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HEALTHCARE MANAGEMENT STRATEGIES TO IMPROVE TUBERCULOSIS CASE NOTIFICATION AND TREATMENT SUCCESS RATES IN MAKUENI COUNTY REFERRAL HOSPITAL

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DISSERTATION SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF MASTER OF BUSINESS ADMINISTRATION IN HEALTHCARE MANAGEMENT AT STRATHMORE UNIVERSITY

APRIL 2025

DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this university or any other university. To the best of my knowledge and belief, the dissertation contains no material previously published or written by another person except where there is due reference.

Dr. Pius Mutuku

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Signature_____Date_____13th April 2025_____

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Approval

The dissertation of Dr. Pius Mutuku was reviewed and approved by:

Signature: ___  _ Date_____13th April 2025_____

Prof. Joseph Odhiambo Onyango,

Associate Professor, Strathmore University.

ABSTRACT

Tuberculosis (TB) has remained a significant global public health challenge, particularly in low- and middle-income countries, where it continues to affect millions and contributes to high morbidity and mortality rates. Despite the disease being both preventable and curable, the World Health Organization (WHO) reported over 10 million new TB cases in 2022, with African and South-East Asian regions bearing the greatest burden. Kenya, as one of the high-burden TB countries, faces persistent challenges in achieving the WHO's End TB Strategy targets, which aim to reduce TB-related deaths by 75% by 2025. This study was conducted to assess the healthcare management strategies used to improve TB case notification and treatment success rates at Makueni County Referral Hospital. The study was anchored on three theoretical frameworks: the Management in Health Theory, the Evidence-Based Management (EBM) Theory, and the Utilisation Management (UM) Model. These frameworks provided a lens for evaluating how management practices, evidence-driven decision-making, and resource utilisation influence TB outcomes. A descriptive survey design was employed. The target population comprised hospital administrators and healthcare workers directly involved in TB care. A pilot study was conducted at Makindu Sub-County Hospital, while the main study involved a sample of 122 healthcare professionals drawn from Makueni County Referral Hospital. Data was collected using structured questionnaires and analysed using SPSS, focusing on both descriptive and inferential statistics. The findings revealed that healthcare management strategies had moderately improved TB case notification and treatment success rates. The findings suggested that training of healthcare workers, community-based active case finding, decentralised TB services, provision of adequate personal protective equipment, and the use of geo-coding for case tracking were perceived by respondents to be associated with improved TB case notification and treatment outcomes. However, given the cross-sectional nature of the study, these associations should be interpreted as indicative rather than conclusive, as the design does not permit causal inference. Collaboration with private healthcare providers also contributed positively to service delivery. However, several barriers hindered optimal implementation, including non-adherence to TB guidelines, low staff motivation, inadequate funding, bureaucratic delays, poor communication, and heavy workloads. The study concluded that while progress had been made, several systemic and management-related obstacles persisted. The hospital was recommended to strengthen adherence to TB guidelines through continuous training, decentralise decision-making

processes, and enhance staff motivation through incentives and mental health support. Additionally, increased funding, improved communication protocols, digital record-keeping, and staff expansion were proposed to further improve TB case notification and treatment success rates.

Keywords: *Healthcare Management Strategies; TB Case Detection, TB Case Treatment*

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LIST OF ABBREVIATIONS

ACF	Active Case Finding
CHWs	Community Healthcare Workers
COREQ 32	Consolidated criteria for reporting qualitative research
COVID-19	Coronavirus Disease 2019
DRC	Democratic Republic of the Congo
EBM	Evidence-Based Management
EEA	European Economic Area
EU	European Union
HBM	The Health Belief Model
HCWs	Healthcare Workers
HCPs	Healthcare Providers
HEWs	Healthcare Extension Workers
HIV	Human Immunodeficiency Virus
IPT	Isoniazid Preventive Therapy
LMICs	Low- and Middle-Income Countries
LTFU	Lost-To-Follow-Up
MDR-TB	Multidrug-Resistant Tuberculosis
MOH	Ministry of Health
MTBC	Mycobacterium tuberculosis complex
NGO	Non-government Organisation
PQE	Program Quality Efficiency
QI	Quality Improvement
SOP	Standard Operating Procedure
SPSS	Statistical Package for Social Sciences
TB	Tuberculosis
TB IPC	Tuberculosis Infection Prevention and Control
TIBU	Tuberculosis Information from Basic Units
UM	Utilisation Management
WHO	World Health Organization

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CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The Chapter begins with the background to the study followed by a clear articulation of the problem statement. It then presents the research objectives, research questions, scope of the study and its significance.

Infectious diseases continue to pose a significant threat to global public health, especially in low- and middle-income countries (LMICs), where resource limitations and infrastructural challenges undermine disease prevention and treatment efforts. Among these diseases, tuberculosis (TB) remains one of the most pressing global health challenges despite advancements in medicine and public health interventions. TB is an infectious disease caused by Mycobacterium tuberculosis, which primarily affects the lungs but can also impact other organs. According to the World Health Organization (WHO), TB is the second leading cause of death from a single infectious agent following the COVID-19 pandemic (WHO, 2023). It is estimated that approximately 10.6 million people contracted TB in 2022 alone, resulting in 1.6 million deaths globally. While significant strides have been made in preventing and treating TB, the disease continues to persist, particularly in low- and middle-income countries where access to quality care services is limited (Glaziou et al., 2018). Efforts to combat TB have included the development of new diagnostic tools, vaccines, and drugs aimed at shortening treatment duration and improving outcomes (Cohen et al., 2019). However, TB control has been complicated by factors such as multidrug-resistant TB (MDR-TB), HIV co-infection, and healthcare system challenges in resource-limited settings. These factors, combined with the social determinants of health—such as poverty, malnutrition, and overcrowded living conditions—have made TB a difficult disease to control, especially in high-burden regions like sub-Saharan Africa (Harries et al., 2020).

Africa remains a significant hotspot for TB infections, contributing significantly to the global TB burden. The WHO estimates that the African region accounts for approximately 25% of the world's TB cases, with South Africa, Nigeria, and Kenya among the countries with the highest incidence rates (WHO, 2023). The prevalence of HIV in Africa exacerbates the TB situation, as TB is the leading cause of death among people living with HIV (Kirenga et al., 2021). The co-

infection of TB and HIV presents unique challenges for disease management, as HIV weakens the immune system, making it harder for individuals to fight TB infections. Despite global efforts to end TB, Africa lags in terms of TB case detection and treatment success rates. Structural barriers such as limited healthcare infrastructure, inadequate diagnostic facilities, and insufficient funding for TB control programs hinder progress. Additionally, social stigma and lack of public awareness about TB symptoms further complicate early detection and timely treatment (Cegielski et al., 2022). As a result, Africa has one of the highest TB-related mortality rates, which calls for urgent action in scaling up TB prevention, diagnosis, and treatment interventions.

In this context, healthcare management strategies have become increasingly critical in tackling the TB burden. These strategies include structured interventions such as workforce training, decentralised TB services, integration of care, data-driven decision-making, and community-based case finding (Holtrop et al., 2023; Al-Worafi, 2023). When effectively implemented, they support better care coordination, promote adherence to treatment protocols, and improve case detection and treatment success rates. Conceptually, such interventions are framed within the Management in Health Theory (Rachmad, 2022), Evidence-Based Management Theory (Sohrabi & Zarghi, 2015), and Utilisation Management Theory (Beerman, 2024), which collectively emphasize the role of leadership, standardisation, and evidence in achieving health system efficiency. However, while these frameworks are well-developed in theory, empirical evidence on their practical application in decentralized and resource-limited settings remains sparse.

In Kenya, TB has remained a priority public health issue. According to the Ministry of Health (2022), the country's TB incidence stands at approximately 292 cases per 100,000 people, placing it among the 30 high TB burden countries globally. Makueni County has demonstrated noteworthy progress, with a treatment success rate of 92% recorded in 2023 (Mumo, 2024). Yet, many questions remain unanswered regarding the specific healthcare management practices that contributed to this outcome. There is a need to understand whether the successes in treatment and detection are the result of replicable strategies or context-specific conditions. This study therefore investigates the healthcare management strategies applied at Makueni County Referral Hospital, examining their role in TB case notification and treatment outcomes, identifying implementation barriers, and suggesting potential policy and operational improvements.

1.1.1 Healthcare Management Strategies in TB Detection and Treatment

Research has significantly tried to link healthcare care management strategies to TB, prevention, detection, and treatment. Holtrop et al. (2023) describe care (or healthcare) management strategies as team-oriented, patient-centred tactics intended to assist patients and their support systems, including healthcare workers (HCWs), in managing illnesses more effectively. It comprises the care coordination activities that patients and caregivers need to employ so as to offer medical care services (Holtrop et al., 2023). From this perspective, healthcare management strategies can also be considered as a set of activities for assisting patients and HCWs to manage medical issues accordingly (Holtrop et al., 2023). Usually, healthcare management strategies are organised around the principle that proper interventions are likely to moderate, lessen, or even eliminate health risks for individuals while regulating care costs (Holtrop et al., 2023). Healthcare management strategies aim to improve patients' functional health status, optimise the efficient use of healthcare resources, enhance care coordination, eliminate service duplication, moderate expensive medical services, and intensify patient engagement in self-care. Healthcare facilities deploy many care management strategies to realise these goals. The most notable healthcare management strategies include comprehensive care plans, medication and care-management tools, patient education, community and home-based service providers, and care visits. HCWs often collaborate closely with patients, families, and colleagues to ensure the success of these programmes.

The European Centre for Disease Prevention and Control (2014) examined healthcare management strategies for TB control, giving a view of what happens in European nations (mostly high-income countries). In its report, the institution establishes that care management strategies such as timely diagnosis of multi-drug resistance TB (MDR TB) through the implementation of rapid molecular drug-susceptibility testing in line with national guidelines have and remain key to realising good treatment outcomes of patients with MDR TB (European Centre for Disease Prevention and Control, 2014). The report also acknowledges that training healthcare providers (HCPs), including HCWs, HEWs, and CHWs, equips them with adequate means to support patients and significantly contribute to MDR TB detection and control. Inter-sectoral collaboration and cross-border management of MDR TB cases through collaborative mechanisms between countries are also credited for the improved detection and control of MDR TB in the European Union (EU) and European Economic Area (EAA). This discovery is also

supported by Al-Worafi (2023), who focused on developing nations in his study. Similarly, Al-Worafi (2023) uncovered that cross-sectoral and international collaborations can help to enhance social support systems for TB patients and reporting of treatment outcomes, as well as to address the social determinants of TB and ensure continuity of care during emergencies. In addition, Al-Worafi (2023) emphasised the crucial role a comprehensive TB management approach involving strengthened healthcare systems, expanded access to TB services, early detection and diagnosis, treatment adherence support, and integration of TB and HIV services plays in TB detection and control or treatment.

Mhimbira et al. (2017) also tried to examine care management strategies (interventions) in the context of TB detection. The researchers discovered that TB outreach screening, educational sessions or training for HCWs, and house-to-house visits are suitable healthcare management strategies for tuberculosis detection and contributors to treatment success (Mhimbira et al., 2017). The scholars also established that health promotion activities, such as mass media strategies and locally organised events, motivate people to undergo TB screening to enhance early TB detection and improve TB treatment success (Mhimbira et al. (2017). Li et al. (2017) further found screening for high-risk groups, adequate follow-up treatment with close evaluation and monitoring, and improved programmatic management as appropriate healthcare management strategies for TB detection, control, prevention, and treatment. The discoveries of Mhimbira et al. (2017) and Li et al. (2017) highlight healthcare management strategies as suitable for TB detection (case notification) and treatment.

Zwama et al. (2021) made an effort to examine care management strategies for TB in the context of low- and middle-income countries (LMICs). In their study, the scholars uphold that establishing policies and guidelines for TB infection prevention and control (TB IPC) can strengthen the implementation of related programmes, enhancing TB case detection and treatment rates (Zwama et al., 2021). Zinatsa et al. (2018) also uncovered several healthcare management strategies suitable for managing TB detection and treatment. Focussing on South Africa, a fairly developing nation, the scholars established that “training for comprehensive TB infection control for all HCWs; clarity on TB infection control policy guidelines; improved patient education and awareness of TB infection control measures; emphasis on the active role HCWs can play in infection control as change agents; improved social support; practical, hands-on training improve behavioural skills; and the destigmatisation of TB among HCWs and

patients" as proper approaches for managing TB detection and treatment (Zinatsa et al., 2018). Chijioke-Akaniro et al. (2022) further noted that TB service expansion, enhanced monitoring and evaluation, and increased data usage in decision-making improve TB detection and treatment coverage.

Focusing on Ethiopia, Scardigli et al. (2018) emphasised the role of community engagement and decentralised service supervision in managing TB detection and treatment. The authors noted that decentralised community-based services involving health extension workers (HEWs) and HCWs are appropriate healthcare management strategies for TB detection and treatment (Scardigli et al., 2018). Accordingly, regular household visits and health education by HEWs and HCWs make identifying individuals with TB symptoms easier, as well as collecting sputum samples, preparing smears, and sending samples to laboratories for testing. This approach assists in finding missed TB patients and developing treatment support systems and interventions to save and transform their lives. While focusing on Senegal, Scardigli et al. (2018) also observed community engagement as an appropriate care management strategy for TB detection and treatment. Scardigli et al. (2018) noted that scaling up community activities through an increased engagement with community-based organisations and sensitisation initiatives with locals increased TB detection, control, prevention, or treatment. In Senegal, the strategy significantly increased the proportion of TB cases detected by community-based organisations, HEWs, and HCWs.

Subsequently, focusing on the Ivory Coast, Scardigli et al. (2018) established that decentralising TB management through decentralised service operations is also suitable for TB detection and treatment. According to the researchers, decentralising TB management through the establishment of a steering committee, integration of TB services within existing health facilities, distribution workshops, and training of care providers, including HEWs and HCWs, improves the detection and treatment of TB (Scardigli et al., 2018). Situational analysis, improved engagement of community-based organisations, including non-government organisations (NGOs) and training of community health workers (CHWs) are also considered desirable care strategies for TB detection at the community level. Decentralisation, integration, and intensified community engagement are highly credited for improving TB detection and treatment outcomes in the Ivory Coast.

Scardigli et al. (2018) also covered Tanzania in the report, discovering that introducing Program Quality and Efficiency (PQE) at the facility level can also improve TB detection and treatment. PQE includes developing a Toolkit for Quality Improvement (QI) in TB case detection. Such toolkits offer efficient support for detecting TB, enabling care providers to make informed control, prevention, and treatment decisions. PQE also entails training packages and tools (like paediatric scoring charts), comprehensive TB screening at hospitals, and intense monitoring of care facilities and presumptive TB registers. Following the implementation of PQE, Tanzania reported an increase in TB case notifications for child TB and an increased index of suspicion among HCWs (Scardigli et al., 2018).

The WHO further identifies workplace and administrative strategies that benefit TB case detection, control, prevention, and treatment (World Health Organization, 2008). According to WHO, workplace and administrative interventions are the first line of defence for managing TB spread in healthcare settings (World Health Organization, 2008). As such, they play a vital role in preventing TB exposure to HCWs and patients by improving ventilation and patient flow in the environment where their interactions occur. Workplace and administrative strategies include creating an infection (TB) control plan, administrative support for procedures covered in the plan, training of HCWs, educating patients and intensifying community awareness, and coordination & communication with the TB control programme (World Health Organization, 2008).

The WHO also highlights personal respiratory protection as another care management strategy for TB prevention. Accordingly, WHO ascertains that personal respiratory protection entails training in selecting and using respirators (World Health Organization, 2008). Personal respiratory protection strategies include implementing a respiratory protection program, training HCWs on respiratory protection, and educating patients on respiratory hygiene and cough etiquette procedures (World Health Organization, 2008). WHO identifies ventilators as less reliable, especially in protecting HCWs from contracting *M. Tuberculosis*. Besides, they are costly, require specialised installation equipment, and are usually unavailable in resource-limited settings. Nonetheless, they are vital in specific high-risk areas in care facilities, including referral centres such as specialised treatment centres for persons with MDR-TB.

