MAGNITUDE AND FACTORS ASSOCIATED WITH DIAGNOSTIC DELAY OF TUBERCULOSIS AMONG ADULTS IN TARIME DC, MARA REGION, TANZANIA

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By

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A Dissertation Submitted in Partial Fulfillment of the Requirements for the Degree of Master of Public Health of

Muhimbili University of Health and Allied Sciences

October, 2024

CERTIFICATION

The undersigned certify that they have read and hereby recommend for acceptance a dissertation entitled "**Magnitude and factors associated with diagnostic delay of Tuberculosis among adults**, **in Tarime District, Mara Region, Tanzania**" in partial fulfillment of the requirements for award of the Degree of Master of Public Health of Muhimbili University of Health and Allied Sciences.

Dr. Candida Moshiro

(Supervisor)

Date----------

Mr. Elias Bukundi

(Supervisor)

Date----------

DECLARATION AND COPY RIGHT

I, **Dr. Joshua Alexander Karaba,** hereby declare that this dissertation is my own original work and that no part of it has been presented for another degree in this University or elsewhere

Signature…….. Date ……..

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DEDICATION

This dissertation is dedicated to my dear parents, mother Priscilla Karaba and father Alexander Karaba for their parental care and for sponsorship of most of my studies. Also to my siblings Glory, Jeremiah and James for their lovely support, prayers and encouragement. I love and appreciate them.

ABSTRACT

Background: Tuberculosis (TB) is a curable infectious disease, yet it remains a global health concern, especially in sub-Saharan Africa. Tanzania, a high-burden country, faces significant diagnostic delays in TB management. Prompt diagnosis is essential to reduce transmission and improve outcomes.

Aim of the study: This study aimed to determine the magnitude and factors associated with delays in TB diagnosis among adult TB patients in Tarime District Council.

Materials and methods: A cross-sectional study conducted from May to July 2024 involved 254 adult TB patients from six DOT centers in Tarime District Council. Data were collected through interviews and patient file reviews. Diagnostic delay was defined as a summation of ≥ 30 days including; personal delay (≥23 days from symptom onset to health facility visit) and facility delay (≥7 days from sample collection to result). Data were analyzed using STATA version 18, with modified Poisson regression identifying factors associated with delay.

Results: Of 254 participants (median age 39 years [IQR: 28-50]; 61.0% male), 54.7% had basic education, and 53.6% were employed. Median distance to health facilities was 5 km [IQR: 3-8]. High TB knowledge was found in 61.0%, while 26.4% reported stigma. Diagnostic delay prevalence was 16.9%, with median patient and facility delays of 20 and 6 days, respectively. Main delay reasons included lack of symptom awareness (60.5%) and difficulty accessing healthcare (18.6%). Stigma (adjusted prevalence ratio (APR)=3.40; 95% CI 1.79,6.64),alcohol consumption (PR=1.84; 95% CI 1.14,2.99), increased distance to facilities (PR=1.12; 95% CI 1.08,1.16) were positively associated with diagnostic delay while adequate TB knowledge (PR=0.12; 95% CI 0.05,0.32), basic education (PR=0.56; 95% CI 0.33,0.93), married patients (PR=0.5; 95% CI 0.29,0.85) and those satisfied with TB care (PR=0.05; 95% CI 0.02,0.13) were negatively associated with delays; exacerbated delays.

Conclusion: TB diagnostic delays in Tarime DC, Tanzania was relatively low as compared to other studies. Contributing factors for diagnostic delays include low knowledge of TB, stigma, and distance to facilities. Reducing these delays requires targeted patient interventions and systemic health infrastructure improvements to enhance TB management and control.

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LIST OF ABBREVIATIONS

AIDS	Acquired Immunodeficiency Syndrome
ART	Antiretroviral Therapy
COVID 19	Corona Virus Disease of 2019
CTC	Care and Treatment Centre
DC	District Council
DED	District Executive Officer
DMO	District Medical Officer
DOT	Directly Observed Treatment
DTLC	District Tuberculosis and Leprosy Coordinator
ETL	Electronic TB and Leprosy register
HIV	Human Immunodeficiency Virus
HMIS	Health Management Information System
MC	Municipal Council
MoH	Ministry of Health
MUHAS	Muhimbili University of Health and Allied Sciences
PORALG	President's Office Regional Administration and Local Government
TB	Tuberculosis
TC	Town Council
WHO	World Health Organization

DEFINITION OF TERMS

Directly observed therapy:	a way of helping patients take their medicine for TB. It involves meeting a healthcare worker daily or several times a week. The healthcare worker watches the TB patient swallow each dose of the prescribed drug and gets an opportunity to ask the patient about any problems or side effects with the medication (1).
Diagnostic Delay:	Prolonged time interval (≥30 days) between the onset of symptoms suggestive of TB (such as productive cough, fever, night sweats, and weight loss) and the confirmation of TB disease through lab tests or clinical evaluation. In this study, it was the total of patient and health facility delays (Total Diagnostic delay = Patient delay + Health system delay) (2,3,4).
Patient Delay:	Period from the onset of first symptoms of suspected pulmonary TB to the date and time of first contact with the health facility about the condition. If it was 23 days and more then considered a patient delay for the purpose of this study (2).
Health system delay:	From the time of the patient's first contact with a health facility to the time of final diagnosis. If it was 7 days and more then considered a health facility delay for the purpose of this study (3).

