the community to reduce costs and travel. It would be imperative for the stakeholders to develop socio-economic forums to support these rural communities with food programs and other activities with financial benefits. Mobilizing resources from private institutions and other stakeholders is required for these envisioned initiatives. Finally, an additional positive social change is that the study findings have added to the body of knowledge, especially for men with TB disease in this setting, and there are new opportunities for further research.

Conclusion

TB remains a public health threat globally and in South Africa, affecting more men than women despite the general reduction of TB incidence and mortality rates (WHO, 2020). Although evidence-based strategies to prevent and control TB globally are available, and South Africa offers free TB services, more men die of TB (Loveday et al., 2019; WHO, 2020). Several kinds of literature included evidence for the need to focus on men to prevent and control TB. Men's susceptibility, exclusion, and marginalization have globally contributed to poor TB outcomes (Chikovore et al., 2020; Chinouya and Adeyanju, 2017; Loveday et al., 2019; Seidu, 2020). Despite the existing barriers that affect the general population in accessing and utilizing TB services, there was a need to identify factors that affect men's geographic access and the quality of TB services utilization. These identified factors would guide the stakeholders to develop suitable interventions to contribute to TB prevention, early diagnosis, treatment, and control to achieve better TB outcomes in the Zululand district and in similar settings.

The purpose of this quantitative study was to assess the factors that affect men's geographical access and quality utilization of TB services in the Zululand district of KZN province in South Africa. Specifically, my goal was to explore any relationship between HCWs' attitudes (like friendliness, respect, and support), HCWs' gender, HCFs processes (waiting time, service hours, referrals to other facilities, and availability of required HCWs), and men's quality of TB services utilization. Secondly, I examined any association between age, level of education, level of income, marital status, level of TB knowledge, cultural beliefs, stigma, TB seriousness, and men's quality of TB services

utilization. Lastly, I determined the relationship between travel time to the health facility, mode of transportation, income, and men's geographical access to TB services.

The findings indicated that 42.5% of men (N = 200) had high-quality utilization of TB services. These men accessed TB services early and were diagnosed within three weeks of the onset of TB symptoms, within three clinic visits, and started TB treatment within two days. High-quality utilization of TB services had positive associations with higher levels of TB knowledge and minimal income of R1-R3500. Good geographical access (69.5%) had negative associations with travel time and the use of public transport. Descriptive data showed more characteristics of the sample and there were no missing values. These findings have provided recommendations for men, the public, HCWs and other relevant stakeholders to promote early TB diagnosis, treatment, and control to achieve better TB outcomes. This study has also provided further opportunities for future studies focusing on men with TB because they need support. Tuberculosis remains a priority, and multiple stakeholders must collaborate to deal with its complexities.

References

Abaerei, A. A., Ncayiyana, J., & Levin, J. (2017). Healthcare utilization and associated factors in Gauteng province, South Africa. *Global Health Action, 10*(1), 1305765. https://doi.org/10.1080/16549716.2017.1305765

Adu, P.A., Spiegel, J.M. & Yassi, A. (2021). Towards TB elimination: How are macro-level factors perceived and addressed in policy initiatives in a high burden country? *Global Health 17*. https://doi.org/10.1186/s12992-020-00657-1

Adu, P.A., Yassi, A., Ehrlich, R., & Spiegel, J.M. (2020). Perceived health system barriers to tuberculosis control among health workers in South Africa. *Annals of Global Health*, *86* (1). https://doi.org/10.5334/aogh.2692

Andersen, R. M. (1995). Revisiting the behavioral model and access to medical care: Does it matter? *Journal of Health and Social Behavior, 36*(1), 1–10. https://doi.org/10.2307/2137284

Andersen, R., & Newman, J. F. (1973). Societal and individual determinants of medical care utilization in the United States. *The Milbank Memorial Fund quarterly. Health and Society*, *51*(1), 95–124.

Andersen, R., & Newman, J. F. (2005). Societal and individual determinants of medical care utilization in the United States. *The Milbank Quarterly*, *83*(4). https://doi.org/10.1111/j.1468-0009.2005.00428.x

Babbie, E. (2017) *Basics of social research* (7th ed.). Cengage Learning.