Kenya cannot be excluded from the list of countries implementing healthcare management strategies for TB case detection and treatment. Scardigli et al. (2018) noted that the Kenyan government, through the Ministry of Health, is dedicated to training hospital managers and senior clinicians so that they can train other HCWs, HEWs, and CHWs on TB diagnosis, control, prevention, and treatment. Even so, the researchers further stressed management support as essential in successfully implementing care management strategies for TB case detection and treatment (Scardigli et al., 2018). The lack of management participation in pilot programmes conducted in some Kenyan hospitals revealed no improvement in TB case detection and treatment, with HCWs not changing their strategies or practices towards TB control (Scardigli et al., 2018). However, Amisi et al. (2021) noted that isoniazid preventive therapy (IPT) is successfully slowing TB progression in children in Western Kenya. Mailu et al. (2019) also found the Public-Private Mix (PPM) to be a prominent TB management strategy in Kenya's private and public health sectors, with the strategy encouraging the involvement of healthcare providers, civil society organisations, and community engagement in TB IPC. Considering the setbacks in the implementation of most TB IPC strategies as observed by Scardigli et al. (2018), the current study seeks to examine healthcare management strategies to improve TB case notification and treatment success rates focusing on Makueni County to note whether there have been developments towards successful adoption and outcomes.

1.1.2 Makueni County Referral Hospital

Kenya is among the 30 high TB burden countries identified by the WHO, with an estimated TB incidence of 292 cases per 100,000 people (WHO, 2023). The country faces multiple challenges in controlling the spread of TB, including high rates of drug-resistant TB, low treatment adherence, and delays in case detection. These issues are compounded by socio-economic factors such as poverty, malnutrition, and poor healthcare infrastructure, particularly in rural areas (Ministry of Health (MOH), 2022). Makueni County, located in South Eastern Kenya, is one of the regions grappling with a high TB burden; therefore, it is relevant to the current research and certainly a proper case study for this study. The County has witnessed a continuous rise in TB cases since 2012, with reports indicating a prevalence rate of 233/100,000 in 2012 and 194/100,000 in 2015 (MOH, 2022). In 2016, the County reported an 82% TB case detection rate, with the prevalence rate jumping to 558/100,000 in 2017. In 2023, the County recently recorded a 92% treatment success rate, with all the affected persons being treated adequately (Mumo, 2024). With a 92%

TB treatment success rate, 3% less than the target of 95%, the county is also a desirable case study for the current research; understanding the healthcare management strategies responsible for these incredible case detection and treatment success rates aligns with the goal of the current study.

Besides, the County's plan to integrate artificial intelligence (AI) to boost support for TB diagnosis and management raises concerns about the effectiveness of the current care management strategies for the condition, which this study also seeks to investigate. Of the health facilities in Makueni County, the Makueni County Referral Hospital has been selected for this study owing to its position as the biggest referral health facility in the county, offering high-quality specialist and general services to the people (Makueni County Government, 2024). Therefore, the study will be conducted within the facility to evaluate the healthcare management strategies used to improve tuberculosis case notification and treatment success rates in Makueni County.

1.2 Problem statement

Although Tuberculosis is preventable and treatable, the disease has had a ravaging impact in African and Southeast Asian regions, affecting over 10 million people worldwide each year (WHO, 2023). Global efforts to curb the disease have been substantial, yet many countries are still far from achieving the milestones set by the WHO's End TB Strategy, which aims for a 75% reduction in TB-related deaths by 2025 (Glaziou et al., 2018). These unmet targets underscore the need for improved TB management and control approaches.

Healthcare management strategies can improve TB detection and treatment outcomes when implemented accordingly. Most countries in the EU and EAA favour measures such as personal respiratory equipment and strategies like timely diagnosis of MDR TB, training of HCPs, intersectoral collaboration, cross-border management through reporting of treatment outcomes, and the implementation of rapid molecular drug-susceptibility testing aligned with national guidelines, which have improved TB case detection, control and treatment in the region (European Union for Disease Prevention and Control, 2014). Other high-income nations support practices like TB outreach screening, especially for high-risk groups; home visits; health promotional activities, including mass media strategies and locally organised events; programmatic management; and sufficient follow-up treatment with close monitoring and

evaluation (Mhimbira et al., 2017; Li et al., 2017). While high-income countries are comfortable with any strategy that guarantees quality care outcomes regardless of costs, LMICs hold back from some strategies due to resource (financial constraints) and affordability challenges.

Studies on LMICs have shown that these nations encourage cost-effective care management strategies for TB (Al-Worafi, 2023; Zwama et al., 2021; Zinatsa et al., 2018; Chijioke-Akaniro et al., 2022; Scardigli et al., 2018; Amisi et al., 2021; Mailu et al., 2019). Al-Worafi (2023) established that LMICs prefer international collaborations, cross-sectoral approaches like social support systems, and comprehensive management approaches such as strong healthcare systems, broad TB services, treatment adherence support, early detection and diagnosis. Zwama et al. (2021) highlighted that LMICs prefer establishing policies and guidelines for TB IPC implementation. Zinatsa et al. (2018) identified multiple strategies, including training for HCWs, clarity on TB IPC policy guidelines, improved patient education, and increased social support as equally prominent in LMICs and crucial in TB detection and treatment. Chijioke-Akaniro et al. (2022) emphasised TB service expansion, monitoring and evaluation, and the increasing shift towards data usage in decision-making as strategies prominent in LMICs. Focusing on Ethiopia, Senegal and Ivory Coast, Scardigli et al. (2018) highlighted the growing preferences among LMICs for strategies like decentralised supervision, community engagement, regular household visits, and health education or training by HCPs to enhance TB detection and treatment. Narrowing down to Tanzania and Kenya, Scardigli et al. (2018) noted PQE at facility levels as another emerging care management strategy for TB in LMICs.

There is limited research on healthcare management strategies for TB within the Kenya context. Available studies have focussed on IPT in children (Amisi et al., 2021) and PPM (Mailu et al., 2019). The PPM strategy encourages inter-sectoral approaches (mainly between private and public sectors), such as the increased involvement of HCPs, civil society organisations, and communities (Mailu et al., 2019); it does not address the gap in management support that Scardigli et al. (2018) identified as sometimes being inadequate and undermining the effective implementation of broader TB management strategies. This gap also raises concerns about the effectiveness of implementing care management strategies for TB control. Thus, the study sought to close this gap in the literature by examining successful healthcare management strategies for improved TB detection and treatment using the case of Makueni County Referral Hospital.

1.3 Research Objectives

1.3.1 General Objective

The general objective of this study was to assess the healthcare management strategies used to improve tuberculosis case notification and treatment success rates in Makueni County Referral Hospital.

1.3.2 Specific Objectives

The specific objectives of the study were to:

i. To assess the current TB case notification and treatment success rates in Makueni County.

ii. To evaluate the enabling role of existing healthcare management practices in improving TB case notification and treatment outcomes

iii. To identify barriers to effective TB case notification and treatment within the healthcare management framework.

iv. To identify enabling factors for improving TB case notification and treatment success rates based on the study findings.

1.4 Research Questions

The study aimed to answer the following questions:

i. What are the current TB case notifications and treatment success rates at Makueni County Referral Hospital?

ii. How effectively are healthcare management strategies improving TB case notification and treatment outcomes in Makueni County Referral Hospital?

iii. What are the barriers to effective TB case notification and treatment within the healthcare management framework in Makueni County Referral Hospital?

iv. What strategies can be used to improve TB case notification and treatment success rates in Makueni County and Kenya?

1.5 Scope of the Study

This study assessed the healthcare management strategies implemented to enhance tuberculosis (TB) case notification and treatment success rates in Makueni County. The research focused on the Makueni County Referral Hospital, examining the current levels of TB case notification and treatment success, alongside evaluating the efficacy of the existing management approaches in improving these indicators. Specifically, the study investigated healthcare management challenges and barriers that hindered effective TB case notification and treatment. It also explored strategic measures that could be adopted to improve the outcomes of TB control programs. By adopting a descriptive survey design, the research incorporated quantitative and qualitative data collection techniques to provide a detailed analysis of the situation. Quantitative data offered statistical insights, while qualitative methods captured in-depth perspectives from healthcare professionals, patients, and other relevant stakeholders. The comprehensive approach was expected to yield actionable insights for improving TB management practices in Makueni County.

1.6 Significance of the Study

The findings from this study had significant implications for public health policy, particularly in improving healthcare management practices, policies, and strategies for tuberculosis (TB) case notification and treatment success rates. By providing data-driven insights, the study aimed to inform policymakers at both the county and national levels, supporting the development of more effective TB control interventions in Makueni County and potentially other high-burden regions. This contributed to improved health outcomes and enhanced the quality of life for individuals affected by TB, helping to reduce the disease's prevalence and mortality rates.

Additionally, the study made a meaningful academic contribution by expanding the existing body of knowledge on TB control strategies. It served as a foundation for further research, offering valuable insights for future studies addressing healthcare system challenges in TB control. The study's findings also aided advocacy efforts by highlighting the importance of strengthening health systems to ensure more efficient TB case detection and treatment. Furthermore, dissemination of the research results helped raise awareness among public health stakeholders and the public, fostering a more informed and engaged community in the fight against TB.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presented the literature review. The first section covered the theoretical framework of the study. The second section presented an empirical review, and the third presented the study's conceptual framework. The fourth section presented the operationalization of the study variables. In the last section, the chapter described the literature review gaps.

2.2 Theoretical Review

The theoretical foundation of this study was anchored on three primary models: the Management in Health Theory, Evidence-Based Management (EBM) Theory, and Utilisation Management (UM) Theory. These theories collectively inform the conceptual framework by providing an integrated perspective on healthcare management strategies. The Management in Health Theory emphasizes the importance of leadership, planning, and organizational structures in driving effective service delivery (Rachmad, 2022), which forms the structural basis of the framework. The EBM Theory adds a critical layer by underscoring the role of data and validated knowledge in informing healthcare decisions and aligning practices with national and international TB guidelines (Sohrabi & Zarghi, 2015). Meanwhile, the UM Theory contributes by highlighting the need to optimise limited healthcare resources and ensure efficiency in service implementation (Beerman, 2024). Together, these theories reinforce the core components of the conceptual framework by linking strategic health management, evidence-informed decision-making, and efficient resource use to enhanced TB case notification and treatment success. This theoretical integration ensures the framework is grounded in both practical healthcare realities and scholarly principles.

2.2.1 Management in Health Theory

Proposed and introduced by Yoesoep Edhie Rachmad (2022), the Management in Health Theory presumes that good management can improve healthcare services' efficiency, effectiveness, and quality. The model is based on the notion that numerous health systems encounter obstacles in managing limited resources, expanding service demands, and improving service quality. For example, in efforts to address patient wait times and assuage health results, effective

management can aid in optimising workflows and available resources. Typically, the theory holds that a methodical approach to health management can encourage constructive and sustainable adjustments in health systems.

The Management in Health Theory entails multiple key stages that define its working principles (Rachmad, 2022). First, the model assumes that it is important to recognise the needs and problems health systems face to deliver optimal health outcomes. Second, it emphasises designing and implementing proper management strategies as central to addressing the emerging impediments. Third, the framework underlines technology adoption and data utilisation as suitable for supporting better and more industrious decisions. It also underlines the significance of continuous training and development for HCPs or HCWs to augment their managerial and technical skills to better position them in making productive decisions that guarantee quality outcomes.

Rachmad's (2022) Management in Health Theory is all about the crucial role effective management plays in attaining optimal health or care results. As such, it acknowledges leadership skills, team coordination, technology adoption and application, and data-driven decision-making as the foundations for effective management. This model's key indicators are improved operational efficiency, patient satisfaction, effectiveness of health teams, quality health or care services, and reduced operational costs (Rachmad, 2022). These indicators are measurable, with patient satisfaction surveys, performance data analysis, and service quality evaluations being the most prominent means of measurement. Through these assessments, these indicators help evaluate and understand the extent to which management strategies have been successfully adopted and implemented and whether they have achieved their intended purpose. In other words, findings obtained from surveys (including self-assessments) and performance data analysis offer insights into the application and integration of management practices in healthcare processes and inform the interventions to enhance the effectiveness of healthcare management strategies.

In increasingly complex healthcare services, effective management is mandatory to ensure that health systems and their relative components function efficiently and smoothly for better outcomes. Thus, Rachmad's (2022) Management in Health Theory offers a framework for developing and implementing the best healthcare management strategies to promote high-quality

care services. The theory's relation and relevance to the current study are based on its operational variables of assessing resource utilisation efficiency, the effectiveness of healthcare management strategies, and the impact on health(care) outcomes.

In essence, Rachmad's (2022) Management in Health Theory aligned with the current study's focus on examining the healthcare management strategies for improving TB case notification and treatment success rates. It provided the foundation for assessing and understanding the current TB case notification and treatment success rates in Makueni County and the potential barriers undermining effective TB case notification and treatment within the healthcare management framework. The theory was also applicable in assessing the effectiveness of the existing healthcare management strategies for improving TB case notification and treatment results.

2.2.2 Evidence-Based Management Theory

Coined in the 1990s by a Canadian American physician, Dr. David Sackett, the Evidence-Based Management (EBM) theory presumes that management and decision-making should be entirely based on critical thinking and reliable evidence (Sohrabi & Zarghi, 2015). While the model was initially designed for the medical field, today, its principles have been extended to cater for disciplines as varied as criminology, education, public policy, social work, and most recently, management (Sohrabi & Zarghi, 2015). In the management context, the EBM model posits that management decisions should be designed around critical thinking and the best available evidence (Sohrabi & Zarghi, 2015). By evidence, the framework refers to information, facts or data supporting (or contradicting) a claim, assumption, or hypothesis (Sohrabi & Zarghi, 2015). Accordingly, this evidence can be obtained from either scientific research, internal (organisation) information, or professional experience. In essence, Sackett's EBM theory emphasises that managers within organisations should design their decisions around reliable evidence.

Sackett's EBM theory is dependent on a series of principles. The first principle stresses the need for managers to face the hard facts and cultivate a culture that encourages the truth even if it may be pleasant (Sohrabi & Zarghi, 2015; Rundall, Martelli, Arroyo, & Mc Curdy, 2007). The second one urges managers to commit to fact-based decision-making by obtaining the best evidence available and leveraging it to guide actions (Sohrabi & Zarghi, 2015; Rundall, Martelli, Arroyo, & Mc Curdy, 2007). The third one suggests that managers view and handle the organisation as an ongoing prototype, encouraging action-based learning (Sohrabi & Zarghi,

2015; Rundall, Martelli, Arroyo, & Mc Curdy, 2007). The fourth principle asks managers to identify the risks and drawbacks in internal or external suggestions to ensure the best courses of action are assumed (Sohrabi & Zarghi, 2015; Rundall, Martelli, Arroyo, & Mc Curdy, 2007). The last one underscores the need for managers to avoid basing decisions or actions on unproved but strongly held beliefs, past undertakings, or uncritical "benchmarking" of what the best in the field are doing (Sohrabi & Zarghi, 2015; Rundall, Martelli, Arroyo, & Mc Curdy, 2007).

The EBM model proposes six steps that managers can leverage in making management-based decisions. The first step is converting a practical issue into an answerable question (Sohrabi & Zarghi, 2015; Rundall, Martelli, Arroyo, & Mc Curdy, 2007). The second step involves systematically searching for and acquiring or retrieving the evidence to answer the questions (Sohrabi & Zarghi, 2015; Rundall, Martelli, Arroyo, & Mc Curdy, 2007). The third step entails critically assessing the reliability and relevance of the acquired or obtained evidence (Sohrabi & Zarghi, 2015; Rundall, Martelli, Arroyo, & Mc Curdy, 2007). The fourth step demands managers carefully weigh and pull together the identified evidence (Sohrabi & Zarghi, 2015; Rundall, Martelli, Arroyo, & Mc Curdy, 2007). The fifth step encourages managers to incorporate or leverage the evidence in decision-making and formulating actions (Sohrabi & Zarghi, 2015; Rundall, Martelli, Arroyo, & McCurdy, 2007). The sixth and last step emphasises the importance of assessing the outcome of the decision made or course of action taken, providing insights into its effectiveness or shortcomings (Sohrabi & Zarghi, 2015; Rundall, Martelli, Arroyo & Mc Curdy, 2007).

As a healthcare management model, the EBM theory necessitates healthcare managers, nurses, and HCPs to make care decisions based on the best available evidence. There is a need for healthcare managers to impose EBM standards (principles and steps) on the decision-making process to ensure proper decisions and actions that guarantee better care outcomes are considered and prioritised. Typically, doing this is more likely to ensure some level of uniformity to the decisions or actions of HCPs, supporting the attainment of quality care outcomes.

Sackett's EBM theory aligned with the current study's focus on healthcare management strategies for improving TB case notification and treatment success rates. It provided a foundation for examining the role of healthcare managers in evidence-based interventions for TB detection and treatment. It also provided the basis for understanding the significance of TB ICP

guidelines or standards in improving TB case notification and treatment success. Besides, the theory offers a foundation for identifying evidence-backed barriers that deter healthcare managers from executing their functions effectively and obstruct the success or effectiveness of healthcare management strategies.