CHAPTER ONE

1.0 INTRODUCTION

1.1 BACKGROUND

Tuberculosis (TB) is an airborne infectious disease that is a significant cause of ill health and one of the leading causes of death worldwide (5). The infection is caused by an organism of *Mycobacterium tuberculosis* complex that typically affects the lungs; pulmonary TB and other body parts known as extra-pulmonary TB (6).

Although TB is a preventable and curable infectious disease, it still poses a considerable threat to public health (7,8). Tuberculosis ranked 10th among all causes of death worldwide and until the COVID-19 (SARS-CoV-2) pandemic, it was the leading cause of death from a single infectious agent. Worldwide in 2019, it is estimated that 10 million people suffered from TB, and there were1.4 million TB-associated deaths, which over 95% occurred in low- and middle-income countries (6,9). Furthermore, WHO estimated that about 29% of TB cases are not reported to public health authorities or those who were not diagnosed and therefore not treated (9).

Africa accounts for about 23% of all cases worldwide, second only to South-East Asia with Europe contributing 2% hence being the least(9). HIV also is a notable co-infection but will not be the scope of this study. Other risk factors responsible for the high occurrence of TB are under nutrition, indoor air pollution, type 2 diabetes, smoking and excess alcohol consumption (9).

Tanzania is among the 30 countries in the world that reported highest TB burden according to the 2021 Global TB Report. The country had 133,000 new TB cases reported every year (10), this is reported amid the situation that 38% of the people who had the TB were never diagnosed.

According to WHO, there were an estimated 10.6 million cases of TB worldwide in 2022; only 6.4 million cases were detected and reported to national TB programs. Among other

challenges, the detection gap is a notable barrier to controlling the TB pandemic (1,10). In order to combat the burden of TB, different approaches have been set and implemented from a global scale to a national level. For example, in 2014, all WHO member states agreed on an End TB strategy which aimed at 20% and 80% reduction in the TB incidence rate with 35% and 90% reduction in the annual number of TB deaths by 2020 and 2030, compared with 2015, respectively (10). The components included integrated patient-centered care and prevention, supportive policies, intensified research, and innovation (10). With these strategies, the global reduction of TB incidence rate reduced by 9% from 2015-2020, which is far below the anticipated target (5).

In 2012, following the TB prevalence survey, Tanzania reported that nearly one-third of the potential TB cases who had TB symptoms reached the health facility and nearly 50% of these did not undergo diagnostic procedures for TB (11,12). The barriers related to early TB detection have been reported, ranging from the individual level to the health system. Such barriers include limited accessibility to health, limited knowledge about TB signs and symptoms, hence delay in seeking healthcare, poor health-seeking behaviors, and costs involved in seeking TB care (12,13).

To diagnose TB a patient, need to be aware of the symptoms, whereas the attending physician should have a high suspicion of both the TB signs and symptoms. This study, therefore, will estimate the prevalence of delayed diagnosis and factors associated with such delays in one of the rural districts in Tanzania,

1.2 PROBLEM STATEMENT

TB diagnostic delay is a problem in previous Regional and local data whereas TB diagnostic delay has been demonstrated to range from about 30-50%. There is also limited current local data, especially in rural Tanzania

The proportion of individuals delaying being diagnosed with TB remains very high in Africa including Tanzania. A study concerning diagnostic delays amongst TB cases in mainland Tanzania, in Dar Es Salaam showed that 35.1% had delayed presentation to the health facility, 52.9% delayed diagnosis, and 34.4% treatment delays (12).

The possible causes of TB diagnostic delay are likely multifactorial, including poor awareness of TB symptoms and risks, limited access to diagnostic facilities, low health-seeking behavior, and inadequate TB diagnostic and treatment services (12). The possible solutions to addressing TB diagnostic delay include community-based health education and awareness campaigns, improving access to diagnostic facilities promoting timely health-seeking behavior, strengthening diagnostic and treatment services and utilizing innovative technologies such as; Telemedicine (16). In its efforts to improve diagnostic delay, the government has a CTRL (Central Tuberculosis Reference Laboratory) that operates under NTLP on the establishment, provision of diagnostic services, coordination, supportive supervision and capacity-building for all TB laboratories. Despite the efforts, the magnitude of diagnostic delay remains high. There is still a gap in knowledge regarding the factors associated with TB diagnostic delay, especially in rural areas in Tanzania. Therefore, this study aimed to determine the magnitude and factors associated with TB diagnostic delays in Tarime DC, a rural area with a community involved in mining activities. Specifically, this study investigated the role of socioeconomic factors, health-system related factors and individual-level factors in TB diagnostic delay.

1.3 CONCEPTUAL FRAMEWORK

The conceptual framework has been adapted from the Reducing TB delays USAID study report for the variables (individual level factors and health system related factors) with the action of TB diagnostic delay. Studies demonstrate that TB diagnostic delay is influenced by several factors. This study has grouped the factors into two categories: individual-level factors and health system-related factors (2).