Bamuya, C., Correia, J. C., Brady, E. M., Beran, D., Harrington, D., Damasceno, A., Crampin, A. M., Magaia, A., Levitt, N., Davies, M. J., & Hadjiconstantinou, M.

(2021). Use of the socio-ecological model to explore factors that influence the implementation of a diabetes structured education programme (EXTEND project) in Lilongwe, Malawi and Maputo, Mozambique: a qualitative study. *BMC Public Health*, *21*(1), 1–11. https://doi-org/10.1186/s12889-021-11338-y

Bashorun, A. O., Linda, C., Omoleke, S., Kendall, L., Donkor, S. D., Kinteh, M.-A., Danso, B., Leigh, L., Kandeh, S., D'Alessandro, U., & Adetifa, I. M. O. (2020). Knowledge, attitude and practice toward tuberculosis in Gambia: a nation-wide cross-sectional survey. *BMC Public Health*, *20*(1), 1566. https://doi.org/10.1186/s12889-020-09685-3

Boah, M., Kpordoxah, M. R., & Adokiya, M. N. (2021). Self-reported gender differentials in the knowledge of tuberculosis transmission and curative possibility using national representative data in Ghana. *PloS One*, *16*(7), e0254499. https://doi.org/10.1371/journal.pone.0254499

Boffa, J., Mhlaba, T., Sulis, G., Moyo, S., Sifumba, Z., Pai, M., & Daftary, A. (2020). COVID-19 and tuberculosis in South Africa: A dangerous combination. *SAMJ: South African Medical Journal*, *110*(5), 14–16. https://doi.org/10.7196/SAMJ.2020.v110i5.14747

Bronfenbrenner, U. (1977). Toward an experimental ecology of human development. *American Psychologist, 32*, 5135–31. https://doi.org/10.1037/0003-066X.32.7.513

Burkholder, G. J., Cox, K. A., & Crawford, L. M. (2016). *The scholar-practitioner's guide to research design.* Laureate Publishing.

Calculator.net (n.d.). Sample Size Calculator. https://www.calculator.net/sample-size-calculator.html?type=1&cl=95&ci=5&pp=50&ps=337&x=120&y=22

Centers for Disease Control and Prevention. (2019). *South Africa country profile.* https://www.cdc.gov/globalhivtb/where-we-work/southafrica/southafrica.html

Challenge TB (2011). Reducing delays in TB diagnosis: Data collection tools to evaluate the cause and frequency of TB delays. TB Care Project. http://www.challengetb.org/publications/tools/ua/Data_Collection_Tool_TB_Patient_Delay.pdf

Challenge TB (n.d.). QUOTE TB light tool. *USAID, TBCAP, WHO, CDC, Royal Tropical Institute – The TB coalition for technical assistance.* The Global Health Bureau. https://www.challengetb.org/publications/tools/ua/Quote_TB_Light.pdf

Chen, H., Wang, T., & Cheng, Q. (2019). Gender and time delays in diagnosis of pulmonary tuberculosis: A cross-sectional study from China. *Epidemiology and Infection, 147*, E94. https://doi.org/10.1017/S0950268819000049

Chikovore, J., Pai, M., Horton, K. C., Daftary, A., Kumwenda, M. K., Hart, G., & Corbett, E. L. (2020). Missing men with tuberculosis: the need to address structural influences and implement targeted and multidimensional interventions. *BMJ Global Health*, *5*(5), e002255. https://doi.org/10.1136/bmjgh-2019-002255

Chinouya, M. J., & Adeyanju, O. (2017). A disease called stigma: The experience of stigma among African men with TB diagnosis in London. *Public Health*, *145*, 45–50. https://doi.org/10.1016/j.puhe.2016.12.017

Chiposi, L., Cele, L. P., & Mokgatle, M. (2021). Prevalence of delay in seeking tuberculosis care and the healthcare-seeking behaviour profile of tuberculosis patients in a rural district of KwaZulu Natal, South Africa. *The Pan African Medical Journal, 39*, 27. https://doi.org/10.11604/pamj.2021.39.27.26717

Creswell, J. W., Creswell, J. D. (2018). *Research design: Qualitative, quantitative, and mixed methods* (5th ed.). Sage Publications.