2.2.3 Utilisation Management Theory

Proposed and introduced by the Institute of Medicine (currently the National Academy of Medicine) in the 1990s, the Utilisation Management (UM) model posits that addressing the overutilisation of services or procedures and a potential waste or abuse of healthcare resources can lead to better care outcomes (Beerman, 2024). While UM was introduced in the 1990s, it has a rich history that dates to the late 1970s and early 1980s during the initial rollout stages of the Medicare program (Medicine & Parties, 1989). The model holds the premise that ensuring proper care is delivered at the right time in a way that improves outcomes and minimizes the risk of poor health outcomes. It is also based on the principle that considering data points such as quality care to enhance healthcare management and related programmes is a recipe for sustainable, uninterrupted care services.

Palmieri and Peterson (2009) clearly highlight the UM model's position in the healthcare space. These researchers establish the UM theory as a proactive framework for managing healthcare through present guidelines (Palmieri & Peterson, 2009). This view already shows the need for and importance of hospitals having TB ICP guidelines to guide HCPs and associated stakeholders, including healthcare managers, patients, and community-based health organisations, to ensure effective TB detection (case notification) and treatment outcomes (success rates). The UM theory clarifies a series of tasks or activities essential to effectively managing care practices within health facilities (Palmieri & Peterson, 2009). Accordingly, the model urges healthcare managers to prioritise management, leading in efforts towards designing healthcare management activities, strategies, or practices that guarantee quality care services for all stakeholders (Palmieri & Peterson, 2009). In this case, it is appropriate for health managers to encourage research to identify the best possible care management interventions that will ensure optimum care outcomes (Palmieri & Peterson, 2009). Besides, by supporting research, health managers can leverage the data collected to develop and implement policies, guidelines, and procedures that guide the effective application of healthcare management strategies.

The UM mode was relevant and aligned with the current study's focus on healthcare management strategies for improving TB case notification and treatment success rate. By emphasising the role of healthcare managers, the UM model offers a foundation for examining and understanding the roles healthcare managers and HCPs play in ensuring the effectiveness of healthcare management strategies for TB case notification and treatment success rates. Thus, the model properly established barriers to effective management, effective TB case notification, and successful treatment.

2.3 Empirical Literature Review

This section explores existing studies on tuberculosis (TB) case notification and treatment success, focusing on the barriers and strategies for improving healthcare outcomes. It examines healthcare worker expertise, resource availability, socio-cultural factors, and patient engagement in TB management. Additionally, it addresses the effectiveness of interventions to improve case detection and treatment adherence in various settings, particularly in low- and middle-income countries.

2.3.1 TB Case Notification and Treatment Success Rates

Tuberculosis (TB) case notification and treatment success are key components in controlling the spread of TB. Case notification is essential for monitoring trends, allocating resources, and implementing targeted interventions (Sohn et la, 2021). Treatment success rates, on the other hand, are crucial for both individual health outcomes and public health (Khawbung, Nat & Chakraborty, 2021). This is because treatment success curbs transmission rates and helps to present the emergence of drug-resistant strains.

A study conducted by Charles et al. (2017) to determine the trends in TB case notification and treatment success in Haiti indicated that TB has been a key area of focus and a priority sector in Haiti since the 2010 earthquake. This study aimed to determine the trends in TB notification and treatment success rates based on the aggregate data reported by the National TB Control Program. There was a notable increase in case notification rates of all forms of TB from 142.7/100,000 in 2010 to 153.4 in 2015, peaking at 163.4 cases /100,000 in 2013. For smear-positive pulmonary TB, Case notification increased from 85.5 cases/100,000 to 105.7 cases/100,000, whereas treatment success rates remained stable at 79–80%.

Penjor, Tshokey and Wangdi (2021) conducted a fourteen-year retrospective study to determine the trend in TB case notification and predictors of poor treatment success rates in Samdrup Jongkhar district, Bhutan. There was a gradual downward trend in TB case notification in the district, with an overall case notification rate of 139/100,000 during the study period. The annual treatment success rate was over 90%, except for the period between 2013 and 2015, with the overall treatment success rate for the study period at 93%. A re-treatment TB patient, sputum-positive at the second month of treatment and being of Indian nationality were significant correlates of unsuccessful treatment outcomes. The overall TB incidence has declined, and the TB treatment success rate was above the recommended 90% in Samdrup Jongkhar District during the study period.

Osei et al. (2019) conducted a study to determine TB case notification and treatment outcomes in the Volta region of Ghana. The study involved a retrospective pool analysis of a multicentre cohort between 2013 and 2017; case notification and treatment success outcomes trends were analysed and compared, and the relationship between patients and disease characteristics and unsuccessful treatment outcomes was analysed using logistic regression analysis. The findings indicated that there was no improvement in TB case notification and successful treatment success rates over the past five years from the study. Generally, the overall treatment success rates observed were below the target of >90%, which the WHO sets for its end TB strategy. In addition, the patients who had interrupted treatment and continued with the treatment later and those who were HIV positive were associated with poor treatment outcomes. The results highlighted the need for sustained and effective interventions to prevent interruptions, improve treatment outcomes, and achieve TB elimination goals.

In another study conducted by Limenh et al. (2024) to analyse TB treatment outcomes and factors associated with TB treatment outcomes among patients at healthcare facilities in Motta Town in Ethiopia, the results indicated that TB treatment success rates varied based on different factors. The study was a facility-based retrospective cross-sectional study design, and the study participants comprised 362 patients diagnosed with TB who were undergoing treatment. The overall treatment success rates were 88.4% (95% CI 85.1, 91.7). The key factors associated with case notification and treatment success rates included gender, normal nutritional status, HIV-negative status and non-presumptive drug resistance to TB. Significant successful TB treatment was observed in every nine out of 10 study participants. Higher treatment success rates were

observed in male participants, those with normal nutritional status, those with non-presumed drug resistance to TB, and the patients who were HIV-negative.

Baluku et al. (2022) analysed Uganda's TB notification rates and treatment outcomes trends. They identified that case nonfiction and treatment success rates varied widely between patients with HIV in rural districts of Uganda for the period between 2015 and 2019. Retrospective programmatic data on notified TB cases and treatment and treatment outcomes was obtained from the District Health Information Systems. From 11,804 TB cases notified, 49.2% of the patients who were notified were HIV co-infected. There was an increase overall by 3.7% from 37.7% to 141.3 cases per 100,000 people in 2015 and 2019, and overall, by 3.7%, from 37.7% to 141.3 cases per 100,000 people in 2015 and 2019, respectively. The treatment success rates among HIV-infected patients increased from 69.9% to 81.9%. Conversely, there was a decline in treatment success rates among HIV-negative patients from 82.1% in 2015 to 63.9% in 2019.

Karamagi et al. (2018) conducted a study in Northern Uganda to analyse TB case notification and treatment success rates. The study utilized the QI-ACF intervention technique in 48 facilities targeting the key vulnerable people, professionals involved in district and facility teams in TB systems strengthening and individuals living with HIV, fishing communities, and prisoners, and trained health workers on national x-ray diagnosis guidelines for smear-negative patients. There was a notable increase in TB case notifications in the intervention districts from 171 to 223 per 100,000 population between 2016 and 2017. The researchers identified that the highest number of smear positive TB cases were identified through active case finding and among TB patient contacts.

In the Kenyan context, Kimani et al. (2021) conducted a retrospective study to determine the factors influencing TB interruption and treatment outcomes among patients in Kiambu. Data was obtained from the Tuberculosis Information Basic Unit (TIBU). The probabilities of time to treatment between intensive and continuation phases were analysed using the Kaplan-Meir curve, and the equality of curves was compared using Log-rank test statistics. Factors that influence treatment interruption were determined using the Cox proportion model. Based on the analysis, the overall treatment success rate was 66.8%. The key factors that influenced treatment outcomes included relocation and lack of knowledge. Treatment interruption was higher among patients in the intensive phase than in the continuation phase.

Katana et al. (2022) conducted a retrospective cohort study in Kilifi County to analyse TB's poor treatment outcomes and the factors associated with poor treatment success between 2012 and 2019. The outcome variables analysed included poor treatment outcomes, lost-to-follow-up (LTFU), death, transferred out, treatment failure, and drug resistance or successful treatment (cured or completed treatment). The analysis involved time-stratified survival regression analyses accounting for sub-county heterogeneity to determine the factors contributing to poor treatment outcomes. The analysis indicated that 16% of the patients had poor treatment outcomes, 7.3% died, 5.3% had LTFU, 2.8% transferred out, 0.7% had treatment failure, and 0.2% had multidrug resistance. There was an increase in the proportion of poor outcomes between 2012 and 2018, between 7.9% to 22.8%. In 2019, poor treatment outcomes declined slightly to 20%.

Notably, while case notification and treatment success are influenced by a range of structural, social, and clinical factors, the presence and consistent application of standardized treatment guidelines play a pivotal role in determining outcomes. National TB programs that integrate WHO-recommended protocols such as standardized diagnostic algorithms, treatment regimens, and directly observed therapy tend to report more favorable success rates, particularly when such guidelines are supported by adequate training and resource availability (World Health Organization, 2021). Studies such as those by Osei et al. (2019) and Katana et al. (2022), which observed suboptimal treatment outcomes, suggest that deviations from established clinical standards or inconsistent implementation may contribute to poorer performance. Conversely, stronger adherence to evidence-based protocols as seen in Bhutan (Penjor et al., 2021) correlates with sustained treatment success. These patterns underscore the practical relevance of the theoretical frameworks underpinning this study, particularly the emphasis of the Evidence-Based Management (EBM) Theory on the use of validated knowledge and standards to guide decision-making and optimize health system outcomes (Sohrabi & Zarghi, 2015).

Tuberculosis (TB) case notification and treatment success are critical for controlling TB spread and ensuring positive health outcomes. The studies reviewed indicate a varied performance across different regions and populations. For instance, Charles et al. (2017) reported improvements in case notification rates in Haiti but noted stable treatment success rates. Similarly, studies in Bhutan (Penjor et al., 2021) and Ethiopia (Limenh et al., 2024) highlighted significant treatment success rates, often above WHO recommendations, while Ghana's Volta region (Osei et al., 2019)

showed lower-than-expected outcomes. Factors such as HIV status, nutritional status, and geographic region influenced outcomes in many cases, reflecting the complexity of achieving both high case notification and treatment success rates.

2.3.2 Healthcare Management Strategies

Available literature or studies on the topic disclose the existence of various healthcare management strategies for improving TB case detection (notification) and treatment outcomes. Amare et al. (2023) conducted a systematic review and meta-analysis of randomized control trials and non-randomized control trials to determine the effectiveness of health professionals and volunteers training on TB case detection. The results indicated that the healthcare management strategies used in TB case notification and treatment success outcomes were highly effective in almost all the studies reviewed. The analysis results indicated that the effectiveness of TB case finding, case notification and treatment success rates were improved through the training for HCWs and volunteers. In all the studies reviewed, healthcare professionals and volunteers were trained on symptoms, diagnostic and screening techniques and TB treatment cases. Learning was done through hands-on training, on-the-job training, instructor-led training, demonstration, group-based training, and technology-based training. Thus, training of HCWs is a suitable healthcare management strategy for improving TB case detection and treatment results.

Chijioke-Akaniro et al. (2022) undertook research to determine how the effectiveness of TB case notification and treatment coverage in Nigeria can be improved based on data. The study was based on pre-and post-secondary TB programmed data that comprised data on increased supervisory visits, incentives for health workers, DOTS expansion, outreaches and geo-coding monitoring. There was an increase in case finding and case notification between 2017 and 2020 from 104,904 to 138,591. Between 2017 and 2018, case finding increased by 2% and by 13% between 2018 and 2019. There was an increase of 15% in case notifications between 2019 and 2010. Regarding treatment coverage, there was an increase of 20% between 2017 and 2018, 38% between 2018 and 2019, and 32% between 2019 and 2020.

Collin et al. (2019) conducted a systematic review to determine the effectiveness of interventions to reduce prevalence and improve case notification and treatment success in countries with low TB incidence in the European Union region. The study used stratified analyses based on direct or indirect effects on TB prevalence. While the review identified the need for stronger evidence to

support expert opinion and country experience when TB control policies are formulated, it highlights cross-border or international collaborations as proper healthcare management strategies for TB detection, prevention, control, and treatment. In his work *Tuberculosis Management in Developing Countries*, Al-Worafi (2023) substantiates Collins et al. (2019) finding on the crucial role cross-border or international collaborations play in TB detection and control, emphasising that international collaborations can help address social determinants of TB and ensure the continuity of care during emergencies. According to Collins et al. (2019), strategies like cross-border or international collaborations can support efforts towards reducing TB prevalence in the EU to meet the World Health Organization (WHO) End TB strategy goals. Collins et al. (2019) also attribute improved TB case notification and treatment success to robust and up-to-date evidence. In other words, the researchers acknowledge the role of real-time evidence or data shaping care management strategies for improved TB case detection and treatment outcomes.

The European Centre for Disease Prevention and Control (2014) conducted qualitative research in EU countries to determine the healthcare system factors (including management practices and strategies) influencing treatment results of patients with MDR TB. In its report, the institution identified several care management strategies for TB case detection and control (European Centre for Disease Prevention and Control., 2014). Accordingly, the institute noted that implementing rapid molecular drug-susceptibility testing in line with national TB ICP guidelines enabled timely diagnosis of MDR TB, allowing for better and prompt care services (European Centre for Disease Prevention and Control., 2014). It also identified management approaches such as intersectoral collaboration focussing on patients' clinical needs like the treatment regimen and co-management of substance dependencies. According to the institution, cross-border management of MDR TB cases through collaborative mechanisms for a range of care can also augment TB detection and treatment outcomes.

Burke et al. (2021) conducted a systematic review to analyse community-based active case-finding interventions for tuberculosis. The libraries used included PubMed, Embase, Scopus, and Cochrane, which focused on TB case notification rates, TB prevalence, and incidence of TB in children. The studies analysed were published between 1980 and 2020. In a cluster randomized trial in Zambia and South Africa, an active case-finding intervention based on community mobilization and sputum drop-off did not significantly reduce TB prevalence. On the contrary, a cluster randomized trial conducted in Vietnam and case-finding mechanisms based on sputum

tuberculosis tests for everyone helped to lower TB prevalence significantly. There was no sufficient evidence that active case finding increases the number of TB cases notified in populations with structural risk factors for tuberculosis.

Isangula et al. (2023) analysed the implementation of evidence-based multiple foci integrated intensified TB screening to end TB (EXIT-TB) package in East Africa, focusing on Kenya, Tanzania and Ethiopia. The study used a qualitative research design, and data was collected from healthcare workers, community health workers, and other stakeholders. The findings indicated that TB case notification and treatment success rates improved in patients with multi-drug-resistant patients. The program helped to reduce delays and waiting for diagnosis, increased the TB suspicion index, and helped decision-making among the healthcare workers involved in TB diagnosis and treatment. Tuberculosis case detection attributes included free X-ray services, integrating TB case-finding activities in other clinics and engaging improved infrastructure for TB screening, improved awareness creation and effective cooperation between healthcare workers involved in TB diagnosis and treatment, and adopting new simplified screening criteria.

Kairu et al. (2021) conducted a study to determine the cost of TB services in Kenya's healthcare facilities, focusing on 20 public and private health facilities from eight counties. Based on the data collected between 2017 and 2018, the study identified that the unit cost involved in passive case finding and treatment was relatively high and a huge barrier. This was particularly the case in the urban areas where the healthcare facilities offered a wider combination of tests. The lack of a wide range of services in rural areas has resulted in the referral of patients to urban facilities for diagnostic and additional tests not offered in rural facilities. This increased the burden on these facilities. The study identified the provision of sufficient resources and investment in TB services as key ways of improving case notification and treatment success.

Evaluating healthcare management strategies is critical for improving TB case notification and treatment outcomes. Studies like Amare et al. (2023) highlighted the importance of training healthcare workers and volunteers to enhance TB case detection and notification. Shah et al. (2022) pointed out gaps in the diagnostic care cascade, indicating that healthcare system inefficiencies and delays in diagnosis hindered effective case management. Moreover, Chijioke-Akiniro et al. (2022) found that interventions like increased supervisory visits and geo-coding techniques improved TB notification rates in Nigeria.

2.3.3 Barriers to Effective TB Case Notification and Treatment Within the Healthcare Management Framework

The available research on barriers to effective TB case notification and treatment within the healthcare management framework is limited, with most studies assuming a more general perspective, focusing on barriers to effective TB detection and treatment. However, some of these general barriers stem from poor management practices, indicating that, to some degree, management issues obstruct effective case notification. Besides, the limited research on barriers to effective TB case notification and treatment within the healthcare management framework suggests a conceptual gap in research that the current study aims to address as well.