Individual level factors include knowledge of TB and socio demographic characteristics such as; age, sex, residence, education level, marital status, occupation, smoking history, alcohol history and estimated per capita income. The factors listed can affect a patient's knowledge of TB, their understanding of the disease and their ability to access healthcare services. For example, low health literacy and poor socioeconomic status can lead to a lack of awareness about TB, this can result in delayed diagnosis and further management. As shown in the literature review below, other studies show women experiencing more barriers to healthcare services than men. Other individual factors include stigma based on TB as it can also influence the patient's willingness to seek care and ability to access healthcare services. For instance, a high level of stigma associated with TB can lead to social isolation and discrimination, which can negatively affect the patient from seeking care (12,16).

Health system-related factors include distance from the health facility and patient satisfaction. The listed factors can affect the patient's experience with healthcare services and willingness to seek care. For instance, poor patient satisfaction can lead to dissatisfaction with healthcare services, which can discourage patients from seeking care, thus causing delay. Long distance from the facility as well has a similar effect as shown in previous studies (17,18).

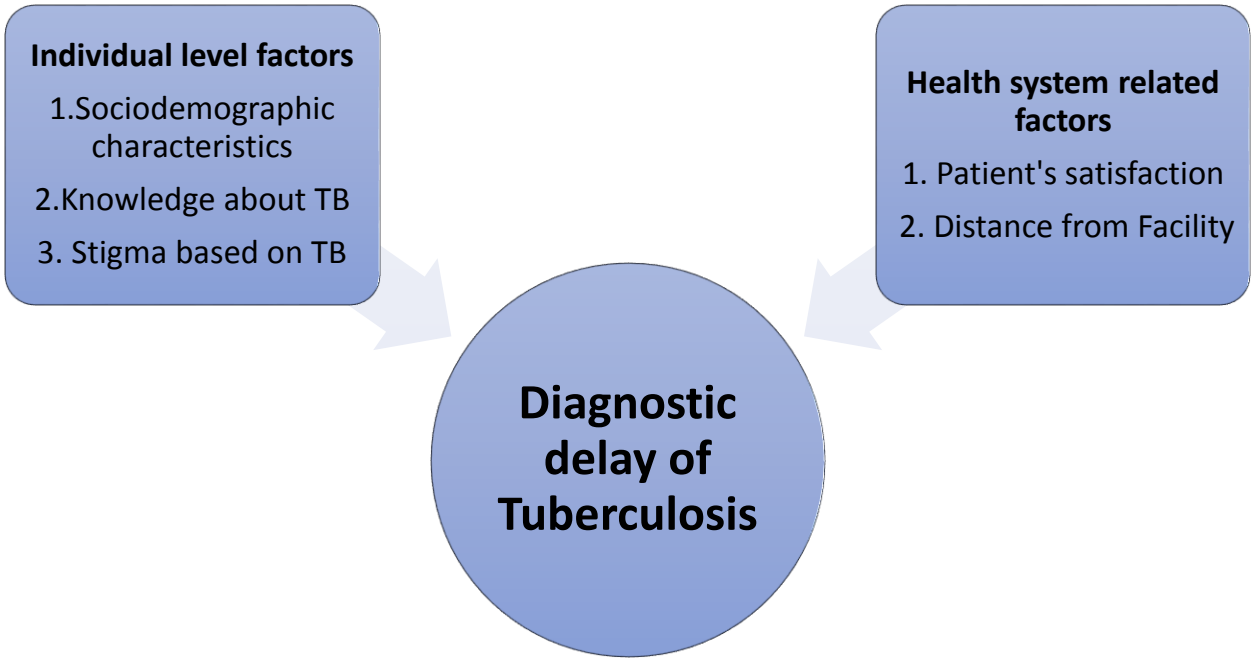


Figure 1: A conceptual framework showing delay in TB diagnosis and its associated factors

1.4 RATIONALE OF THE STUDY

The study will help to emphasize on improvement of community-based health education and awareness campaigns, improving access to diagnostic facilities, promoting timely health-seeking behavior, and strengthening diagnostic services. The study will also contribute to the training of healthcare workers and the implementation of innovative technologies such as telemedicine. The new knowledge gained from the study will contribute to the solutions to practical problems in the community by providing evidence-based information on the factors contributing to TB diagnostic delays in Tanzanian rural areas. This will further inspire the improvement of targeted interventions to address the specific challenges rural communities face in accessing TB diagnostic services

The study aims to offer insights that will be useful in policy formulation by providing updated evidence-based recommendations to inform national and regional policies and strategies for TB control in Tanzania. The findings can be used to advocate for increased resources and investments in TB control, particularly in rural areas where the disease burden is high.

This study also aims to contribute to the existing knowledge on TB diagnostic delay by indicating what contributes to delay of TB diagnosis. The findings of this study will be disseminated to the greater Tanzanian audience as new evidence to inspire more research.

1.5 RESEARCH QUESTIONS

1.5.1 Main research question

What is the magnitude and associated factors of TB diagnostic delay amongst adults in Tarime DC, Mara region in Tanzania?