Daniels, J., Medina-Marino, A., Glockner, K., Grew, E., Ngcelwane, N., & Kipp, A. (2021). Masculinity, resources, and retention in care: South African men's behaviors and experiences while engaged in TB care and treatment. *Social Science and Medicine, 270*, 113639. https://doi.org/10.1016/j.socscimed.2020.113639

Dapaah, J. M. (2017). Attitudes and behaviours of health workers and the use of HIV/AIDS health care services. *Nursing Research and Practice, 2017*. https://doi.org/10.1155/2016/5172497

Dassah, E., Aldersey, H., McColl, M. A., & Davison, C. (2018). Factors affecting access to primary health care services for persons with disabilities in rural areas: a "best-fit" framework synthesis. *Global Health Research and Policy*, *3*(1), 1–13. https://doi.org/10.1186/s41256-018-0091-x

Datiko, D. G., Jerene, D., & Suarez, P. (2020). Patient and health system delay among TB patients in Ethiopia: Nationwide mixed-method cross-sectional study. *BMC Public Health*, *20*(1), 1–10. https://doi.org/10.1186/s12889-020-08967-0

Department of Cooperative Governance & Traditional Affairs. (2020). *District Profile Zululand 2020*. https://www.cogta.gov.za/ddm/wp-content/uploads/2020/08/DistrictProfile_ZULULAND08072020-1.pdf

Department of Health. (2015). *KwaZulu natal strategic plan 2015 – 2019.* http://www.kznhealth.gov.za/Strategic-Plan-2015-2019.pdf

Department of Health. (2018). *Zululand district health plan 2018/19 - 2020/21*. http://www.health.gov.za/DHP201821/kwazulu_Natal/Zululand

Department of Health. (2019). *A rural hospital's TB charts' analysis*. Unpublished manuscript. Zululand Health District.

Department of Health. (2020a). *KwaZulu natal strategic plan 2020 – 2025*. http://www.kznhealth.gov.za/Strategic-plan-2020-2025-rev.pdf

Department of Health. (2020b). *National consolidated guidelines.* https://www.knowledgehub.org.za/system/files/elibdownloads/2020-07/National%20Consolidated%20Guidelines%2030062020%20signed%20PRINT%20v7.pdf

Dong, D., Jiang, W. X., Long, Q., Huang, F., Zhang, H., Chen, J. Y., Xiang, L., Li, Q., Tang, S. L., & Lucas, H. (2019). Impact of an innovative tuberculosis financing and payment model on health service utilization by tuberculosis patients in China: do the poor fare better than the rich? *Infectious Diseases of Poverty*, *8*(1), 44. https://doi.org/10.1186/s40249-019-0559-z

Erlinger, S., Stracker, N., Hanrahan, C., Nonyane, S., Mmolawa, L., Tampi, R., Tucker, A., West, N., Lebina, L., Martinson, N. A., & Dowdy, D. (2019). Tuberculosis

patients with higher levels of poverty face equal or greater costs of illness. *The International Journal of Tuberculosis and Lung Disease*, *23*(11), 1205–1212. https://doi.org/10.5588/ijtld.18.0814

Etikan, I., Musa, S. A., & Alkassim, R. S. (2016). Comparison of convenience sampling and purposive sampling. *American Journal of Theoretical and Applied Statistics, 5* (1–4). https://doi.org/10.11648/j.ajtas.20160501.11

Fink, M., Klein, K., Sayers, K., Valentino, J., Leonardi, C., Bronstone, A., Wiseman, P. M., & Dasa, V. (2020). Objective data reveals gender preferences for patients' primary care physicians. *Journal of Primary Care & Community Health*. https://doi.org/10.1177/2150132720967221

Foster, N., Cunnama, L., McCarthy, K., Ramma, L., Siapka, M., Sinanovic, E., Churchyard, G., Fielding, K., Grant, A. D., & Cleary, S. (2021). Strengthening health systems to improve the value of tuberculosis diagnostics in South Africa: A cost and cost-effectiveness analysis. *PloS One*, *16*(5), e0251547. https://doi.org/10.1371/journal.pone.0251547

Frankfort-Nachmias, C., & Leon-Guerrero, A. (2016). *Social statistics for a diverse society (8th ed.).* Sage Publications.