One study that comes close to examining the barriers to effective TB case notification and treatment within the healthcare management framework is Ogbuabor et al. (2024) research. In a qualitative study conducted in Abia State, Nigeria, to identify enablers and barriers to the control of MDR TB, Ogbuabor et al. (2024) discovered that poor implementation of TB ICP policy, poorly motivated HCWs, HCW stigma, role conflict in data management, and shortage of personal protective equipment. All these barriers fall in the healthcare management framework since it is the role of healthcare managers to ensure effective implementation of TB ICP policy and guidelines, ensure HCWs are well motivated to execute or perform their functions, supported and valued, zero role conflict in data management, and adequate personal protective equipment at facility level.

Another study that comes close to investigating the barriers to effective TB case notification and treatment within the healthcare management framework is Conroy et al. (2021) systematic review to identify barriers and enablers to implementing TB control strategies in EU and EEA countries. Using 65 European Union (EU) based studies published between January 1, 1997, and November 6, 2020, Conroy et al. (2020) found that the most common obstacle to TB control strategies in EU and EEA nations is the divergence of healthcare practices from guidelines due to insufficient knowledge or perceived usefulness of these strategies by HCPs. This obstacle also stems from healthcare managers' inability to support training programmes to equip HCPs with adequate knowledge of the procedures and to align healthcare practices with TB ICP guidelines.

Teibo et al.'s (2024) systematic review to examine the barriers that interfere with access to TB diagnosis and treatment across countries globally also comes close to assessing the barriers to

effective TB case notification and treatment within the healthcare management framework. According to Teibo et al. (2024), the lack of decentralised TB diagnostic services, poor/inadequate human resources, insufficient knowledge of HCPs and poor facility coordination are some of the obstacles to effective TB detection and treatment. Typically, these are management issues as healthcare managers need to lead efforts towards establishing decentralised TB diagnostic services, ensuring adequate staffing, designing training programmes to equip HCPs with adequate knowledge, and overseeing facility coordination.

Fenta et al. (2023) studied the facilitators and barriers to TB active case findings in low-and middle-income countries. The study involved a systematic review of qualitative research using various databases, including Google Scholar, PubMed, SCOPUS, HINARI, and other relevant reference databases. The TB active case finding results were generated based on barriers and facilitators in low- and medium-income countries and two sub-themes of the barriers, which are healthcare-related and non-healthcare-related factors. The health-related factors that influenced TB case findings included the experience of the health workers and their knowledge and skills in detecting TB active case finding, distance to the healthcare facilities, time, availability and workload of healthcare workers involved in active case finding. Other barriers to active case findings and case notification included a lack of resources such as diagnostic equipment, reagents, and consumables at TB-active case finding and poor training of the existing and new healthcare workers involved in active case finding and notification. Some of these barriers, including inadequate knowledge and skill of HCWs and lack of or poor training, can be traced back to ineffectiveness in management.

Der et al. (2022) conducted a study to determine barriers to PTB case findings and case notification in primary and secondary health facilities in four rural areas of Ghana. The study involved structured clinic observation and in-depth interviews with 12 healthcare workers, including five who were trained in TB case detection and notification. The transcripts used in the interview and clinical observation data were organized manually, triangulated, and analysed to identify health system-related and HCW-related barriers. The key health-related barriers identified from the analysis included a lack of TB diagnostic laboratories in rural health facilities and a lack of a standard referral system to the municipal hospital for further assessment and TB testing. Also, missed opportunities for early diagnosis of TB were driven by suboptimal screening practices of healthcare workers whose application of the national standard

operating procedures (SOP) for TB case detection and notification was inconsistent. Poor case notification and treatment success rates also resulted from poor infection prevention and control measures. Other barriers to TB case notification and treatment outcomes included lack of training on case detection and notification guidelines, fear of infection, which was increased by lack of suitable personal protective equipment and poor and lack of motivation among HCWs involved in TB case finding, case notification and poor treatment outcomes. Most of these barriers fall under the management category since they can be addressed or solved from a management perspective.

Zinatsa et al. (2018) conducted a qualitative case study in the Mangaung Metropolitan District, South Africa, to determine the barriers and strategies used to improve TB infection control in primary healthcare factors. Based on the data obtained from TB nurses and facility managers, which was analysed using the Information Motivation and Behaviour (IMB) Model, the study identified that the key barriers to TB case notification and infection control included poor motivation among healthcare workers, poor training and conflicting policy guidelines, negative attitudes of healthcare workers, poor district health support and general health system challenges.

2.4 Summary of Research Gaps

In pursuing effective TB management, existing literature highlights various barriers to case notification and treatment success. These barriers range from healthcare-related factors, such as inadequate training and resource limitations, to non-healthcare-related issues, including socioeconomic influences and community awareness (Teibo et al., 2024; Fenta et al., 2023). Despite significant findings across multiple studies, several critical research gaps remain unaddressed, particularly in low- and middle-income countries. For instance, while the importance of community engagement and healthcare worker motivation is acknowledged, specific strategies to enhance these areas have not been sufficiently explored (Der et al., 2022). Understanding the nuances of these challenges is vital for developing comprehensive strategies that can lead to improved TB outcomes, particularly in resource-constrained settings.

Existing literature provides valuable insights into community-based active case finding and intensified screening efforts, with several studies demonstrating promising results in improving TB case notification and treatment outcomes. However, the integration of innovative approaches and the evaluation of existing interventions have been inadequately addressed. There is a notable

lack of longitudinal data assessing the long-term impact of these initiatives on TB case notification and treatment success (Isangula et al., 2023; Burke et al., 2021). Furthermore, the interplay between healthcare systems and socio-economic factors remains underexplored, particularly concerning how these dynamics influence patient adherence and healthcare worker engagement (Zinatsa et al., 2018). By identifying these gaps, researchers and policymakers can better understand the multifaceted challenges within healthcare systems and design targeted interventions that address the unique needs of diverse populations.

Table 2.1: Research Gaps

Author	Title	Findings	Research Gap
Teibo et al. (2024)	Barriers to Effective Tuberculosis Case Notification in Sub-Saharan Africa	Numerous barriers hinder timely diagnosis, reporting, and treatment of TB within the healthcare management framework.	The study lacks a detailed analysis of how these barriers differ across healthcare settings, particularly in rural versus urban areas.
Fenta et al. (2023)	Facilitators and barriers to TB active case findings in low- and middle-income countries	Barriers included a lack of healthcare worker expertise, distance to health facilities, limited resources, and inadequate training.	The study focuses on low- and middle-income countries but lacks country-specific contextual analysis for a more tailored TB management approach.
Pradipta et al. (2021)	Barriers and strategies to successful tuberculosis treatment in a high-burden TB setting	Barriers included socio-demographic factors, knowledge gaps, and economic challenges impacting TB treatment.	Limited exploration of specific policy interventions to address the socio-demographic and economic barriers identified in high-burden settings.
Der et al. (2022)	Barriers to TB case findings and case notification in primary and secondary health facilities	A lack of TB diagnostic labs, inconsistent case detection, and insufficient infection prevention were key barriers in rural Ghana.	The study only covers rural areas in Ghana and lacks a comparative analysis of rural versus urban settings within or across other African contexts.

Zinatsa et al. (2018)	Barriers and strategies to improve TB infection control in primary healthcare factors	Poor motivation, training gaps, and inconsistent policy guidelines were the key barriers identified in South Africa's primary healthcare system.	No detailed exploration of how healthcare worker motivation and support systems can be sustainably improved to enhance TB case notification and treatment.
Zinatsa et al. (2018)	Barriers and strategies to improve TB infection control in primary healthcare factors	Poor motivation, training gaps, and inconsistent policy guidelines were the key barriers identified in South Africa's primary healthcare system.	No detailed exploration of how healthcare worker motivation and support systems can be sustainably improved to enhance TB case notification and treatment.
Collin et al. (2019)	Effectiveness of interventions to reduce TB prevalence in low- incidence EU countries	Community-based active case-finding initiatives were effective, but evidence was insufficient for certain high-risk populations.	Limited focus on how community-based interventions can be adapted and scaled in countries outside the EU, particularly in high TB-burden regions like Africa.
Collin et al. (2019)	Effectiveness of interventions to reduce TB prevalence in low- incidence EU countries	Community-based active case-finding initiatives were effective, but evidence was insufficient for certain high-risk populations.	Limited focus on how community-based interventions can be adapted and scaled in countries outside the EU, particularly in high TB-burden regions like Africa.
Burke et al. (2021)	Community-based active case-finding interventions for tuberculosis	Case-finding interventions like sputum tests significantly lowered TB prevalence in some settings, while others showed limited effects.	The study lacks an exploration of structural risk factors that may influence the varying effectiveness of interventions across different contexts and populations.
Kairu et al. (2021)	The cost of TB services in healthcare facilities in	High unit costs for TB case finding in urban areas, with patients in rural areas often referred to urban centres for	Insufficient discussion on strategies to reduce TB service costs and improve access to diagnostic services in rural areas

	Kenya	more comprehensive diagnostic services.	of Kenya.

Source: Author (2024)

2.5 Conceptual Framework

The study aims to examine healthcare management strategies to improve TB case notification and treatment success rates while also identifying the potential barriers to effective healthcare management strategies for TB case notification and treatment success rates. Literature has shown numerous healthcare management strategies for TB detection and control exist, with some notable differences in healthcare management strategies for high-income countries and LMICs. It has also shown that effectively implementing the right healthcare management strategies guarantees better TB case detection and treatment outcomes. Occasionally, some obstacles could impede this effective implementation, undermining TB detection and treatment while exposing patients and even HCWs to severe health risks. This conceptual framework explicitly shows the link between the variables (independent and dependent variables) under study to investigate the relationships between healthcare management strategies (independent variable), TB case notification (dependent variable) and TB treatment success rates (dependent variable). The conceptual framework is essential to draw a plan of the inter-relationships between concepts or variables to direct an inquiry into their interaction and effect. The conceptual framework of the study is thus illustrated in Figure 2.1 below.

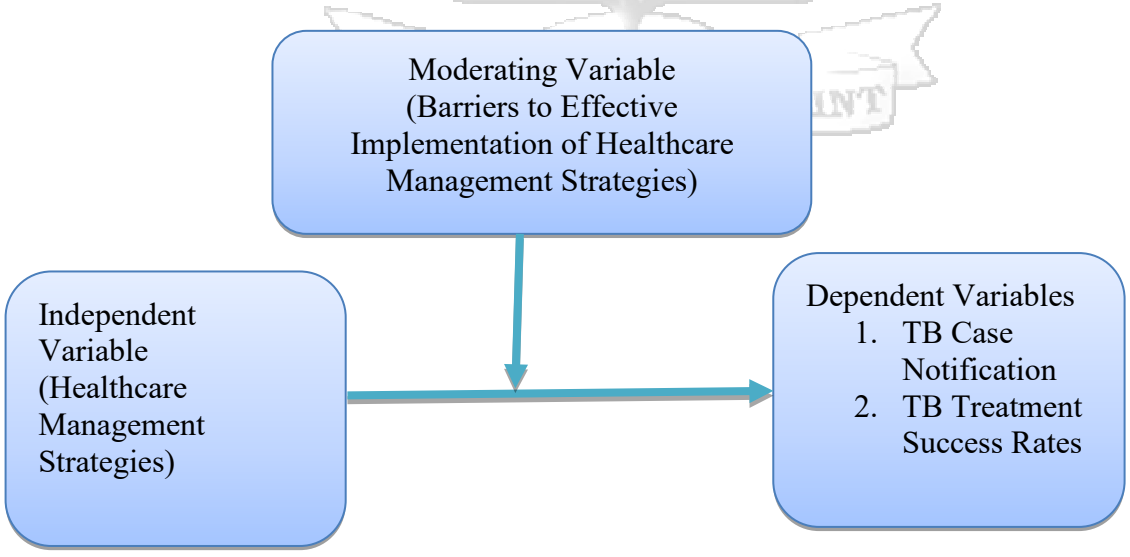

Figure 2.1: Conceptual Framework

Source: Author (2024)

Figure 2.1 above presents the proposed conceptual framework for investigating the link between healthcare management strategies, barriers (Barriers to Effective Implementation of Healthcare Management Strategies), and outcomes (TB case notification and TB treatment success rates). The framework hypothesises multiple variables relative to healthcare management practices, TB case notification, and treatment success rates. It is based on a multi-theoretical framework involving Management in Health Theory, EBM theory, and the UM model. It is also founded on research on healthcare management strategies, TB case detection (or notification), and TB control (or treatment). The conceptual framework for the study, as seen in Figure 2.1 above, contains four categories of variables: the independent variable, the dependent variables, the moderating variables, and the mediating variables.

This study focuses on effectively implementing healthcare management strategies for TB case detection and treatment. The proposed conceptual framework has one independent variable, healthcare management strategies, and it was assessed in the context of Makueni County. Healthcare management will be evaluated through seven variables: Training of HCWs and CHWs; TB Screening; Community-based active case-finding interventions; Investment in TB Services; Decentralisation of TB services; Geo-coding monitoring; and collaborations with private HCPs.

Healthcare management strategies are linked to TB case notification and treatment success rates. The literature review indicates that previous research associates healthcare management strategies with improved TB case notification and treatment success. Thus, the dependent variables for this study are TB case notification and TB treatment success rates.

TB case notification is about the overall success of healthcare management strategies in improving its intended objective of improved TB case detection. It was assessed through TB case detection, which entailed the degree to which healthcare management strategies, including Training of HCPs, HCWs, and CHWs; TB Screening; Community-based active case-finding interventions; Investment in TB Services; and Decentralisation of TB services increase the detection or notification rate of TB cases.

TB treatment success rates are about the overall success of healthcare management strategies in improving the intended objective of quality treatment outcomes. It was assessed using the

percentage rate of those who have fully recovered from TB. This entailed the degree to which healthcare management strategies, including Training of HCPs, HCWs, and CHWs; TB Screening; Community-based active case-finding interventions; Investment in TB Services; and Decentralisation of TB services contribute to full recovery from TB.

Implementing healthcare management strategies for TB case detection and treatment is complex. Previous studies have noted the existence of barriers or obstacles to effective implementation. This means that other factors are more likely to influence the effective implementation of healthcare management strategies for TB case detection and treatment. Research, for instance, has partially highlighted problems in management as a factor undermining the effective implementation of healthcare management strategies and their capacity to realise better TB case detection and treatment success rates. Thus, barriers to effectively implementing healthcare management strategies for improved TB case detection and treatment success are the study's moderating variable, as denoted in Figure 2.1 (conceptual framework). Barriers to effective implementation primarily refer to the factors that shape the effectiveness of healthcare management strategies, and it was assessed using six variables: nonadherence to TB IPC policy/guidelines, poor data management, poorly motivated HCWs, inadequate human resources, and poor facility coordination.

2.6 Operationalization of Variables

Table 2.2: Operationalization of Variables

Variables	Indicators	Rating scale	Empirical review
Healthcare Management Strategies	• Training of HCPs, HCWs, and CHWs • TB Screening • Community-based active case-finding interventions, e.g. community TB outreach initiatives • Decentralisation of TB services • Investment in TB services • Geocoding monitoring	• 4-point Likert scale • Strongly Agree, Agree, Disagree, Strongly Disagree	(Telisinghe et al., 2021). (Amare et al., 2023) (Shah et al., 2022) (Chijioke-Akaniro et al., 2022), (Bulabula et al., 2019) (Legesse et al., 2020)

TB Case notification	• TB case detection (change in TB case detection)	• 4-Point Likert Scale • Significantly Improved, Moderately Improved, Somewhat Improved, Not Improved at All	(Sohn et al., 2021) (Khawbung, et al., 2021) (Charles et al., 2017) (Penjor et al., 2021) (Osei et al., 2019) (Limenh et al., 2024) (Baluku et al., 2022)
TB Treatment Success	• Percentage rate of those who have fully recovered from TB	• 4-Point Likert Scale • Very High, Moderately High, Somewhat High, Very Low/Poor	(Karamagi et al., 2018) (Kimani et al., 2021) (Katana et al., 2022)
Barriers to Effective Implementation of Healthcare Management Strategies	• Non-adherence to TB ICP policy or guidelines • Poorly motivated HCWs, CHWs • Poor data management • Inadequate human resources • Poor facility Coordination	• 4-point Likert scale strongly	(Fenta et al., 2023) (Pradipta et al., 2021) (Der et al., 2022) (Zinatsa et al., 2018)

Source: Author (2024)

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presented the research methodology. It discussed the methods and procedures that were used to conduct the study. The pertinent issues covered in this chapter included research design, population and sampling, target population, sampling technique, sample size determination, data collection methods, data collection procedures, pilot test study, reliability and validity analysis, data analysis and presentation, and ethical consideration.