1.5.2 Specific research questions

1. What is the magnitude of TB diagnostic delay amongst adult TB patients in Tarime DC, Mara region?
2. What are the individual-level factors associated with TB diagnostic delay in Tarime DC, Mara region?
3. What are the health system-related factors associated with TB diagnostic delay in Tarime DC, Mara region?

1.6 OBJECTIVES

1.6.1 Broad objective

To determine the magnitude and associated factors of TB diagnostic delay amongst adults in Tarime DC, Mara region in Tanzania.

1.6.2 Specific objectives

1. To determine the magnitude of TB diagnostic delay amongst adult TB patients in Tarime DC, Mara region.

2. To determine the individual factors associated with TB diagnostic delay amongst adults in Tarime DC, Mara region.
3. To determine the health system-related factors associated with TB diagnostic delay amongst adults in Tarime DC, Mara region.

1.7 STUDY HYPOTHESIS

There will be a significant positive or negative association between individual and health system-related factors with diagnostic delay among TB patients in Tarime DC, Mara region.

CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

The literature review of studies conducted mainly in the low-and middle-income countries across the world. Articles were searched for publications from 2010 to 2024. The researcher searched several databases, mainly PUBMED, Web of Science, Google Scholar, BMC and used Mendeley for further referencing and literature search.

2.2 Magnitude of TB diagnostic delay

To control the spread of TB, early diagnosis and prompt management is very imperative. Though the situation in most African countries varies to a slight extent, delays from patient level to the facility level are not uncommon in several studies conducted. Various articles discussed on the context of Africa and Tanzania specifically.

A study by Das et al. (2017) in Darjeeling, West Bengal, revealed significant delays in diagnosing pulmonary tuberculosis (TB). The average patient delay was 23.64 days, while the health system delay averaged 5.71 days, resulting in a total diagnostic delay of 29.46 days. Median delays were 25 days for patient delay, 5 days for health system delay, and 32 days for total diagnostic delay. These prolonged delays raise concerns about treatment outcomes and the potential for increased transmission of TB within the community (2).

A study in Ethiopia in 2019 based on the delay of tuberculosis diagnosis and treatment in Amhara state, Ethiopia, showed that 59.9% of patients visited the facility with a mean time of health seeking after the development of symptoms of TB being approximately 7.6 weeks. The study reported a wide range of seeking the health services from one week to 103 weeks. A second delay, related to patient receiving treatment at the facility, had a mean of 33.3 days, ranging from 1 week to 51 weeks. It was noted that until the disease was diagnosed the patients had been repeatedly attended at the facility on average thrice (3 times). A study was done in the Gedeo zone in southern Ethiopia in 2018. The study found that nearly half of the patients (50.9%) had an unacceptable delay in treatment of TB(17,18).

A hospital-based survey was done in Dar Es Salaam, Tanzania in 2006 amongst 639 TB patients, 52.9% of patients reported delayed diagnosis. Another study was done in Dar Es Salaam in 2017 for 513 TB patients the cohort study enrolled between November 2013 and June 2015. The study showed a median diagnostic delay time of 3 weeks [1 - 45 weeks]; 28 patients (5%) having a diagnostic delay of more than 4 weeks and 442 patients (86%) after three weeks of developing symptoms concluding a delay among 21% of TB patients (12,20).

In order to control the spread of TB and its related morbidity and mortality, early diagnosis and prompt management is very imperative.

2.3 Individual-level factors associated with TB diagnostic delay

Socioeconomic factors have been linked to TB diagnostic delays in rural areas. A study in Cali Colombia showed that some socio demographic factors are associated with TB diagnostic delay. Poor knowledge of TB symptoms and transmission attributed to low health literacy among patients had a 30% longer delay. Patients who smoked had a 20% longer delay than non-smokers than those who did not. Besides, older patients, above 65 years had 30% shorter delay than those under 25 years. Also, employed patients had 20% shorter delay than those unemployed (19).

In 2014, a systematic review among six-sub-Saharan countries using mixed methods systematic analysis showed poor knowledge of TB being related to longer delay, female patients were more likely to have longer delay in seeking care than male, patients with no formal education or lower education were more likely to have a longer delay, patients who were never married were more likely to have longer delay, patients with lower income were more likely to have a longer delay, patients who smoked and with alcohol history were more likely to have a longer delay in diagnosis (15).

A cross-sectional study done in Dar Es Salaam, Tanzania in 2008 amongst 295 smear-positive TB patients measured patient delay (the time from onset of symptoms to the first consultation of any health provider) and the health system delay (the time from the first consultation to diagnosis and treatment initiation). The median patient delay was 60 days and the median health system delay was seven days. This study found that low health

literacy, older age, female sex, low education level, being married, unemployment status, having a history of smoking or alcohol use and a low income were significantly associated with longer patient delay (20).