Frick M. (2017). Funding for tuberculosis research-an urgent crisis of political will, human rights, and global solidarity. *International Journal of Infectious Diseases, 56*, 21–24. https://doi.org/10.1016/j.ijid.2016.11.412

Gautam, N., Karki, R. R., & Khanam, R. (2021). Knowledge on tuberculosis and utilization of DOTS service by tuberculosis patients in Lalitpur District, Nepal. *PloS One*, *16*(1), e0245686. https://doi.org/10.1371/journal.pone.0245686

Glanz, K., Rimer, B. K., & Viswanath, K. (Eds.). (2015). *Health behavior: Theory, research, and practice* (5th ed.). Jossey-Bass.

Hartel, L. A., Yazbeck, A. S., & Osewe, P. L. (2018). Responding to health system failure on tuberculosis in Southern Africa. *Health Systems and Reform*, *4*(2), 93-100. https://doi.org/10.1080/23288604.2018.1441621

Hatherall, B., Newell, J. N., Emmel, N., Baral, S. C., & Khan, M. A. (2019). "Who will marry a diseased girl?" Marriage, gender, and tuberculosis stigma in Asia. *Qualitative Health Research*, *29*(8), 1109–1119. https://doi.org/10.1177/1049732318812427

Heinrich Heine Universitat. (2020). *G*Power 3.1.9.7 for Windows*. https://www.psychologie.hhu.de/arbeitsgruppen/allgemeine-psychologie-und-arbeitspsychologie/gpower

Howell, E. M., Kigozi, N. G., & Heunis, J. C. (2018). Community-based directly observed treatment for TB patients to improve HIV services: a cross-sectional study in a South African province. *BMC health services research*, *18*(1), 255. https://doi.org/10.1186/s12913-018-3074-1

Kang H. (2021). Sample size determination and power analysis using the G*Power software. *Journal of Educational Evaluation for Health Professions*, *18*, 17. https://doi.org/10.3352/jeehp.2021.18.17

Keene, C., Mohr-Holland, E., Cassidy, T., Scott, V., Nelson, A., Furin, J., & Triviño-Duran, L. (2020). How COVID-19 could benefit tuberculosis and HIV services in South Africa. *The Lancet Respiratory Medicine*, *8*(9), 844–846. https://doi.org/10.1016/S2213-2600(20)30311-8

Kigozi, N. G., Heunis, J. C., Engelbrecht, M. C., Janse Van Rensburg, A. P., & 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 toward improved health education. *BMC Public Health*, *17*(1), 1–8. https://doi.org/10.1186/s12889-017-4825-3

Kilanowski J. F. (2017). Breadth of the socio-ecological model. *Journal of Agromedicine*, *22*(4), 295–297. https://doi.org/10.1080/1059924X.2017.1358971

Kimani, E., Muhula, S., Kiptai, T., Orwa, J., Odero, T., & Gachuno, O. (2021). Factors influencing TB treatment interruption and treatment outcomes among patients in Kiambu County, 2016–2019. *PLoS One*, *16*(4), 1–12. https://doi.org/10.1371/journal.pone.0248820

Kollamparambil, U., & Oyenubi, A. (2021). Behavioural response to the Covid-19 pandemic in South Africa. *PloS One*, *16*(4), e0250269. https://doi.org/10.1371/journal.pone.0250269

Kyonka E. (2018). Tutorial: Small-N Power Analysis. *Perspectives on Behavior Science*, *42*(1), 133–152. https://doi.org/10.1007/s40614-018-0167-4

KZN Online. (2020). *Zululand district municipality*. http://www.kznonline.gov.za/

Li, Y. N., Nong, D. X., Wei, B., Feng, Q. M., & Luo, H. Y. (2016). The impact of predisposing, enabling, and need factors in utilization of health services among rural residents in Guangxi, China. *BMC Health Services Research*, *16*(1), 1–9. https://doi.org/10.1186/s12913-016-1825-4

Lisboa, M., Fronteira, I., Mason, P. H., & Martins, M. (2020). National TB program shortages as potential factor for poor-quality TB care cascade: Healthcare workers' perspective from Beira, Mozambique. *PloS One*, *15*(2), e0228927. https://doi.org/10.1371/journal.pone.0228927

Loveday, M., Cox, H., Evans, D., Furin, J., Ndjeka, N., Osman, M., & Naidoo, K. (2020). Opportunities from a new disease for an old threat: Extending COVID-19 efforts to address tuberculosis in South Africa. *South African Medical Journal*, *110*(12), 1160–1167. https://doi.org/10.7196/SAMJ.2020.v110i12.15126