3.2 Research Design

A research design refers to a plan stipulating how a research study is conducted to meet the research objectives and answer the research questions. The research design entails the methods and procedures used to collect and analyse data to answer the research questions (Mahat, Neupane & Shrestha, 2024). In this study, a descriptive survey research design was used. According to Siedlecki (2019), this research method leverages surveys to gather information about a phenomenon or population, offering descriptions accurately and systematically. Siedlecki (2019) also noted that the descriptive survey research design is suitable for answering what, where, when, and how questions but not why. Thus, this approach was considered as it offered insights into how healthcare management strategies contributed to improved TB case notification and treatment success rates. Besides, the method was prioritised as it was cost-effective and quick.

3.3 Population and Sampling

3.3.1 Target Population

The target population refers to the individuals or items the researcher intends to study and draw conclusions from. The target population has common traits, and it is from this population that a sample is drawn to generalize findings (Dahabreh, 2020). This study focused on Makueni County Referral Hospital – the biggest referral health facility offering high-quality specialist and general services to the people of Makueni County. We selected Makueni County Referral Hospital for easy data collection, logistics and uniformity. The respondents of interest included all the outpatient department staff members at Makueni County Referral Hospital.

Table 3.1: Population Distribution

Staff	Population
Management Team	2
Medical Doctors	12
Clinical Officers	30
Nurses	117
Medical Lab Officers	17
Health Records Officers	12
Pharmaceutical technologists	7
Psychological counsellors	5
Support Staff, Social workers, Nutritionists	15
Community Health Assistants	3
Total	**220**

Source: Health Service Department Makueni County (2024)

3.3.2 Sampling Technique

Data collected in a study is meant to contribute to a good understanding of the theoretical framework of the research (Clark & Vealé, 2018). Therefore, it was crucial to ensure that participants were selected based on sound judgment to ensure the data was representative. Participants were selected using purposive sampling. This non-probability sampling technique involved deliberately selecting respondents based on their specialised knowledge (Sarstedt et al., 2018). All the target respondents were engaged in TB diagnosis and treatment in some capacity, thus placing them in a better position to provide reliable data and information regarding healthcare management strategies, TB case notification, and treatment success rates.

3.3.3 Sample Size Determination

A sample is a subsection of the target population selected and analysed to draw general conclusions about the total population (Rahman, 2023). The sample size was computed using Slovin's formula, as the total population was known. This method ensured the sample was representative of the target population, allowing for valid generalizations (Ryan, 2013).

Slovin's Formula (Ryan, 2013)

$$n = \frac{N}{1+N(e^2)}$$

Where,

n = Sample Size,

N = Population Size, and

e = Margin of Error, which is 0.05 since the study maintains a confidence level of 95 per cent.

Using Slovin's Formula, an ideal sample size was obtained from the target population of 213 outpatient department staff members.

$$n = \frac{220}{1+220(0.05^2)}$$

n = 142

Table 3.2: Sample Size Distribution

Staff	**Population**	**Sample**
Management Team	2	1
Medical Doctors	12	8
Clinical Officers	30	19
Nurses	117	75
Medical Lab Officers	17	11
Health Records Officers	12	8
Pharmaceutical technologists	7	5
Psychological counsellors	5	3
Support Staff, Social workers, Nutritionists	15	10
Community Health Assistants	3	2
Total	**220**	**142**

Source: Author (2024)

3.4 Data Collection Methods

Data collection methods refer to how the study obtains the data needed for analysis (Khoa, Hung, & Hejsalem-Brahmi, 2023). In this study, we collected primary data, enabling the researcher to

gather first-hand accounts of respondents' perceptions regarding the research phenomenon. Therefore, we used a survey questionnaire to gather data from the selected hospital staff since the target respondents were easily accessible. The questionnaire contained both closed-ended and open-ended questions. Closed-ended questions provided structured responses, while open-ended questions allowed respondents to provide more detailed answers. These questions ensured comprehensive data collection and capturing of rich insights into healthcare management strategies for TB case notification and treatment success rates in Makueni County. The questionnaire was divided into sections for clarity: demographic data, current TB case notification and treatment success rates, healthcare management strategies, and barriers to effective implementation of healthcare management strategies.

3.4.1 Data Collection Procedures

The researcher collected data with the help of four trained research assistants. The research assistants were trained to administer questionnaires and convince respondents to provide data. A thorough introduction was given to respondents to ensure informed consent before participation. The questionnaires were administered face-to-face, helping to build rapport with respondents and improve the response rate (Pagliarin, Mendola, & Vis, 2023). However, a digitised questionnaire was generated using the Kobo Collect tool and made available just in case some participants were unavailable to reach (so that they could fill it out at their convenience) and were uncomfortable with a face-to-face encounter.

3.5 Data Analysis

The data collected was sorted, edited, and cleaned to prepare it for analysis. Quantitative analysis was done using the Statistical Package for Social Sciences (SPSS version 26). This was done using both descriptive and inferential techniques. Descriptive analysis involves summarising and describing the main features of the data. It entailed measures of frequencies and percentages, central tendency measures, and dispersion measures. Measures of frequencies and percentages were applied to categorical variables (e.g. gender, age, marital status), where the frequency of each response was calculated and expressed as a percentage of the total responses. Measures of central tendency entailed computing the mean, median, and mode to summarise the responses from the Likert scale questions. Measures of dispersion focused on the standard deviation or variance to assess the variability in responses. Inferential analysis was used to determine the

relationship between the independent and the dependent variables. This was achieved using the Chi-Square Test.

3.6 Research Quality

Research quality pertained to the degree of reliability and validity of the instruments used in the study. High-quality research instruments accurately captured the intended constructs, ensuring that the data collected reflected the research phenomenon accurately (Dahal, 2023). A pilot test was conducted to ensure quality, and feedback was used to improve the instruments. Additionally, the validity and reliability of the instruments were tested.

3.6.1 Pilot Test Study

A pilot study was conducted before the main data collection. This was a preliminary and small-scale trial conducted before the full-scale implementation of a research study (Obodo, 2024). This study aimed to determine the potential issues, test the research tools and procedures, and ensure that the main study was well-planned and designed. Also, the purpose of a pilot study was to improve the reliability of the research instruments. A pilot study was conducted at Makindu Sub County Hospital.

3.6.2 Reliability

Reliability refers to the consistency of the research instruments in yielding the same results over repeated trials (Dehalwar & Sharma, 2023). In this research, the reliability of the questionnaires was assessed using the test-retest method. The internal consistency of the questionnaire was evaluated using Cronbach's Alpha, with a cut-off point of 0.7, to ensure acceptable reliability (Field, 2018).

3.6.3 Validity

Validity refers to the extent to which the research instruments accurately measure what they are intended to measure (Kumari et al., 2023). Expert judgment was used to assess the content validity of the instruments, ensuring the questions were aligned with the research objectives. The research supervisor reviewed the instruments to ensure clarity and sufficiency in addressing the research questions.

3.7 Ethical Considerations

This being a social science research study, researchers observed ethical guidelines and standards to protect the rights and welfare of the respondents. The research was guided by ethical principles outlined in The Belmont Report (1979), emphasising respect for persons, beneficence, and justice. In this regard, the researcher ensured that privacy, anonymity, discretion, legality, and professionalism are upheld throughout the research process (Mertens, 2018). First, the researcher applied for ethical review to Strathmore University Institutional Scientific and Ethical Review Committee reference number SU-ISERC2513/24. Upon approval, the researcher sought permission from the Makueni County Referral Hospital to conduct the study and obtained a research permit from the National Commission for Science, Technology, and Innovation (NACOSTI) reference number 181529. These approvals and permits ensured the study is conducted in line with legal and ethical standards and helped to gain the trust of respondents.

Before data collection, participants were thoroughly briefed on the study's purpose, objectives, procedures, and their role in the study. This ensured that respondents gave informed consent voluntarily and understood their rights, including the ability to withdraw from the study at any point without any negative consequences (The Belmont Report, 1979).

Confidentiality was a key consideration. The researcher assured respondents that their privacy would be protected and no identifying information would be disclosed. Instead, codes and pseudonyms were used to replace real names, ensuring anonymity (Rudolph et al., 2020). Additionally, the data collected was securely stored and only accessible to authorized personnel involved in the research. Any audio recordings were only made with the respondents' permission, and these recordings were stored securely.

Protection from harm was another ethical priority. The researcher ensured respondents were not physically or psychologically harmed during the study. The data collection process was designed to minimize discomfort, and interviews were conducted in private settings to safeguard respondents' dignity and well-being. Furthermore, participants were not exposed to any social disadvantage, psychological distress, or privacy invasion because of their participation.

The data collected was used exclusively for academic purposes, such as informing public health policy, advocacy, and designing interventions to improve TB case notification and treatment success rates in Makueni County. The researcher ensured the findings were reported accurately,

without bias or misrepresentation, and the final data was stored securely to prevent unauthorized access.

Adhering to ethical guidelines throughout the study ensured that respondents' rights were respected, data integrity was maintained, and the findings contributed meaningfully to public health efforts without compromising the ethical integrity of the research (Mertens, 2018; The Belmont Report, 1979).

CHAPTER FOUR

DATA ANALYSIS, FINDINGS AND DISCUSSION

4.1 Introduction

This chapter presented the findings on the healthcare management strategies to improve tuberculosis case notification and treatment success rates in Makueni County Referral Hospital. Specifically, the chapter presented the demographic information of the respondents, the current TB case notification and treatment success rates in Makueni County, the effectiveness of existing healthcare management strategies in improving TB case notification and treatment outcomes, key barriers to effective TB case notification and treatment within the healthcare management framework, and strategies for improving TB case notification and treatment success rates based on the study findings.

4.2 Response Rate

The researcher administered 142 questionnaires, out of which 122 were duly filled, yielding a response rate of 85.9%. While response rate thresholds vary by context, this level was generally considered high and acceptable for descriptive survey designs conducted within a defined, controlled population such as a single healthcare facility (Fincham, 2008). In such settings, a high response rate helps minimise the risk of non-response bias and supports the representativeness of the findings (Baruch & Holtom, 2008). In this study, the strong participation rate added credibility to the conclusions drawn about healthcare management strategies to improve TB case notification and treatment success rates in Makueni County Referral Hospital. The high response was facilitated by the rapport built with participants, the clarity of the research tool, and the perceived relevance of the study's objectives.

The response and non-response rates are presented in Table 4.1.

Table 4.1: Response rate

Response and Non-response	Frequency	Percent
Response	122	85.9%
Nonresponse	20	14.1%
Total	**142**	**100.0**

4.2.1 Demographic Analysis

Analysis in this section sought to determine the demographic data of the respondents. The variables analysed here included sex, age, marital status, occupation status, job position/description/professional category, education level, and years worked at the facility. The findings are presented in the table below.

Table 4.2: Demographic Analysis

Variable	Number	Percent
Sex		
Male	51	41.8
Female	71	58.2
Age		
18 to 30 years	33	27
31 to 40 years	49	40.2
41-50 years	25	20.5
51 years and above	15	12.3
Marital Status		
Single	38	31.1
Married	63	51.6
Divorced	6	4.9
Widowed	3	2.5
Not Indicated	12	9.8
Occupation Status		
Permanently Employed	80	65.6
Contract	34	27.9

Internship	8	6.6
Job Position		
Management team	1	.8
Medical doctors	7	5.7
Clinical officers	16	13.1
Nurses	72	59.0
Medical lab officers	7	5.7
Health records officers	8	6.6
Pharmaceutical technologies	3	2.5
Psychological counsellors	1	.8
Support staff, social workers, Nutritionists	6	4.9
Community Health Assistants	1	.8
Education level		
Diploma	62	50.8
Bachelor's Degree	33	27.0
Master's Degree	8	6.6
Others	19	15.6
Years worked at the facility.		
Above 10 years	25	20.5
6 to 10 Years	37	30.3
1 to 5 Years	55	45.1
Less than 1 Year	5	4.1

The gender findings indicated that 58.2% were females and 41.8% were males. The findings imply that the majority of the respondents were female, indicating that the workforce in Makueni

County Referral Hospital was predominantly female. On gender, the findings indicated that 40.16% were aged between 31-40 years, 27.05% were aged between 18-30 years, 20.49 were aged between 41-50 years, and 12.30% were aged 51 years and above. Cumulatively, most respondents were young, between 18 and 40 years old. This age distribution indicates a predominantly energetic and potentially adaptable workforce, which could be advantageous in implementing healthcare management strategies for TB control. At the same time, older respondents, though in smaller numbers, provide a reservoir of experience and expertise. On marital status, 51.6% were married, 31.1% were single, 4.9% were divorced, 2.5% were widowed, and 9.8% did not indicate their marital status. The results indicate a diverse marital profile among healthcare professionals involved in TB management.

The findings of the occupation status indicated that 65.57% were permanently employed, 27.87% were employed on a contract basis, and 6.56% were on an internship. The findings indicate that most of the workforce is stable, with a significant proportion of staff permanently employed. This suggests continuity and experience within the hospital, which is beneficial for consistent TB management. On occupation of the respondents, 59% of the respondents were nurses, 13.1% were clinical officers, 5.7% were medical officers, 5.7% were medical lab officers, 6.6% were health records officers, 2.5% were pharmaceutical technologists, 0.8% were from the management team, 0.8% were psychological councillors, 0.8% were community health assistants, 2.5% pharmaceutical technologists and 4.9% were support staff, social workers, nutritionists. The findings indicated that the sample was representative, and the diverse representation of healthcare professionals improves the depth and reliability of the findings.

The findings of the education level indicated that 50.8% hold a diploma, 27% have a bachelor's degree, 6.6% possess a master's degree, no respondents have a PhD, and 15.6% have other academic qualifications. Cumulatively, most of the respondents had diplomas and bachelor's degrees. The presence of respondents with master's degrees indicates that besides those with mid-level qualifications, there were healthcare practitioners with higher-level expertise. The findings suggest that the healthcare workforce at Makueni County Referral Hospital comprises mid-level professionals, with a notable presence of individuals possessing higher-level expertise. This distribution indicates a balanced mix of practical skills and advanced knowledge, which can contribute to effective TB management.

For the duration the respondents had worked in Makueni County Referral Hospital, 4.1% had worked at the facility for less than 1 year, 45.1% had worked at the facility for 1-5 years, 30.3% had worked at the hospital for 6-10 years, and 20.5% of the respondents had worked at the institution for more than 10 years. The findings suggest that the majority of healthcare workers at Makueni County Referral Hospital have considerable experience, with a significant portion having worked at the facility for more than five years. This indicates that the Makueni County Referral Hospital workforce is familiar with the hospital's TB management systems, protocols, and challenges.

During data collection, questionnaires were administered both face-to-face and via online channels. Although the study did not initially aim to compare outcomes between these two groups, a post hoc review revealed no notable variation in demographic distribution (such as gender and age) or in responses to key variables across the two modes. Both response formats produced proportionate insights across most indicators, suggesting minimal mode-induced bias in this context. Nonetheless, acknowledging the mixed-mode administration is important, as emerging research highlights the need for careful interpretation when multiple data collection channels are used, due to potential differences in respondent engagement, comprehension, or candour (de Leeuw, 2005). A simple comparative table can be included in the appendix to illustrate this balance.

4.3 Descriptive Analysis

This section presents a descriptive analysis of TB case notification and treatment success rates, the effectiveness of the existing healthcare management strategies and barriers to effective implementation of healthcare management strategies.

4.3.1 TB Case Notification and Treatment Success Rates

Analysis in this section was done to determine the current TB case notification and treatment success rate. The respondents were asked to indicate how they perceive the current state of TB case notification. The findings are presented in Figure 4.1.