The scientific community increasingly recognizes the importance of gender-related analyses in healthcare. WHO prioritizes addressing gender-related health disparities and integrating gender analysis into health programs. In the context of TB, gender analyses are vital for optimizing TB services worldwide. The systematic review highlighted that women often face more challenges and delays in accessing TB services compared to men. Specific gender-related factors like financial, stigma, and health literacy barriers were identified, which can be targeted through focused interventions. A qualitative study in Peru found that stigma based on TB was a barrier to timely diagnosis as patients feared discrimination, isolation, rejection and loss of social status and the distance from the nearest facility affected the accessibility of TB diagnosis (10,21,22).

These factors can significantly impact TB diagnostic delays and are crucial to consider when addressing public health challenges related to TB. A study in West Bengal, India showed factors associated with patient delay were low suspicion of TB, AOR = 2.7 [95% 1.3-5.6) and stigma, AOR = 2.4; [95% CI 1.1-5.1]. A study by Gelaw (2016) in Ethiopia found that overall TB knowledge was low, with only 44.05% and 33.3% in women and men, respectively, having good knowledge of TB. A study that was conducted in Mwanza showed thah only 15% of patients reported to a health facility within 30 days of onset of symptoms. National Tuberculosis and Leprosy Program report stated that patients with a high degree of suspicion are more likely to seek care early and shorten the diagnostic delay. The report also shows that stigma is a significant barrier to early diagnosis of TB(4,23,24).

Along the lake zone of Mainland Tanzania, a cross-sectional descriptive study was done on 296 smear-positive TB patients in Mwanza in the year 2000 that focused on the underlying factors of diagnostic delay in tuberculosis patients in rural areas. The study showed a mean period between the onset of symptoms and reporting to the facility was 161.7 days, with a more extended period with patients aged 45 years and above and patients living in rural

areas. The study also compared the means of patient's delay and the total delay, concluding that close to 90% of the total delay was ascribed to the patient, calling for an intensifying age and services access strategies (16).

2.4 Health system-related factors associated with TB diagnostic delay

Health system-related factors have been associated with TB diagnostic delays in rural areas. A study conducted in Ethiopia found that the mean patient waiting time at the health facilities was 30 minutes. Long waiting time was significantly associated with low patient satisfaction and high delay. Patients who were satisfied with health services were 1.6 times more likely to seek care within two weeks of symptom onset than those who were dissatisfied, and 1.5 times more likely to be diagnosed within one week after seeking care than those dissatisfied (18). A study in West Bengal, India showed that distance from the nearest health facility factors was also associated with patient delay, AOR 2.1 [95% CI 1.0-4.4] (24). A cross-sectional descriptive study in Mwanza showed a more extended diagnostic period with patients living more than 10km from the facility (16).

CHAPTER THREE

3.0 METHODOLOGY

3.1 Study design

A cross-sectional study was carried out using a quantitative approach at six healthcare facilities within the Tarime District Council in the Mara region.

3.2 Study Area

Despite Mara region not being among the regions contributing to the highest incidence based on TB notification rate data, it is still an area of emphasis since it has mining districts, with Tarime DC being the most notable mining district. Mining communities are among areas of focus as per NTLP since the National Strategic Plan VI 2020-2025, which stipulates that the mining population is a key population with a high-risk population. The tuberculosis control program provides active case finding, advocacy, coordination and occupational health services for the mining population. However, there are challenges, such as limited access to TB services and low awareness of TB disease among the mining population.

Mara is located in the northern-western part of Tanzania's mainland, with a total area of 30,150 km^2 with a population of 1,743,830 inhabitants. The north of the Mara region borders Uganda and Kenya. Mara region comprises of 9 districts namely Tarime DC, Tarime TC, RoryaDistrict, Serengeti District, Butiama District, Bunda DC, Bunda TC, Musoma DC and Musoma MC. Based on the reports of TB notification and Electronic TB and Leprosy Register data entry targets by the 1^{st} quarter of the year 2022, the following districts have the highest to lowest targets, respectively, based on the TB burden, namely; Rorya DC (1699 cases), Tarime DC (461 cases), Bunda TC (454 cases), Musoma MC (418 cases), Butiama district (331 cases), Serengeti DC (327 cases), Tarime TC (265 cases), Bunda DC (236 cases) and Musoma DC (175 cases) (25,26).

Tarime DC comprises 4 divisions (namely Ingwe, Inchage, Inchugu and Inano), 26 wards, and 88 villages with 469 hamlets. Tarime District Council has 43 health facilities (34

government facilities and nine private facilities). There is one hospital, ten health centres and 32 dispensaries. There's a total of 9 TB DOT centres with a high volume of patients (Tarime DC Hospital, Nyangoto Health Centre, Sirari Health Centre, Muriba Health Centre, Masanga Health Centre, Genkuru Health Centre, Nyamongo Health Centre, Magoto Health Centre and Nyarwana Health Centre). 1 Private facility (Masanga Health Centre) among the 9 DOT centres with the remaining 8 being government facilities.In total, 35 to 50 patients are attended monthly, an average of about 43 per month per facility. This number was attainable in 6 of the 8 DOT centres that were randomly selected as clarified in the methodology section. These facilities are Tarime DC Hospital, Nyangoto HC, Sirari HC, Muriba HC, Nyamongo HC and Nyarwana HC.

3.3 Study population

The population covered were adult TB patients attending clinics in the 6 out of 8 government TB DOT centres in Tarime DC.