Loveday, M., Mzobe, Y. N., Pillay, Y., & Barron, P. (2019). Figures of the dead: A decade of tuberculosis mortality registrations in South Africa. *South African Medical Journal*, *109*(10), 728–732. https://doi.org/10.7196/SAMJ.2019.v109i10.14073

Lyu, H., Xu, T., Brotman, D., Mayer-Blackwell, B., Cooper, M., Daniel, M., Wick, E. C., Saini, V., Brownlee, S., & Makary, M. A. (2017). Overtreatment in the United States. *PLoS One*, *12*(9), 1–11. https://doi.org/10.1371/journal.pone.0181970

Macintyre, K., Bakker, M. I., Bergson, S., Bhavaraju, R., Bond, V., Chikovore, J., Colvin, C., Craig, G. M., Cremers, A. L., Daftary, A., Engel, N., France, N. F., Jaramillo, E., Kimerling, M., Kipp, A., Krishnaratne, S., Mergenthaler, C.,

Ngicho, M., Redwood, L., Rood, E., … Mitchell, E. (2017). Defining the research agenda to measure and reduce tuberculosis stigmas. *The International Journal of Tuberculosis and Lung Disease*, *21*(11), 87–96. https://doi.org/10.5588/ijtld.17.0151

Maharaj, J., Ross, A., Maharaj, N. R., & Campbell, L. (2016). Multidrug-resistant tuberculosis in KwaZulu-Natal, South Africa: An overview of patients' reported knowledge and attitudes. *African Journal of Primary Health Care & Family Medicine*, *8*(1), e1–e6. https://doi.org/10.4102/phcfm.v8i1.1089

Mair, L., Corbett, E. L., Feasey, H. R. A., Kamchedzera, W., Khundi, M., Lalloo, D. G., Maheswaran, H., Nliwasa, M., Squire, S. B., Webb, E. L., & MacPherson, P. (2020). Provider-initiated HIV testing and TB screening in the era of universal coverage: Are the right people being reached? A cohort study in Blantyre, Malawi. *PLoS One*, *15*(8), 1–12. https://doi.org/10.1371/journal.pone.0236407

Marahatta, S. B., Yadav, R. K., Giri, D., Lama, S., Rijal, K. R., Mishra, S. R., Shrestha, A., Bhattrai, P. R., Mahato, R. K., & Adhikari, B. (2020). Barriers in the access, diagnosis and treatment completion for tuberculosis patients in central and western Nepal: A qualitative study among patients, community members and health care workers. *PloS One*, *15*(1), e0227293. https://doi.org/10.1371/journal.pone.0227293

Mbokazi, N., Madzima, R., Leon, N., Lurie, M. N., Cornell, M., Schmidt, B. M., & Colvin, C. J. (2020). Health worker experiences of and perspectives on engaging men in HIV care: A qualitative study in Cape Town, South Africa. *Journal of the*

International Association of Providers of AIDS Care, *19*, 2325958220935691. https://doi.org/10.1177/2325958220935691

Murdoch, J., Curran, R., van Rensburg, A. J., Awotiwon, A., Dube, A., Bachmann, M., Petersen, I., & Fairall, L. (2021). Identifying contextual determinants of problems in tuberculosis care provision in South Africa: a theory-generating case study. *Infectious Diseases of Poverty*, *10*(1), 67. https://doi.org/10.1186/s40249-021-00840-5

Murphy, J. P., Moolla, A., Kgowedi, S., Mongwenyana, C., Mngadi, S., Ngcobo, N., Miot, J., Evans, D., & Pascoe, S. (2021). Community health worker models in South Africa: a qualitative study on policy implementation of the 2018/19 revised framework. *Health Policy and Planning*, *36*(4), 384–396. https://doi.org/10.1093/heapol/czaa172

Naidoo, K., Gengiah, S., Yende-Zuma, N., Padayatchi, N., Barker, P., Nunn, A., Subrayen, P., & Abdool Karim, S. S. (2017a). Addressing challenges in scaling up TB and HIV treatment integration in rural primary healthcare clinics in South Africa (SUTHI): a cluster randomized controlled trial protocol. *Implementation Science*, *12*(1), 129. https://doi.org/10.1186/s13012-017-0661-1