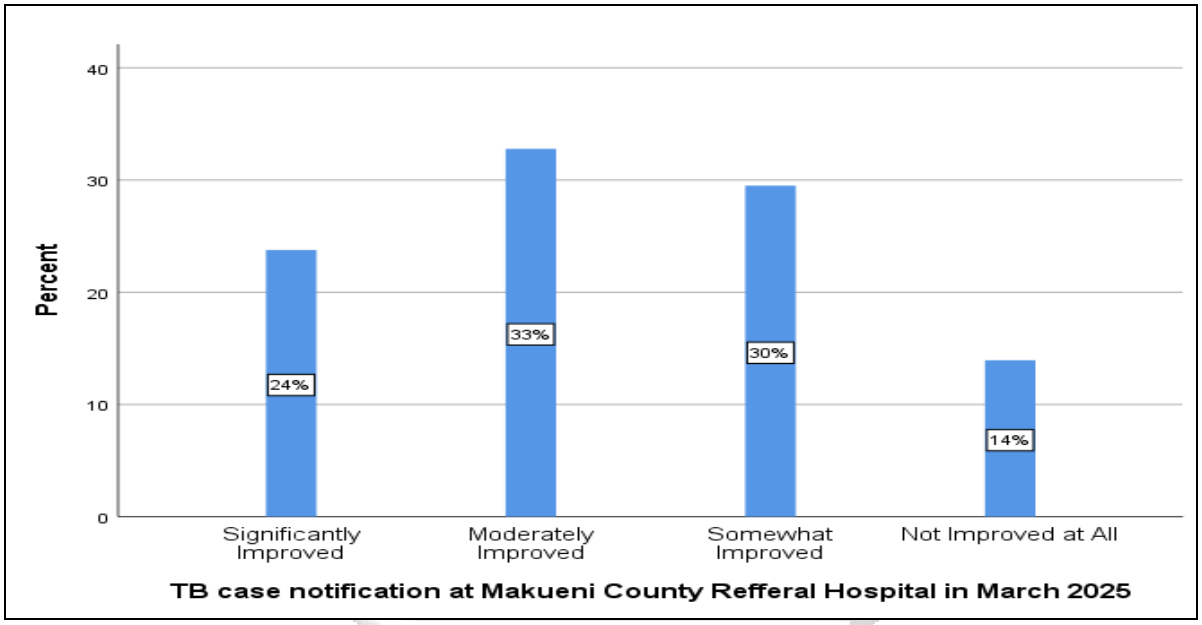

Figure 4.1: Current TB Case Notification

Based on the analysis, 33% of the respondents reported that the current state of TB case notification has improved moderately, 29.5% opined that the current state has somewhat improved, and 14% reported that the current state has not improved. Only a small proportion reported that the current state of TB case notification has improved significantly, as shown by 23.5%. The findings suggest that although efforts to improve TB case notification in Makueni County have yielded some progress, there is still room for further improvement. Many respondents recognize improvements, though the extent of progress differs. While some respondents feel notable progress, others feel the improvements are limited or moderate. On the current state of TB treatment success, 41% reported that the current state of TB treatment success is moderately high, 25% reported that the treatment success is somewhat high, 14% reported that the treatment success rate is very low, and 20% had the opinion that the current state of TB treatment was very high. The findings indicate that although TB treatment in Makueni County is generally effective, perspectives on its success differ, and there is a need for more efforts to improve the success rates. The findings are presented in Figure 4.2;

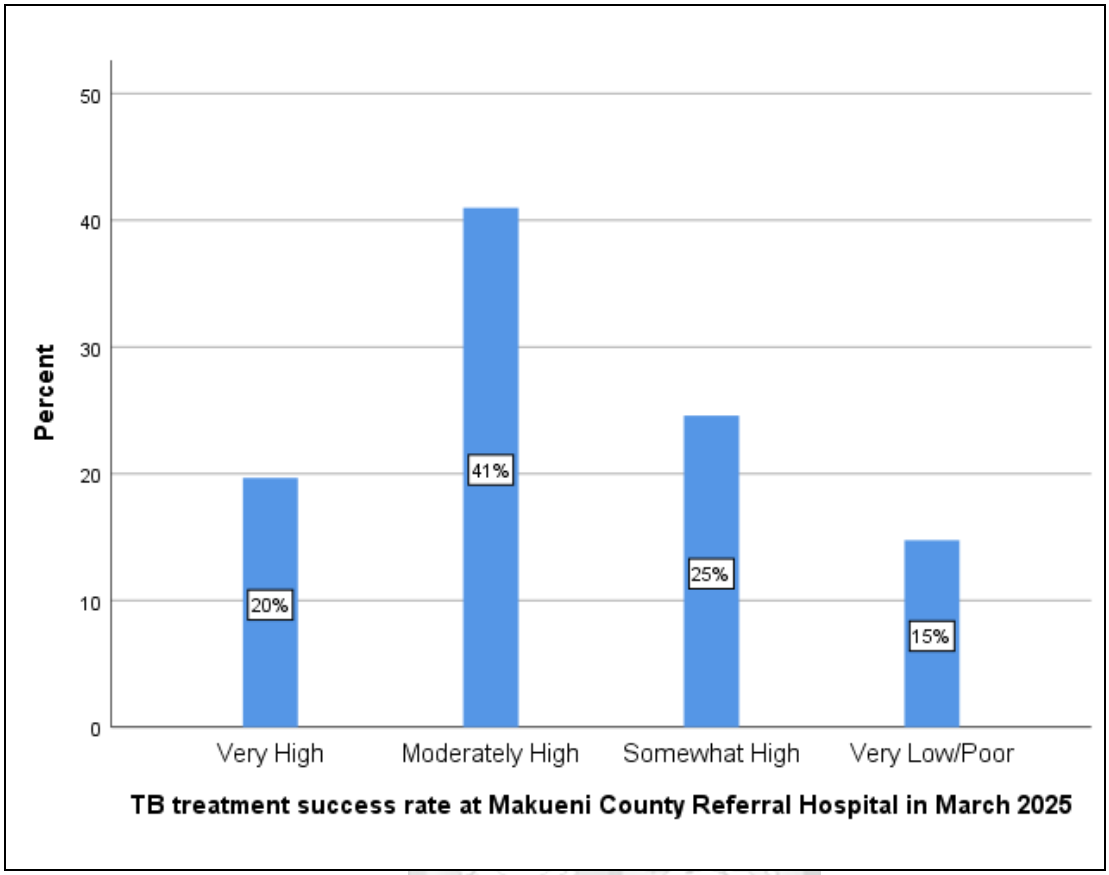

Figure 4.2: The current state of TB treatment success

4.3.2 Effectiveness of Existing Healthcare Management Strategies

The analysis in this section sought to examine healthcare management strategies at Makueni County Referral Hospital. The respondents were asked to rate various statements on healthcare management strategies for TB control at the facility. The findings are presented in Table 4.3;

Table 4.3: Healthcare Management Strategies for TB Control at Makueni County Referral Hospital

Statement	N	Mean	SD
The facility offers healthcare workers training on how to manage TB	122	4.7377	.54247
The facility offers and supports community-based active case-finding interventions for TB	122	4.7951	.40531
The facility encourages TB screening for patients who present mild symptoms of TB	122	4.6721	.53694

The facility has adequately invested in TB services, e.g., personal protective equipment	122	4.7295	.53066
The facility has decentralized TB services	122	4.7623	.46450
The facility encourages/supports Geo-coding monitoring for TB	122	4.8033	.53996
The facility embraces collaborations with private healthcare providers	122	4.0574	.63375

Based on the analysis results, the respondents strongly agreed that the hospital offers healthcare workers training on how to manage TB (Mean=4.7377, SD=.54247), that the facility offers and supports community-based active case finding interventions for TB (Mean=4.7951, SD=.40531), that the facility encourages TB screening for patients who present mild symptoms of TB (Mean=4.6721, SD=.53694). The respondents also strongly agreed that Makueni County Referral Hospital has adequately invested in TB services, e.g., personal protective equipment (Mean=4.7295, SD=.53066), that the facility has decentralized TB services (Mean=4.7623, SD=.46450) and that the facility encourages/supports Geo-coding monitoring for TB (Mean, SD=4.8033, SD=.53996). They agreed that the facility embraces collaborations with private healthcare providers (Mean=4.0574, SD=.6337).

The findings indicate that Makueni County Referral Hospital has made significant investments in TB management, as indicated by the facility's strong support for healthcare worker training, active case finding, and early screening for patients with mild symptoms. The decentralization of TB services, provision of essential resources such as personal protective equipment, and use of geo-coding for monitoring indicate that the hospital has a proactive and well-structured approach to TB case notification and treatment. In addition, although the hospital collaborates with private healthcare providers, the findings indicate that there is a need for the partnerships to be strengthened.

4.3.3 Barriers to Effective Implementation of Healthcare Management Strategies

The barriers to the effective implementation of healthcare management strategies for TB were analysed in this section. To achieve this, the respondents were asked to indicate the extent to which various challenges hinder the implementation of healthcare management strategies for TB.

Table 4.4: Barriers to effective implementation of healthcare management strategies for TB

Barriers	N	Mean	SD

Non-adherence to TB infection control and prevention guidelines	122	3.8934	.38154
Poorly motivated healthcare workers, including community health workers	122	3.6148	.64854
Poor data management	122	2.1721	.61244
Inadequate human resources	122	2.1230	.55414
Poor facility coordination	122	3.2459	1.97217

The analysis findings indicated that the respondent's nonadherence to TB control and infection guidelines hindered the implementation of healthcare management strategies for TB to a large extent (Mean=3.8934, SD=.38154). Also, poorly motivated healthcare workers, including community health workers, hindered the implementation of the strategies to a large extent (Men=3.6148, SD=.64854). The respondents reported that poor data management (Mean=2.1721, SD=.61244) and inadequate human resources (Mean=2.1230, SD=.55414) hindered the implementation of healthcare management strategies for TB to a small extent. Poor facility coordination somewhat hindered the implementation of healthcare management strategies for TB to a small extent (Mean=3.2459, SD=1.97217).

The findings imply that non-adherence to TB infection control guidelines and low motivation among healthcare workers are significant barriers to effectively implementing TB management strategies at Makueni County Referral Hospital. These challenges could compromise infection prevention efforts and reduce the overall efficiency of TB control programs. On the other hand, poor data management, inadequate human resources, and poor facility coordination were reported as lesser obstacles.

Other administrative and management issues reported by the respondents as barriers that impede the successful implementation of healthcare management strategies for TB included bureaucratic delays, inadequate funding and resource allocation, inefficient communication and coordination, high workload, and inconsistent policy enforcement. Bureaucratic delays slow down the approval of key resources, policies and interventions to improve TB control. The respondents highlighted that decision-making is centralized within the Ministry of Health in Makueni County, where bureaucrats hold control over the funds generated by the county. The respondents expressed concerns that the management loses its autonomy when critical decisions, such as equipment procurement and staff hiring, are made. In some cases, the study found that

equipment purchases were influenced by political considerations rather than the actual health needs of the community. In some instances, the delays lead to missed opportunities for timely response to TB outbreaks, delayed procurement of necessary supplies, and slower implementation of updated TB treatment protocols.

Inadequate funding was reported as another issue that hindered the successful implementation of healthcare management strategies for TB. The financial challenges hinder the ability of the hospital to purchase essential equipment and medication and invest in other necessary infrastructure. As a result, healthcare workers may struggle to offer optimal care, affecting TB management strategies' overall success.

Effective implementation of healthcare management strategies for TB also results from poor and inefficient communication and coordination between different departments and healthcare teams involved in TB management. Poor coordination often creates confusion and delays in patient management. The lack of clear communication channels between departments responsible for diagnosis, treatment, and follow-up care can result in fragmented service delivery, which reduces the efficiency of TB case detection and treatment adherence.

The high workload among the healthcare staff is also a key issue in implementing healthcare management strategies for TB. However, not a major challenge, as reported by the respondents, a shortage of workforce overburdens the healthcare workers, which leads to burnout and reduced job satisfaction. This affects their performance and TB care management.

4.4 Inferential Analysis

Inferential analysis determined the relationship between healthcare management strategies, TB case notification, and treatment success rates. This was done using the Chi-Square test. The Chi-square test was considered suitable because the independent and dependent variables were measured at a categorical level.

4.4.1 Chi-Square Analysis

First, analysis was done to determine the relationship between the effectiveness of existing healthcare management strategies and TB case notification. The cross-tab results are presented in Table 4.5.

Table 4.5: The effectiveness of existing healthcare management strategies and TB case notification

		Disagree	Neutral	Agree	Strongly Agree	Total	Chi-Square
Healthcare workers' training on how to manage TB and the current state of TB case notification	Significantly Improved	1	0	7	20	28	$\chi^2 = 7.458$
		100.0%	0.0%	30.4%	21.1%	23.0%	df= 9
	Moderately Improved	0	1	4	29	34	p= 0.022
		0.0%	33.3%	17.4%	30.5%	27.9%	V = 0.5313
	Somewhat Improved	0	2	8	34	44	P = 0.022
		0.0%	66.7%	34.8%	35.8%	36.1%	
	Not Improved at All	0	0	4	12	16	
		0.0%	0.0%	17.4%	12.6%	13.1%	
Community-based active case-finding interventions and the current state of TB case notification	Very High	0	0	6	22	28	$\chi^2 = 0.359$
		0.0%	0.0%	24.0%	22.7%	23.0%	df= 3
	Moderately High	0	0	7	27	34	p= 0.046
		0.0%	0.0%	28.0%	27.8%	27.9%	V = 0.507
	Somewhat High	0	0	8	36	44	P = 0.046
		0.0%	0.0%	32.0%	37.1%	36.1%	
	Very Low/Poor	0	0	4	12	16	
		0.0%	0.0%	16.0%	12.4%	13.1%	
TB screening for patients who present mild symptoms of TB and current state of TB case notification	Very High	0	1	9	18	28	$\chi^2 = 3.027$
		0.0%	25.0%	28.1%	20.9%	23.0%	df= 6
	Moderately High	0	1	7	26	34	p= 0.019
		0.0%	25.0%	21.9%	30.2%	27.9%	V = 0.507
	Somewhat High	0	2	10	32	44	P = 0.019
		0.0%	50.0%	31.3%	37.2%	36.1%	
	Very Low/Poor	0	0	6	10	16	
		0.0%	0.0%	18.8%	11.6%	13.1%	
TB services, e.g., personal protective equipment and current state of TB case notification	Very High	1	0	7	20	28	$\chi^2 = 6.545$
		100.0%	0.0%	26.9%	21.5%	23.0%	df= 9
	Moderately High	0	1	5	28	34	p= 0.028
		0.0%	50.0%	19.2%	30.1%	27.9%	V =0.592
	Somewhat High	0	1	9	34	44	P= 0.028
		0.0%	50.0%	34.6%	36.6%	36.1%	
	Very Low/Poor	0	0	5	11	16	
		0.0%	0.0%	19.2%	11.8%	13.1%	
Decentralised	Very High	0	0	6	18	24	$\chi^2 = 5.861$

TB services and current state of TB case notification		0.0%	0.0%	24.0%	18.9%	19.7%	df= 6
	Moderately High	0	1	8	19	28	p= 0.040
		0.0%	50.0%	32.0%	20.0%	23.0%	
	Somewhat High	0	1	6	27	34	
		0.0%	50.0%	24.0%	28.4%	27.9%	
	Very Low/Poor	0	0	6	38	44	
		0.0%	0.0%	24.0%	40.0%	36.1%	
Geocoding monitoring for TB and the current state of TB case notification	Very High	0	0	5	11	16	χ^2 =8.775
		0.0%	40.0%	0.0%	21.0%	19.7%	
	Moderately High	1	0	3	24	28	df= 9
		100.0%	0.0%	27.3%	22.9%	23.0%	p= 0.038
	Somewhat High	0	2	3	29	34	
		0.0%	40.0%	27.3%	27.6%	27.9%	V = 0. 0.641
	Very Low/Poor	0	1	3	40	44	
		0.0%	20.0%	27.3%	38.1%	36.1%	P = 0.038
Collaborations with private healthcare providers and current state of TB case notification	Very High	1	1	22	4	28	χ^2 =17.662
		33.3%	8.3%	26.8%	16.0%	23.0%	
	Moderately High	0	2	24	8	34	df= 9
		0.0%	16.7%	29.3%	32.0%	27.9%	p= 0.039
	Somewhat High	0	5	30	9	44	
		0.0%	41.7%	36.6%	36.0%	36.1%	V = 0.611
	Very Low/Poor	2	4	6	4	16	
		66.7%	33.3%	7.3%	16.0%	13.1%	P = 0.039

The chi-square test results indicate that several healthcare management strategies are significantly associated with the current state of TB case notification. Specifically, training of healthcare workers on TB management shows a significant relationship with improved case notification (χ^2 = 7.458, df = 9, p = 0.022). Cramér's V value indicated a strong association between training and improved TB case notification (V = 0.5313, P = 0.0290). The findings suggest that well-trained staff are crucial for accurately identifying and managing TB cases. Proper training ensures that healthcare providers have the necessary skills and knowledge to recognize symptoms, conduct appropriate screenings, and follow proper reporting procedures. This leads to more accurate case detection and timely notification, which ultimately contribute to better management and control of TB.

A statistically significant relationship existed between community-based active case-finding interventions (χ^2 = 0.359, df = 3, p = 0.046). Cramér's V value showed a strong relationship

between community-based active case-finding interventions and improved TB case notification (V = 0.507, p = 0.04). The findings indicate that proactive community outreach effectively increases case detection and notification. By engaging directly with communities, these interventions help reach individuals who may not seek care independently, improving early detection, diagnosis, and timely reporting.