3.4 Inclusion and exclusion criteria

3.4.1 Inclusion criteria

- Pulmonary TB patients attending TB clinics at the DOT centres
- Adult TB patients aged 18 years and above
- Patients who have not received a tuberculosis diagnosis within the last six months.
- Patients referred to health facilities from rural areas for tuberculosis diagnosis.

3.4.2 Exclusion criteria

- Patients who are unable to provide informed consent.
- Patients who are unable to complete the study questionnaire.

3.5 Sample size estimation

The estimated sample size required for this study was calculated by the formula below:

$$n = \frac{z^2.p(1-p)}{e^2}$$

Where n= minimum sample size required

Z=Z-score for 95% confidence interval, which is 1.96

e= Margin of error is 5 % (0.05)

p = an estimated proportion of TB patients with a delay in diagnosis. Referring to a study that was once done in Dar Es Salaam that shown a delay of 21%, hence p=21% (12)

n= 254

Therefore, the estimated sample size was 254 patients.

3.6 Sampling procedure

In this study, DOT centres were selected based on facilities with a high volume of patients. Only government facilities were included in this study. A comprehensive list of eight DOT centres in Tarime DC providing TB clinic services was developed, from this list a random number generator or lottery system was employed to select six facilities (Tarime DC Hospital, Nyangoto HC, Sirari HC, Muriba HC, Nyamongo HC and Nyarwana HC) amongst the facilities with the highest attendance that would serve as the sites for data collection. The estimated sample size was allocated among the six selected health facilities based on their capacity to care for TB patients. Subsequently, consecutive enrollment was conducted at each DOT centre, whereas eligible TB patients were identified based on predefined inclusion criteria. The employed systematic approach ensured representative sample of individual study participants.

3.7 Data collection

3.7.1 Recruitment and training of Research assistants

Five research assistants with previous experience in healthcare-related data collection including; clinical officers and nursing officers attending patients at DOT centres were identified at the respective facilities, trained, and oriented on the questionnaire to conduct data collection.

3.7.2 Data collection tool and technique

The researcher used an interviewer-administered questionnaire for interviewing the participants from 6 DOT centres. The questionnaire had been adapted and modified from several tools such as the Stop TB stigma assessment tool developed by the Stop TB partnership and data collection tools to evaluate TB delays used by USAID (27,28). Patient files and TB treatment charts were also be checked at the clinics.

3.7.3 Questionnaire Pre-testing

The research assistants at Tarime DC pre-tested the questionnaire to assess whether it was comprehensible, intuitive and acceptable for the study population. The tool was piloted.

3.8 Study variables and their measurements

3.8.1 Outcome variable

The outcome variable was the diagnostic delay of TB. Diagnostic delay used two items namely personal delay and facility delay. Personal delay was defined as the time interval between the day a participant notices some TB-suggestive symptoms for the first time to the day of presentation to the health facility. In this case,≥23 days was a personal delay (2). Facility delay was assessed by the longevity of results, from the day the sample was taken to the day the patient received the results. In this case, it was 7 days to fit the geographical context (25). Thereafter, patients with personal delay and facility delay were regarded as the diagnosis delay of TB by adding the number of days the participant experienced personal and facility delay. The resulting variable for diagnostic delay has two categories: ≥ 30 days was considered delay (1=yes), less than 30 days was considered no delay (0=no) (3).

3.8.2 Independent variables

Independent variables included individual-level, health factors, and sociodemographic factors including age, sex, highest education level, marital status, occupation, knowledge about TB and stigma. Also, habits such as smoking, and alcohol intake were asked. The level of knowledge about TB was a combination of the following i.e., knowledge of TB, cause of TB, Symptoms and Transmission of TB. All the items were converted to binary

variables (yes=1/no=0). Patients with a total score of four were regarded to have high/adequate knowledge of TB otherwise, low/ inadequate knowledge of TB. The stigma domain had nine dichotomously measured items (i.e., yes=1/no=0). The total score was obtained by adding up all the 9 items with a range of 0-9, whereby patients with a score less than the mean score (5.63) were regarded to ever experience stigma, otherwise ever not.

3.9 Data management and analysis

Data collected from this study was analyzed using STATA version 18. Results were presented using frequency distribution tables. Since the outcome was binary and the prevalence was above 10% a modified Poisson regression was used to assess the factors associated with the diagnosis delay of TB. Any variables with a p-value of <0.20 during the bivariate analysis were included in the multivariable regression analysis including age and sex to account for confounding. All the statistical test was performed at 5% significant level.

3.10 Ethical considerations

The study obtained the ethics approval from the MUHAS Institutional Review Board before data collection. Local permissions to conduct the field work was sought from the District Executive Director and District Medical Officer of Tarime DC. Participants were assigned identifying numbers instead of names, to de-identify them. This ensured confidentiality of patients' and the health data. A consent form was used to seek written consent from the study participants before filling in the questionnaires.