Naidoo, P., Theron, G., Rangaka, M. X., Chihota, V. N., Vaughan, L., Brey, Z. O., & Pillay, Y. (2017b). The South African tuberculosis care cascade: Estimated losses and methodological challenges. *Journal of Infectious Diseases*, *216*(7), S702–S713. https://doi.org/10.1093/infdis/jix335

Natarajan, S., Singla, R., Singla, N., Gupta, A., Caminero, J. A., Chakraborty, A., &

Kumar, V. (2020). Treatment interruption patterns and adverse events among patients on bedaquiline containing regimen under programmatic conditions in India. *Pulmonology*. https://doi.org/10.1016/j.pulmoe.2020.09.006

National Academy of Sciences. (2018). *Healthcare utilization as a proxy in disability determination*. Washington DC: National Academies Press (US). https://www.ncbi.nlm.nih.gov/books/NBK500095/

Ngwenya, N., Nkosi, B., Mchunu, L. S., Ferguson, J., Seeley, J., & Doyle, A. M. (2020). Behavioural and socio-ecological factors that influence access and utilisation of health services by young people living in rural KwaZulu-Natal, South Africa: Implications for intervention. *PloS One*, *15*(4), e0231080. https://doi.org/10.1371/journal.pone.0231080

Nyasulu P, Sikwese S, Chirwa T, Makanjee C, Mmanga M, Babalola JO, Mpunga J, Banda HT, Muula AS, & Munthali AC. (2018). Knowledge, beliefs, and perceptions of tuberculosis among community members in Ntcheu district, Malawi. *Journal of Multidisciplinary Healthcare*, *11*, 375–389. https://doi.org/10.2147/JMDH.S156949

Oga-Omenka, C., Tseja-Akinrin, A., Sen, P., Mac-Seing, M., Agbaje, A., Menzies, D., & Zarowsky, C. (2020). Factors influencing diagnosis and treatment initiation for multidrug-resistant/rifampicin-resistant tuberculosis in six sub-Saharan African countries: a mixed-methods systematic review. *BMJ Global Health*, *5*(7), e002280. https://doi.org/10.1136/bmjgh-2019-002280

Organization for Economic Co-operation and Development [OECD] (2019). Education at a glance database 2019. *OECD iLibrary*. https://doi.org/10.1787/f8d7880d-en

Osman, M., Karat, A. S., Khan, M., Meehan, S. A., von Delft, A., Brey, Z., Charalambous, S., Hesseling, A. C., Naidoo, P., & Loveday, M. (2021). Health system determinants of tuberculosis mortality in South Africa: a causal loop model. *BMC Health Services Research*, *21*(1), 388. https://doi.org/10.1186/s12913-021-06398-0

Pai, M., & Temesgen, Z. (2018). Quality: The missing ingredient in TB care and control. *Journal of clinical tuberculosis and other mycobacterial diseases*, *14*, 12–13. https://doi.org/10.1016/j.jctube.2018.12.001

Pedrazzoli, D., Boccia, D., Dodd, P. J., Lönnroth, K., Dowdy, D. W., Siroka, A., Kimerling, M. E., White, R. G., & Houben, R. (2017). Modelling the social and structural determinants of tuberculosis: opportunities and challenges. *The International Journal of Tuberculosis and Lung Disease*, *21*(9), 957–964. https://doi.org/10.5588/ijtld.16.0906

Polanco-Pasaje, J. E., Rodríguez-Márquez, I., Tello-Hoyos, K. Y., Torres-Pereda, P., Guzmán-Salazar, B. L., & Pérez, F. (2021). Tuberculosis care cascade for the indigenous population in Colombia: an operational research study. *Pan American Journal of Public Health*, *45*, e20. https://doi.org/10.26633/RPSP.2021.20

Schneider, H., Besada, D., Sanders, D., Daviaud, E., & Rohde, S. (2018). Ward-based primary health care outreach teams in South Africa: developments, challenges and future directions: review. *South African Health Review*, *2018*(1), 59–65.