TB screening for patients with mild symptoms has a statistically significant relationship with TB case notification (χ^2 = 3.027, df = 6, p = 0.019). According to the effect size test, there was a strong relationship between TB screening for patients with mild symptoms and improved TB case notification (V = 0.618, p = 0.038). The findings imply that screening individuals who may not show obvious or severe symptoms leads to identifying additional TB cases that would otherwise go undetected. This proactive approach helps detect TB at an earlier stage, even in patients with subtle symptoms, improving the accuracy and timeliness of case notification.

Provision of TB services, such as personal protective equipment and TB case notification, had a statistically significant relationship (χ^2 = 6.545, df = 9, p = 0.028). Cramér's V value showed a strong relationship between the two variables (V =0.592, p= 0.028). The results show that maintaining a safe environment for healthcare workers and patients improves TB management. By ensuring that healthcare settings are equipped with proper protective measures, the likelihood of detecting and reporting TB cases increases as both healthcare workers and patients are more likely to seek care and participate in the screening process.

Decentralisation of TB services and TB case notification had a statistically significant relationship (χ^2 = 5.861, df = 6, p = 0.040). The relationship was strong, as indicated by Cramer's V statistics (V =0.601, p= 0.040). The strong relationship, as shown by Cramér's V value, suggests that decentralizing services makes TB care more accessible and reduces delays in diagnosis and treatment. By bringing TB services closer to communities, decentralization improves the efficiency of case reporting and encourages timely notification, which ultimately contributes to better TB control and management.

There was a statistically significant association between geo-coding monitoring and TB case notification was statistically significant (χ^2 = 8.775, df = 9, p = 0.038). Cramér's V value showed a strong relationship between the two variables (V = 0. 0.641, p = 0.038). The findings imply that geo-coding monitoring strengthens surveillance and response efforts, improving TB case

notification. Using geo-coding as a tool helps track and manage TB cases more effectively, ensuring they are detected and recorded more accurately.

Collaborations between the hospital and private healthcare providers and TB notification had a statistically significant relationship ($\chi^2 = 17.662$, df = 9, p = 0.039). Cramér's V value showed a strong relationship between the two variables (V = 0.611, p = 0.039). The findings imply that when Makueni County referral hospitals collaborate with healthcare providers, the timeliness and accuracy of reporting cases are improved. This is because collaboration facilitates better information sharing, coordination, and referral systems, all of which contribute to more efficient and effective TB case notification.

Based on the analysis, some healthcare management strategies had a stronger effect on TB case notification and treatment than others. Generally, the best strategies focus on early detection, accessibility, education, and collaboration, strongly emphasising community engagement and healthcare worker preparedness. These factors directly address key barriers to TB case notification, making them the most impactful in improving overall TB management.

Analysis was also done to determine the relationship between the effectiveness of existing healthcare management strategies and TB treatment success rates. The analysis showed a statistically significant positive relationship between healthcare workers training on how to manage TB and the current state of TB treatment success rate ($\chi^2 = 10.283$, p= 0.328<0.05). The Cramer's V statistics indicated a strong relationship between healthcare workers training to manage TB and the current TB treatment success rate (V=0.538, p=0.024). The findings suggest that well-trained healthcare workers contribute to improved treatment outcomes, highlighting the need and significance of continuous capacity-building efforts in TB management.

Community-based active case-finding interventions had a positive statistical relationship with the current state of TB treatment success (χ^2 =0.998, p= 0.024<0.05). The Cramer's V statistics indicated a strong relationship between community-based active case-finding interventions and the current state of TB treatment success (V=0.607, p=0.024). Results indicate that proactive community outreach and early TB detection efforts improve treatment outcomes. The findings emphasize the need to strengthen such initiatives for better TB control.

TB screening for patients with mild symptoms of TB and the current state of TB treatment success has a statistically significant relationship (χ^2 =0.972, p= 0.019<0.05). The Cramer's V

statistics indicated a strong relationship between TB screening for patients who present mild symptoms of TB and the current state of TB treatment success (V=0.591, p=0.019). This implies that encouraging early screening among individuals with mild symptoms improves timely diagnosis and treatment, which helps to improve TB treatment outcomes.

The study established a statistically significant relationship between the availability of essential TB services, particularly personal protective equipment and the current state of TB treatment success ($\chi^2 = 2.167$, $p = 0.029 < 0.05$). Cramer's V statistics indicated a strong relationship between personal protective equipment and the current state of TB treatment success ($V = 0.550$, $p = 0.029$). This suggests that adequate TB services, such as protective equipment, improve infection control, which ensures a safer environment for healthcare workers and patients.

Similarly, the analysis revealed that decentralisation of TB services was significantly associated with TB case notification ($\chi^2 = 2.167$, $df = 6$, $p = 0.029$). The relationship was strong, as indicated by Cramer's V statistics ($V = 0.580$, $p = 0.029$). The strong relationship, as shown by Cramér's V value, suggests that decentralising services makes TB care more accessible and reduces delays in diagnosis and treatment. By bringing TB services closer to communities, decentralisation improves the efficiency of case reporting and timely treatment.

The findings also showed a significant relationship between geo-coding monitoring for TB and the current state of TB treatment success ($\chi^2 = 8.634$, $p = 0.042 < 0.05$). The Cramer's V statistics indicated that the relationship between the two variables was strong ($V = 0.652$, $p = 0.042$). This suggests that using geo-coding for TB case tracking improves monitoring, which enables timely interventions and improves treatment outcomes. By tracking the geographical distribution of TB cases, healthcare providers can better identify high-burden areas, ensuring timely and effective care.

In addition, the study identified a statistically significant relationship between collaborations with private healthcare providers and the current state of TB treatment success ($\chi^2 = 9.739$, $p = 0.0370$). The Cramer's V statistics indicated a strong relationship between the variables ($V = 0.517$, $p = 0.0370$). These findings suggest that partnerships between Makueni County Referral Hospital and private providers are crucial in improving TB treatment success rates. This is because partnerships expand access to treatment services.

Lastly, the study findings indicated that some healthcare management strategies were more effective in TB treatment than others. For example, healthcare workers' training was particularly effective because well-trained staff are crucial in diagnosing and managing TB accurately. Training ensures that healthcare workers adhere to treatment protocols and address complications, directly improving treatment outcomes. Similarly, community-based active case findings proved effective as they actively reach individuals who might not otherwise seek care. This ensures early detection and reduces delays in treatment. TB screening for mild symptoms was also highly effective as it allows for early identification of cases, preventing the disease from advancing to more severe stages, where treatment becomes more complicated. On the other hand, although strategies such as personal protective equipment and decentralization of TB services contributed to infection control and accessibility, their impact was less immediate. The findings are presented in Table 4.6 below;

Table 4.6: Effectiveness of Existing Healthcare Management Strategies and TB Treatment Success Rates

		Disagree	Neutral	Agree	Strongly Agree	Total	Chi-Square
Healthcare workers training on how to manage TB and the current state of TB treatment success	Very High	0	1	2	21	24	
		0.0%	33.3%	8.7%	22.1%	19.7%	$\chi^2 = 10.283$
	Moderately High	1	0	12	47	60	df= 9
		100.0%	0.0%	52.2%	49.5%	49.2%	p= 0.328
	Somewhat High	0	2	6	14	22	
		0.0%	66.7%	26.1%	14.7%	18.0%	V=0.538
	Very Low/Poor	0	0	3	13	16	p=0.024
		0.0%	0.0%	13.0%	13.7%	13.1%	
Community-based active case-finding interventions and the current state of TB treatment success	Very High	0	0	5	19	24	
		0.0%	0.0%	20.0%	19.6%	19.7%	$\chi^2 = 0.998$
	Moderately High	0	0	14	46	60	df= 3
		0.0%	0.0%	56.0%	47.4%	49.2%	p= 0.024
	Somewhat High	0	0	4	18	22	
		0.0%	0.0%	16.0%	18.6%	18.0%	V=0.607

	Very Low/Poor	0	0	2	14	16	p=0.024
		0.0%	0.0%	8.0%	14.4%	13.1%	
TB screening for patients who present mild symptoms of TB and current state of TB treatment success	Very High	0	1	6	17	24	
		0.0%	25.0%	18.8%	19.8%	19.7%	χ^2 =0.792
	Moderately High	0	2	16	42	60	df= 6
		0.0%	50.0%	50.0%	48.8%	49.2%	p= 0.019
	Somewhat High	0	1	6	15	22	
		0.0%	25.0%	18.8%	17.4%	18.0%	V=0.591
	Very Low/Poor	0	0	4	12	16	p=0.019
		0.0%	0.0%	12.5%	14.0%	13.1%	
TB services, e.g., personal protective equipment and current state of TB treatment success	Very High	0	1	2	21	24	
		0.0%	50.0%	7.7%	22.6%	19.7%	χ^2 =8.352
	Moderately High	1	0	13	46	60	df= 9
		100.0%	0.0%	50.0%	49.5%	49.2%	p= 0.041
	Somewhat High	0	1	7	14	22	
		0.0%	50.0%	26.9%	15.1%	18.0%	V=0.550
	Very Low/Poor	0	0	4	12	16	p=0.029
		0.0%	0.0%	15.4%	12.9%	13.1%	
Decentralised TB services and current state of TB treatment success	Very High	0	0	6	18	24	
		0.0%	0.0%	24.0%	18.9%	19.7%	
	Moderately High	0	1	12	47	60	χ^2 =2.167
		0.0%	50.0%	48.0%	49.5%	49.2%	df= 6
	Somewhat High	0	1	4	17	22	p= 0.029
		0.0%	50.0%	16.0%	17.9%	18.0%	
	Very Low/Poor	0	0	3	13	16	V = 0.580
		0.0%	0.0%	12.0%	13.7%	13.1%	p=0.029
Geocoding monitoring for TB and the current state of TB	Very High	0	2	0	22	24	
		0.0%	40.0%	0.0%	21.0%	19.7%	χ^2 =8.634
	Moderately High	1	1	7	51	60	df= 9

treatment success		100.0%	20.0%	63.6%	48.6%	49.2%	p= 0.042
	Somewhat High	0	2	3	17	22	
		0.0%	40.0%	27.3%	16.2%	18.0%	V=0.652
	Very Low/Poor	0	0	1	15	16	p= 0.042
		0.0%	0.0%	9.1%	14.3%	13.1%	
Collaborations with private healthcare providers and current state of TB treatment success	Very High	2	2	12	8	24	
		66.7%	16.7%	14.6%	32.0%	19.7%	χ^2 =9.739
	Moderately High	1	7	40	12	60	df= 9
		33.3%	58.3%	48.8%	48.0%	49.2%	p= 0.0370
	Somewhat High	0	2	17	3	22	
		0.0%	16.7%	20.7%	12.0%	18.0%	V= 0.517
	Very Low/Poor	0	1	13	2	16	P=0.0370
		0.0%	8.3%	15.9%	8.0%	13.1%	

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CHAPTER FIVE

DISCUSSION, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This section represented the final chapter of the study. The first part presented a summary of the findings based on the research questions. The second part provided the conclusions, while the third part offered recommendations. In the last part, the chapter gave suggestions for further research.

5.2 Summary of the Findings

The study aimed to assess the healthcare management strategies used to improve tuberculosis case notification and treatment success rates in Makueni County Referral Hospital. The first objective was to assess the current TB case notification and treatment success rates in Makueni County. From the analysis, most respondents believed the current state of TB case notification and treatment success rates had generally improved. However, some still felt that the current state had not improved or had slightly improved. The findings indicated that while the respondents felt that there had been improvements, there was a need for the Makueni County Referral Hospital to put more effort into improving TB notification and treatment success rates.

The second objective of the study aimed to assess the effectiveness of existing healthcare management strategies in enhancing TB case notification and treatment outcomes. The findings indicated that the strategies implemented at Makueni County Referral Hospital are generally effective, as respondents strongly agreed that healthcare workers had received adequate training in TB management, enabling them to handle cases efficiently. The hospital actively supports community-based interventions for TB case finding, ensuring early detection and treatment while also encouraging patients with mild TB symptoms to undergo screening. Additionally, the availability of personal protective equipment (PPE) was deemed sufficient, enhancing safety for both healthcare workers and patients. The decentralization of TB services was highlighted as a key strength, improving accessibility to TB care across different regions. Furthermore, the hospital has adopted geocoding for TB case monitoring, strengthening surveillance and response efforts. To further enhance TB screening and treatment, the facility has also established

collaborations with private healthcare providers, expanding access to diagnostic and treatment services and contributing to more effective TB management in the region.

The third objective of the identified barriers to effective TB case notification and treatment within the healthcare management framework. Several barriers were reported as hindrances to effective TB case notification and treatment. The study found that non-adherence to TB control guidelines and low motivation among healthcare workers significantly hindered TB management strategies. Inadequate human resources, poor data management, and weak facility coordination had a smaller impact, but they still contributed to inefficiencies in TB case notification and treatment. Key administrative identified included bureaucratic delays, inadequate funding, poor communication, high workloads, and inconsistent policy enforcement. Centralized decision-making limited hospital autonomy, delaying resource approval, equipment procurement, and staff hiring, sometimes influenced by politics rather than healthcare needs. Funding shortages further restricted access to essential equipment and medication, affecting TB care quality. Poor coordination between departments leads to delays in diagnosis, treatment, and follow-up, weakening TB case detection and treatment adherence. Further, in some cases, high workloads, though a significant challenge, contributed to burnout and reduced job satisfaction, impacting overall TB management effectiveness.

5.3 Discussions

The study aimed to analyse healthcare management strategies used to improve TB case notification and treatment success rates in Makueni County Referral Hospital. The findings indicated that the current state of TB case notification and treatment success in Makueni County Referral Hospital highlighted positive developments and areas needing improvement. There has been some progress in TB notification and treatment success rates. A noticeable proportion of the respondents acknowledged there had been a moderate improvement in the notification system, while a small proportion acknowledged that there had been a significant improvement in the TB notification. The findings indicate that while the hospital has made progress in TB notification, there is a need for improvements.

The assessment of the TB treatment success rates also revealed a mix of opinions, with most of the respondents indicating a moderately high success rate. Although a significant portion of respondents rated treatment success as either moderately high or somewhat high, a proportion of

the respondents still felt the treatment success rate was low. This divergence in responses suggests that although TB treatment is generally seen as effective at Makueni County Referral Hospital, there is a gap between different stakeholders' experiences. This highlights the need for targeted interventions to improve consistency in TB treatment success.

The healthcare management strategies employed at Makueni County Referral Hospital revealed a well-organized and proactive approach to TB control. The findings showed that the hospital is strongly committed to improving TB care through different initiatives. For instance, similarly to the findings of Amare et al. (2023) and Teibo et al. (2024), the study identified that Makueni County Referral Hospital has well-designed training programmes that help to equip HCPs with sufficient knowledge required for TB case notification and treatment. The hospital has emphasized healthcare worker training as essential in ensuring that healthcare professionals are equipped with the necessary skills and knowledge to handle TB case notification and treatment success. The healthcare workers are trained in various aspects, including symptom identification, diagnosis and screening techniques. However, unlike the findings of Amare et al. (2023) and Teibo et al. (2024), training in Makueni Hospital is not effectively done, which hinders effective TB case notification and treatment.

The study identified that Makueni County Referral Hospital has decentralized TB services. Similarly to the findings of Chijioke-Akaniro et al. (2022), Makueni County Referal Hospital has outreach programmes and proper monitoring that help to increase case findings, case notification and treatment. The decentralised services aim to ensure that TB care is accessible even in remote areas, improving treatment adherence and case follow-up. This involves reaching out to communities to identify and treat TB cases early. It encourages early TB screening for patients presenting with mild symptoms, making sure that cases are detected before they advance and become more difficult to treat. Also, the hospital collaborates with private healthcare providers to improve TB case notification and treatment. Strengthening these partnerships helps expand coverage and improve the overall TB management network, ensuring more people have access to necessary services.

Makueni County has invested in personal protective equipment, such as masks and gloves, demonstrating its commitment to safeguarding patients and healthcare workers. Similarly to the findings of Ogbuabor et al. (2024), Makueni County Referral Hospital has emphasized the need

for and importance of protective gear in TB treatment. The hospital has recognized that healthcare workers are at the frontline when treating TB and other infectious diseases and are at high risk of acquiring influenza and other respiratory infections. Similarly to these findings, where a majority of hospitals in Nigeria did not have adequate personal protective equipment, at Makueni County Referral Hospital, bureaucracies often led to delays in the procurement of TB protective masks and gloves, which interfered with the ability of the healthcare workers to consistently implement the TB infection control guidelines.