CHAPTER FOUR

4.0 RESULTS

4.1 Characteristics of respondents

A total of 254 adults were enrolled in the study. The median age was 39 years [interquartile rage (IQR), 28-50]. Majority of participants were male (n=155, 61.0%). Nearly half of the participants (n=139, 54.7%) had basic education, equally another half (n=136, 53.6%) were employed. The median distance from the health facility was 5 km [IQR, 3-8]. The proportion of respondents with high level of knowledge about TB was 61.0% (n=155, 95% CI, 54.9%-66.9%). Overall, stigma was reported by 26.4% of the respondents (n=67, 95% CI, 21.3%-32.2%) (Table 1). Other results showed that 61% of patients had high knowledge about TB, with 84.2% affirming it as a serious disease, while 19.3% feeling hurt by other's reactions and 20.5% reported losing firnds after revealing their TB status, though these findings were not the primary aim of the study.

Overall Patient satisfaction was also assessed, and 78.7% (n=200, 95% CI, 73.2%-83.4%) of participants were satisfied. Overall patient satisfaction was comprised of satisfaction with the amount of time spent with healthcare provider, satisfaction with overall TB clinic care services and satisfaction with diagnosis and management. Satisfaction with the amount of time spent during visits was reported by 80.3% (n=204), while 80.7% (n=205) expressed satisfaction with the explanation of their diagnosis and management (Table 1).

Table 1: Characteristics of respondents (n=254)

Variable	Number (%)
Age [Median years, IQR]	39, 28-50
≤45 years	155(61.0)
> 45 years	99(39.0)
Sex	
Male	155(61.0)
Female	99(39.0)
Marital status	
Single	77(30.3)
Married	177(69.7)
Education	
No formal education	41(16.2)
Primary/secondary	139(54.7)
College and above	74(29.1)
Occupation	
No employed	28(11.0)
Employed	136(53.6)
Self employed	90(35.4)
Ever smoked (>5 pack in lifetime)	
No	200(78.7)
Yes	54(21.3)
Currently smoking	
No	212(83.5)
Yes	42(16.5)
Currently drinking alcohol	
No	196(77.2)
Yes	58(22.8)
Distance from health facility in km [Median, IQR]	5, 3-8
Stigma	
No	187(73.6)
Yes	67(26.4)
Knowledge about TB	
High	155(61.0)
Low	99(39.0)
Overall patient satisfaction	
Satisfied	200 (78.7)
Not satisfied	54 (21.3)

4.2 Tuberculosis diagnosis delay

The magnitude of TB diagnosis delay among adults was 16.9% (n=43, 95% CI, 12.8%-22.1%). The common reasons for delaying seeking healthcare for the symptoms were not being aware of the symptoms (n=26, 60.5%), lack of time (n=5, 11.6%), and difficulty accessing healthcare (n=8, 18.6%) (Table 2).

Considering that diagnostic delay was the total sum of patient and health system-related delay, the findings further demonstrated the distribution of the study population according to different types of delay. About 18.89% had prolonged patient delay; 16% had health system-related delay; Mean patient and health system-related delay was 11.21 and 4.94 days, respectively; and the median patient and health system-related delays were 20 days [IQR: 18.5-24.5] and 6 days [IQR: 5-7], respectively.

Table 2: Reasons for a delay in diagnosis (n=43)

Reason	Number (%)
Not aware of the symptoms	26(60.5)
Fear of losing job	4(9.3)
Lack of time	5(11.6)
Difficult to access healthcare	8(18.6)

4.3 Individual and health system factors associated with TB diagnosis delay

The multivariate analysis of individual factors associated with delay of TB diagnosis delay indicates that TB patients perceived of stigma were more than three times as likely to delay TB diagnosis with an adjusted PR of 3.40 (95% CI, 1.79-6.64, $p<0.001$). Conversely, patients with adequate knowledge about TB were 88% less likely to delay TB diagnosis than those with poor knowledge about TB with an adjusted PR of 0.12 (95% CI, 0.05-0.32, $p<0.001$). Also, patient who consume alcohol were more likely to delay TB diagnosis with an adjusted PR of 1.84 (95% CI, 1.14-2.99), this also suggests that they were 84% more likely to delay in TB diagnosis. Likewise, patients with basic education (i.e., primary & secondary education) were 56% less likely to delay TB diagnosis with an adjusted PR of

0.56 (95% CI, 0.33-0.93, p=0.026) Also, patients that reported to be married were less likely to delay TB diagnosis compared to those reported to be single with a crude PR of 0.5 (95% CI, 0.29-0.85, p=0.206) (Table 3).

During multivariate analysis, it was found that patients satisfied with TB care were less likely to delay TB diagnosis with an adjusted PR of 0.05 (95% CI, 0.02-0.13, p<0.001). Despite the insignificant ration, increase in the distance from the health facility increase the crude PR of delay TB diagnosis with an PR of 1.12 (95% CI, 1.08-1.16, p<0.001) (Table 3).