Seidu, A.-A. (2020). Using Anderson's model of health service utilization to assess the use of HIV testing services by sexually active men in Ghana. *Frontiers in Public Health*. https://doi.org/10.3389/fpubh.2020.00512

Shao, S., Wang, M., Jin, G., Zhao, Y., Lu, X., & Du, J. (2018). Analysis of health service utilization of migrants in Beijing using Anderson health service utilization model. *BMC Health Services Research*, *18*(1), 462. https://doi.org/10.1186/s12913-018-3271-y

Sima, B. T., Belachew, T., & Abebe, F. (2017). Knowledge, attitude and perceived stigma toward tuberculosis among pastoralists; Do they differ from sedentary communities? A comparative cross-sectional study. *PloS One*, *12*(7), e0181032. https://doi.org/10.1371/journal.pone.0181032

Simbayi, L., Zuma, K., Zungu, N., Moyo, S., Marinda, E., Jooste, S., Mabaso, M., Ramlagan, S., North, A., van Zyl, J., Mohlabane, N., Dietrich, C., & Naidoo, I. (2019). *The fifth South African national HIV prevalence, incidence, behaviour and communication survey, 2017 (SABSSM V)* (Vol. 2017, Issue July). HSRC Press. https://www.hsrcpress.ac.za/books/south-african-national-hiv-prevalence-incidence-behaviour-and-communication-survey-2017

Sinai, I., Cleghorn, F., & Kinkel, H. F. (2018). Improving management of tuberculosis in people living with HIV in South Africa through integration of HIV and tuberculosis services: a proof of concept study. *BMC Health Services Research*, *18*(1), 711. https://doi.org/10.1186/s12913-018-3524-9

South African National AIDS Council. (2017). South Africa's national strategic plan for HIV, TB and STIs 2017–2022. In *The South African National AIDS Council* (Issue March). http://sanac.org.za/2017/05/11/download-the-full-version-of-the-national-strategic-plan-for-hiv-tb-and-stis-2017-2022/

Statistics South Africa. (2016). *National community survey 2016.* http://cs2016.statssa.gov.za/

Statistics South Africa. (2018). *Provincial profile: KwaZulu-Natal community survey 2016*. http://cs2016.statssa.gov.za/wp-content/uploads/2018/07/KZN.pdf

Statistics South Africa. (2019). *Mortality and causes of death in South Africa, 2016: Findings from death notification.* https://www.statssa.gov.za/publications/P03093/P030932016.pdf

Statistics South Africa. (2020). *Key statistics*. http://www.statssa.gov.za/

Stime, K. J., Garrett, N., Sookrajh, Y., Dorward, J., Dlamini, N., Olowolagba, A., Sharma, M., Barnabas, R. V., & Drain, P. K. (2018). Clinic flow for STI, HIV, and TB patients in an urban infectious disease clinic offering point-of-care testing services in Durban, South Africa. *BMC Health Services Research*, *18*(1), 363. https://doi.org/10.1186/s12913-018-3154-2

Stop TB Partnership. (n.d.). Digital adherence survey for patients. Naidoo, P., Simbayi, L., Labadarios, D., Ntsepe, Y., Bikitsha, N., Khan, G., Sewpaul, R., Moyo, S., & Rehle, T. (2016). Predictors of knowledge about tuberculosis: Results from SANHANES I, a national, cross-sectional household survey in South Africa. BMC Public Health, 16(1), 1–12. https://doi.org/10.1186/s12889-016-2951-y

Stop TB Partnerships. (2019). TB stigma assessment data collection instruments. UNOPS, 1–30. http://www.stoptb.org/assets/documents/communities/STP%20TB%20Stigma%20Assessment%20Data%20Collection%20Instruments.pdf

Subbaraman, R., Jhaveri, T., & Nathavitharana, R. R. (2020). Closing gaps in the tuberculosis care cascade: an action-oriented research agenda. *Journal of Clinical Tuberculosis and Other Mycobacterial Diseases*, *19*. https://doi.org/10.1016/j.jctube.2020.100144

Suleiman, Y. S. (2021). Accessibility and utilization of tuberculosis directly observed therapy in primary health care facilities in Katsina State, Northwest Nigeria. *Texila International Journal of Public Health*, *9*(1), 29–36. https://doi.org/10.21522/tijph.2013.09.01.art003