The study identified multifaceted barriers to implementing management strategies at Makueni County Referral Hospital. One of the most significant barriers reported was non-adherence to TB infection control and prevention guidelines. Similar to the results of Conroy et al. (2021) and Der et al. (2022), in Makueni County Referral Hospital, divergence of healthcare practices from guidelines due to insufficient knowledge or perceived usefulness of these strategies by HCPs is a huge barrier faced by TB case notification and treatment success. This occurred because of poor or lack of training, awareness, and insufficient resources, among other challenges.

Poor motivation of healthcare workers is another obstacle faced in TB case notification and treatment. Similar to the findings of a study done by Zinatsa et al. (2018) and Der et al. (2022) in Makueni County Referral Hospital, poor motivation among healthcare workers is one of the obstacles faced in TB case notification and treatment. Demotivation resulted from fear of infection, lack of protective equipment and high workload, among other factors. The main demotivation factors identified were high workload and poor compensation, which compromised their ability to offer quality services.

The study identified that data management in the Makueni County referral hospital hinders TB case notification and treatment. However, contrary to the findings of Ogbuabor et al. (2024), who, in a study on enablers and barriers to the control of MDR TB in Abia State, Nigeria, identified that poor data management was among the key barriers faced in Makueni County Referral Hospital, poor data management affected TB case notification and treatment to a small extent. The hospital has good data management for monitoring and evaluating TB cases, which ensures that TB control interventions are targeted and the case notification and treatment outcomes are well tracked.

Bureaucratic delays were identified as a hindrance to effective TB case notification and treatment success. Similarly to the findings of Kyama (2020), in which bureaucratic delays emerged as challenges faced in adopting quality healthcare strategies in the universal healthcare at Makueni, the study found that bureaucracy led to delays in the reimbursement to patients for money spent in the provision of care. The management of the Makueni County Referral Hospital does not have autonomy when vital decisions are made on procuring some equipment and the meritocracy in hiring staff. Bureaucracy led to delays in procuring some equipment and the meritocracy in hiring staff, among other key functions.

Inadequate funding was also cited as a significant issue. Similarly to the findings of Ogbuabor et al. (2024) and Teibo et al. (2024), due to the bureaucracies in funding, Makueni Hospital, in some cases, struggle to purchase the necessary infrastructure, equipment, and medication required for TB case notification and treatment. This financial limitation restricts the ability of the healthcare workers to provide optimal care, thereby affecting treatment success. These challenges occur because decision-making is centralized within the Ministry of Health in Makueni County, where bureaucrats hold control over the funds generated by the county.

Poor communication and coordination between departments was another challenge reported that influenced TB case notification and treatment success. Similarly to the findings of Teibo et al. (2024), at Makueni County Referral Hospital, poor facility coordination is often a hindrance to effective TB case notification and treatment. The inefficient coordination and communication between the departments involved in TB case notification and treatment often leads to confusion and delays in patient management. This lack of coordination between departments responsible for diagnosis, treatment, and follow-up care results in fragmented service delivery, impacting the effectiveness of TB case notification and treatment. Typically, these are management issues as healthcare managers need to lead efforts towards establishing decentralized TB diagnostic services, ensuring adequate staffing, designing training programmes to equip HCPs with sufficient knowledge, and overseeing facility coordination.

The findings of this study were meaningfully interpreted through the lens of the three theoretical frameworks that underpinned the research: the Management in Health Theory, the Evidence-Based Management (EBM) Theory, and the Utilisation Management (UM) Theory. The Management in Health Theory was reflected in the strategic decisions made by Makueni County

Referral Hospital to decentralise services, train healthcare workers, and improve resource allocation all of which contributed to enhanced TB case notification and treatment outcomes. The EBM Theory was evident in the hospital's adoption of geo-coding and data-informed decision-making, which aligned with the principle of using the best-available evidence to guide practice. Finally, the Utilisation Management Theory was relevant in understanding the systemic challenges faced, such as bureaucratic inefficiencies, healthcare worker demotivation, and underuse of diagnostic infrastructure, which all reflected barriers to optimal resource utilisation. These theoretical perspectives collectively contextualised the hospital's performance, highlighting both areas of progress and those in need of strategic improvement.

5.4 Conclusions

The study concluded that TB case notification and treatment success rates in Makueni County Referral Hospital have generally improved. The hospital has well-trained healthcare workers, effective community-based TB case-finding interventions, sufficient personal protective equipment, and decentralized TB services, all of which have improved case detection and treatment outcomes. Also, the hospital has adopted geo-coding for TB case monitoring and has collaborated with private healthcare providers to expand access to TB screening and treatment services. However, despite these improvements, the study concluded that several barriers hinder effective TB case notification and treatment. These include poor and non-adherence to TB control guidelines, low healthcare worker motivation, bureaucratic delays, inadequate funding, poor communication, and high workloads among healthcare workers.

The findings relate to the Management in Health Theory, Evidenced Based Theory, and Utilisation Management Theory. Management Health Theory focuses on optimizing healthcare systems through effective leadership, decision-making, and resource management. In the case of Makueni County Referral Hospital, the improvement in TB case notification and treatment success directly result from administrative and management practices. Investment in training healthcare workers ensures they have the necessary skills to diagnose and treat TB effectively. In addition, decentralizing TB services and providing the healthcare workers with protective equipment indicates the hospital's commitment to efficient resource management and operational efficiency.

Evidence-Based Management Theory emphasizes using data and the best available evidence to guide decision-making and improve healthcare practices. In the case of Makueni County Referral Hospital adopting geo-coding for TB case monitoring, there is a clear example of evidence-based management. By mapping TB cases geographically, healthcare managers can identify high-risk areas and allocate resources more effectively, ensuring that interventions are data-driven and targeted. In addition, collaboration between the hospital and private healthcare providers is rooted in evidence showing that partnerships can improve access to care and treatment outcomes.

Utilization Management Theory focuses on ensuring that healthcare services and resources are used efficiently, minimizing overuse and underuse. The barriers identified in the study, such as poor adherence to TB control guidelines, high healthcare worker workloads, and bureaucratic delays, represent significant challenges to effective utilization management. When healthcare workers are demotivated and overwhelmed by huge workloads, efficient service delivery is hindered, leading to TB case notification and treatment delays.

5.5 Recommendations

i. Poor adherence to TB guidelines was reported as a barrier to effectively implementing healthcare management strategies to improve tuberculosis case notification and treatment success rates in Makueni County Referral Hospital. Therefore, it is recommended that the hospital improve and strengthen adherence to TB guidelines among healthcare workers. To strengthen adherence to TB guidelines in Makueni County Referral Hospital, continuous training and development, supervision, and reinforcement of standard procedures should be invested in.

ii. Low motivation of healthcare workers was identified as a hindrance to effective TB notification and treatment. To address the low motivation of healthcare workers, Makueni County Referral Hospital should offer healthcare workers more incentives to ensure manageable workloads, provide career development opportunities and offer mental health support.

iii. The study identified that poor motivation of healthcare workers affected the implementation of healthcare management strategies to improve tuberculosis case notification and treatment success rates in Makueni County Referral Hospital. To address

this, the hospital is recommended to improve motivation among healthcare workers through better incentives, career development opportunities, and mental health support, which can enhance their commitment to TB management.

iv. Bureaucracy and centralized decision-making lead to delays that hinder the effective implementation of healthcare management strategies to improve tuberculosis case notification and treatment success rates in Makueni County Referral Hospital. It is recommended that the hospital address these challenges through policy reforms that grant the hospital more autonomy in resource allocation, procurement, and staffing decisions. By decentralizing decision-making, delays will be minimized, essential supplies will be acquired, and the responsiveness of TB programs will be improved.

v. Inadequate funding hinders the effective implementation of healthcare management strategies to improve tuberculosis case notification and treatment success rates in Makueni County Referral Hospital. To address this, the County government of Makueni and stakeholders are recommended to prioritize increased budget allocation for TB programs. It is recommended that the hospital strengthen partnerships with private healthcare providers and donor organizations to raise additional financial and technical support for TB control initiatives.

vi. Poor communication and coordination between hospital departments hinder the effectiveness of healthcare management strategies for tuberculosis case notification and treatment success rates in Makueni County Referral Hospital. Makueni County Referral Hospital recommended establishing clear communication protocols, fully digitizing patient records, and integrating TB services into routine healthcare operations in order to improve efficiency in case detection, treatment, and follow-up.

vii. Inadequate healthcare workers and workload were reported as hindrances to the effective implementation of healthcare management strategies to improve tuberculosis case notification and treatment success rates in Makueni County Referral Hospital. It is recommended that the hospital address high workloads among healthcare workers by hiring more staff, optimizing task distribution, and providing stress management programs.

5.6 Suggestions for Further Research

This study solely focused on Makueni County Referral Hospital and, hence, the need for other studies to be done on other hospitals in Makueni County and other counties that conduct TB screening and offer treatment. The study only focused on healthcare management strategies to improve TB case notification and treatment success rates. There is a need for other studies delving deeper into the specific factors that affect TB case notification and treatment success rates in Makueni County Referral Hospital and other hospitals in Makueni County and other counties.

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APPENDICES

Appendix I: Questionnaire

SECTION A: DEMOGRAPHIC DATA

Questionnaire No……...

1. Sex

Male [ ] Female [ ]

2. Age in Years

18 to 30 years [ ]

31 to 40 years [ ]

41 to 50 years [ ]

51 + years [ ]

3. Marital Status

Not Applicable [ ]

Single [ ]

Married [ ]

Divorced [ ]

Widowed [ ]

Not Indicated [ ]

4. Occupation Status

Permanently Employed [ ] Contract [ ] Internship [ ]

5. Job Position/Description/Professional Category

Medical Officer [ ]

Clinical Officer [ ]

Nurse [ ]

Health Records Officer [ ]

Supporting Staff [ ]

6. Education Level

Diploma [ ]

Bachelor's Degree [ ]

Master's Degree [ ]

PhD [ ]

Other [ ]

7. Years worked at the facility

Above 10 Years [ ]

6 to 10 Years [ ]

1 to 5 Years [ ]

Less than 1 Years [ ]

SECTION B: CURRENT TB CASE NOTIFICATION AND TREATMENT SUCCESS RATES

8. How is the current state of TB case notification at the facility?

Significantly Improved [ ]

Moderately Improved [ ]

Somewhat Improved [ ]

Not Improved at All [ ]

9. How would you rate the current state of TB treatment success?

Very High [ ]

Moderately High [ ]

Somewhat High [ ]

Very Low/Poor [ ]

SECTION C: HEALTHCARE MANAGEMENT STRATEGIES

10. To what extent do you agree with the following statements about healthcare management strategies for TB control at the facility?

Statement	Strongly Agree	Agree	Disagre	Strongly Disagree
The facility offers healthcare workers training how to manage TB.				
The facility offers and supports community-based active case-finding interventions for TB.				
The facility encourages TB screening for patients who present mild symptoms of TB.				
The facility has adequately invested in TB services, e.g. personal protective equipment.				
The facility has decentralised TB services.				
The facility encourages/supports Geo-coding monitoring for TB.				
The facility embraces collaborations with priva healthcare providers.				

11. What other novel healthcare management strategies is the facility considering to enhance TB control?

Please identify……...

SECTION D: BARRIERS TO EFFECTIVE IMPLEMENTATION OF HEALTHCARE MANAGEMENT STRATEGIES FOR TB

12. To what extent do the following obstruct the effective implementation of healthcare management strategies for TB?

Obstacle	**Not at All**	**Very Little**	**Somewhat**	**To a Great Extent.**
Non-adherence to TB infection control and prevention guidelines				
Poorly motivated healthcare workers, including community health workers				
Poor data management				
Inadequate human resources				
Poor facility coordination				

13. What other administrative or management issues at the facility are impeding the successful implementation of healthcare management strategies for TB? Please identify and offer a brief explanation ……

THANK YOU FOR TAKING TIME TO ANSWER THESE QUESTIONS

VT OMNES VNVM SINT

Appendix II: Ethics Review Letter

Strathmore UNIVERSITY

13th February 2025

Mr Mutuku Pius,
nthwao@gmail.com

Dear Mr Mutuku,

RE: Healthcare Management Strategies to Improve Tuberculosis Case Notification and Treatment Success Rates in Makueni County Referral Hospital

This is to inform you that SU-ISERC has reviewed and **approved** your above **SU-masters** proposal. Your application reference number is **SU-ISERC2513/24.** The approval period is from **13th February 2025 to 12th February 2026.**

This approval is subject to compliance with the following requirements:

i. Only approved documents including (informed consents, study instruments, MTA) will be used.
ii. All changes including (amendments, deviations, and violations) are submitted for review and approval by SU-ISERC.
iii. Death and life-threatening problems and serious adverse events or unexpected adverse events whether related or unrelated to the study must be reported to SU-ISERC within 72 hours of notification.
iv. Any changes anticipated or otherwise that may increase the risks or affected safety or welfare of study participants and others or affect the integrity of the research must be reported to SU-ISERC within 72 hours.
v. Clearance for the export of biological specimens must be obtained from relevant institutions.
vi. Submission of a request for renewal of approval at least 60 days prior to the expiry of the approval period. Attach a comprehensive progress report to support the renewal.
vii. Submission of an executive summary report within 90 days of completion of the study to SU-ISERC.

Before commencing your study, you will be expected to obtain a research license from National Commission for Science, Technology, and Innovation (NACOSTI) https://research-portal.nacosti.go.ke/ and obtain other clearances needed.

Yours sincerely,

Mr Ambrose Rachier,
Chairperson; SU-ISERC

Ole Sangale Rd, Madaraka Estate. PO Box 59857-00200, Nairobi, Kenya. Tel +254 (0)703 034000
Email admissions@strathmore.edu www.strathmore.edu

Appendix III: NACOSTI Permit

REPUBLIC OF KENYA

NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

Ref No: **181529**

Date of Issue: **27/March/2025**

RESEARCH LICENSE



This is to Certify that Dr.. Pius Nthwao Mutuku of Strathmore University, has been licensed to conduct research as per the provision of the Science, Technology and Innovation Act, 2013 (Rev.2014) in Makueni on the topic: Healthcare Management Strategies to Improve Tuberculosis Case Notification and Treatment Success Rates in Makueni County Referral Hospital. for the period ending : 27/March/2026.

License No: **NACOSTI/P/25/417523**

181529

Applicant Identification Number

Director General
NATIONAL COMMISSION FOR SCIENCE, TECHNOLOGY & INNOVATION

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See overleaf for conditions

THE SCIENCE, TECHNOLOGY AND INNOVATION ACT, 2013 (Rev. 2014)
Legal Notice No. 108: The Science, Technology and Innovation (Research Licensing) Regulations, 2014

The National Commission for Science, Technology and Innovation, hereafter referred to as the Commission, was the established under the Science, Technology and Innovation Act 2013 (Revised 2014) herein after referred to as the Act. The objective of the Commission shall be to regulate and assure quality in the science, technology and innovation sector and advise the Government in matters related thereto.

CONDITIONS OF THE RESEARCH LICENSE

1. The License is granted subject to provisions of the Constitution of Kenya, the Science, Technology and Innovation Act, and other relevant laws, policies and regulations. Accordingly, the licensee shall adhere to such procedures, standards, code of ethics and guidelines as may be prescribed by regulations made under the Act, or prescribed by provisions of International treaties of which Kenya is a signatory to.
2. The research and its related activities as well as outcomes shall be beneficial to the country and shall not in any way;
    i. Endanger national security
    ii. Adversely affect the lives of Kenyans
    iii. Be in contravention of Kenya's international obligations including Biological Weapons Convention (BWC), Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO), Chemical, Biological, Radiological and Nuclear (CBRN).
    iv. Result in exploitation of intellectual property rights of communities in Kenya
    v. Adversely affect the environment
    vi. Adversely affect the rights of communities
    vii. Endanger public safety and national cohesion
    viii. Plagiarize someone else's work
3. The License is valid for the proposed research, location and specified period.
4. Neither the license nor any rights thereunder are transferable.
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11. The Commission reserves the right to modify the conditions of the License including cancellation without prior notice.
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13. The Licensee shall disclose to the Commission, the relevant Institutional Scientific and Ethical Review Committee, and the relevant national agencies any inventions and discoveries that are of National strategic importance.
14. The Commission shall have powers to acquire from any person the right in, or to, any scientific innovation, invention or patent of strategic importance to the country.
15. Relevant Institutional Scientific and Ethical Review Committee shall monitor and evaluate the research periodically, and make a report of its findings to the Commission for necessary action.

National Commission for Science, Technology and
Innovation(NACOSTI),
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E-mail: dg@nacosti.go.ke
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