Tamuzi, J. L., Ayele, B. T., Shumba, C. S., Adetokunboh, O. O., Uwimana-Nicol, J., Haile, Z. T., Inugu, J., & Nyasulu, P. S. (2020). Implications of COVID-19 in high burden countries for HIV/TB: A systematic review of evidence. *BMC Infectious Diseases*, *20*(1), 1–18. https://doi.org/10.1186/s12879-020-05450-4

The World Bank. (2015). *Educational attainment, at least completed primary, population 25+ years, male (%) (Cumulative) - South Africa*. https://data.worldbank.org/indicator/SE.PRM.CUAT.MA.ZS?locations=ZA

Tola, H. H., Holakouie-Naieni, K., Mansournia, M. A., Yaseri, M., Tesfaye, E., Mahamed, Z., & Sisay, M. M. (2019). Intermittent treatment interruption and its effect on multidrug resistant tuberculosis treatment outcome in Ethiopia. *Scientific*

Reports, *9*(1), 1–10. https://doi.org/10.1038/s41598-019-56553-1

Trajman, A., Wakoff-Pereira, M. F., Ramos-Silva, J., Cordeiro-Santos, M., Militão de Albuquerque, M. F., Hill, P. C., & Menzies, D. (2019). Knowledge, attitudes, and practices on tuberculosis transmission and prevention among auxiliary healthcare professionals in three Brazilian high-burden cities: a cross-sectional survey. *BMC Health Services Research*, *19*(1), 532. https://doi.org/10.1186/s12913-019-4231-x

Travers, J. L., Hirschman, K. B., & Naylor, M. D. (2020). Adapting Andersen's expanded behavioral model of health services use to include older adults receiving long-term services and supports. *BMC Geriatrics*, *20*(1), 58. https://doi.org/10.1186/s12877-019-1405-7

UNAIDS. (2019). *UNAIDS data 2019.* https://www.unaids.org/sites/default/files/media_asset/2019-UNAIDS-data_en.pdf

United Nations. (2018). *The sustainable development goals.* https://sdgs.un.org/goals/goal3

Wagner, W. E. (2016). *Using IBM® SPSS® statistics for research methods and social science statistics* (6th ed.). Thousand Oaks, CA: Sage Publications.

Wang, W., Wang, F., Peng, Y., Liu, K., Chen, X., Chai, C., Wang, X., & Chen, B. (2020). Factors associated with health-seeking preference among people who were supposed to cough for more than 2 weeks: A cross-sectional study in Southeast China. *Patient Preference & Adherence*, *14*, 1173–1183. https://doi.org/10.2147/PPA.S257722

Wang, Z., Jiang, W., Liu, Y., Zhang, L., Zhu, A., Tang, S., & Liu, X. (2019). Transforming tuberculosis (TB) service delivery model in China: issues and challenges for health workforce. *Human Resources for Health*, *17*(1), 83. https://doi.org/10.1186/s12960-019-0420-2

Watermeyer, J., & Penn, C. (2019). Community perspectives on tuberculosis care in rural South Africa. *Health & Social Care in the Community*, *27*(1), 182–190. https://doi.org/10.1111/hsc.12637

Wenz, A., Al Baghal, T., Gaia, A., (2020). Language proficiency among respondents: Implications for data quality in a longitudinal face-to-face survey. *Journal of Survey Statistics and Methodology*, 045. https://doi.org/10.1093/jssam/smz045

World Health Organization. (2019). *Global tuberculosis report*. https://www.who.int/tb/global-report-2019

World Health Organization. (2020). *Global tuberculosis report*. https://apps.who.int/iris/bitstream/handle/10665/336069/9789240013131-eng.pdf

Yoshitake, N., Omori, M., Sugawara, M., Akishinonomiya, K., & Shimada, S. (2019). Do health beliefs, personality traits, and interpersonal concerns predict TB prevention behavior among Japanese adults? *PLoS One 14*(2): e0211728. https://doi.org/10.1371/journal.pone.0211728

Zein, R. A., Suhariadi, F., & Hendriani, W. (2017). Estimating the effect of lay knowledge and prior contact with pulmonary TB patients on the health-belief model in a high-risk pulmonary TB transmission population. *Psychology*

Research and Behavior Management, *10*, 187–194.

https://doi.org/10.2147/PRBM.S134034

Zululand Health District. (2021). District health information system TB data.