Table 3: Individual and health system factors associated with TB diagnosis delay (n=254)

Variable	Total	TB delay diagnosis No. (%)	CPR, 95% CI	p-value	APR, 95% CI	p-value
Age						
≤45 years	155	23(14.8)	1		1	
> 45 years	99	20(20.2)	1.36, 0.79-2.35	1.267	0.89, 0.57-1.41	0.637
Sex						
Male	155	30(19.4)	1		1	
Female	99	13(13.1)	0.68, 0.37-1.24	0.206	1.10, 0.72-1.69	0.658
Marital status						
Single	77	20(26.0)	1		1	
Married	177	23(13.0)	0.50, 0.29-0.85	**0.012**	0.85, 0.56-1.30	0.457
Education						
No formal education	41	15(36.6)	1		1	
Primary/ Secondary	139	19(13.7)	0.37, 0.21-0.67	**0.001**	0.56, 0.33-0.93	**0.026**
College and above	74	9(12.2)	0.33, 0.16-0.69	**0.003**	0.66, 0.32-1.33	0.244
Occupation						
No employment	28	4(14.3)	1			
Self-employed	136	28(20.6)	1.44, 0.55-3.79	0.459		
Employed	90	11(12.2)	0.86, 0.29-2.48	0.774		
Current smoking						
No	212	23(10.8)	1		1	
Yes	42	20(47.6)	4.39, 2.66-7.24	**<0.001**	1.46, 0.96-2.23	0.080
Current drinking alcohol						
No	196	16(8.2)	1		1	
Yes	58	27(46.6)	5.70, 3.30-9.84	**<0.001**	1.84, 1.14-2.99	**0.012**
Knowledge of TB						
Low	99	39(39.4)	1		1	
High	155	4(2.6)	0.07, 0.02-0.18	**<0.001**	0.12, 0.05-0.32	**<0.001**
Stigma						
No	187	10(5.4)	1		1	
Yes	67	33(49.3)	9.21, 4.80-17.67	**<0.001**	3.40, 1.79-6.64	**<0.001**
Overall patient satisfaction						
Satisfied	200	5(2.5)	0.04, 0.01-0.09	<0.001	0.05, 0.02-0.13	**<0.001**
Not satisfied	54	38(70.4)	1		1	
Distance from the health facility			1.12, 1.08-1.16	**<0.001**	1.02, 0.99-1.05	0.076

CHAPTER FIVE

5.0 DISCUSSION OF FINDINGS

5.1 Discussion

5.1.1 Introduction.

This section discusses the major research findings from the present study. The study aimed to determine the magnitude and associated factors of tuberculosis (TB) diagnostic delay among adults in Tarime DC, Mara region, Tanzania, focusing on both individual and health system-related factors.

5.1.2 Magnitude of TB diagnostic delay

The prevalence of TB diagnostic delay of 16.9% observed in this study is relatively lower than in some other regions, though direct comparisons are complicated by differing definitions of delay. For instance, in Dar es Salaam, Tanzania, a diagnostic delay was reported in 52.9% of TB patients, with a median delay of 3 weeks (3). Similarly, in Ethiopia, a study reported that 59.9% of TB patients experienced delays in seeking health services, with a mean delay of 7.6 weeks (29).

The mean patient delay observed in this study was 11.21 days, which is slightly lower than the delays reported in similar studies conducted in other regions such as Darjeeling, where reported a mean patient delay of 23.64 days (2). A median of 6 days was observed on health facility-related delays, which is consistent with the findings of the study by, where the median delay was reported as 5 days (2). These variations might be attributable to differences in the local health infrastructure, patient awareness levels, and socio-cultural factors.

The current study defined diagnostic delay (≥30 days) as patients experiencing a total of personal (≥23 days) and health facility (≥7 days) delays, whereas other studies often define it as the total delay exceeding a certain number of days as seen in the study done in Darjeeling, India which considered a total delay of more than 37 days as significant (2).

These differences in definitions necessitate careful interpretation of comparative data and underscore the need for a universally accepted criterion for TB diagnostic delay.

The delays in diagnosis not only affect the prognosis of individual patients but also have broader public health implications, including prolonged infectious periods and increased transmission rates. Strategies to reduce these delays must include both patient-targeted interventions and systemic health infrastructure improvements.

5.1.3 Individual-level factors associated with TB diagnostic delay

Several individual-level factors were found to be associated with TB diagnostic delays. Our study found that female patients and those with lower educational levels were more likely to experience prolonged diagnostic delays. These findings align with existing literature indicating that marginalized groups often face greater barriers to accessing timely healthcare although pertaining to female patients in these studies the association was not significant statistically (2,30).

Other socioeconomic factors, such as poor knowledge of TB were significant contributors to delays. Patients with poor knowledge of TB were more likely to experience longer delays in seeking healthcare. This finding is supported by a study in Cali, Colombia, which found that patients with poor knowledge of TB symptoms had a 30% longer delay in seeking diagnosis, the study also showed female clients being more affected by delay (31). Additionally, smoking and older age were associated with longer delays, while employment status was linked to shorter delays.

Alcohol consumption and smoking were significant predictors of patient delay, similar to the findings by Basu et al. (2017) who reported that lifestyle factors like alcohol consumption significantly contributed to delays in seeking healthcare (2). This suggests a need for targeted public health interventions focusing on lifestyle modifications and health education.

5.1.4 Health system-related factors associated with TB diagnostic delay

The delays within the health system were significantly influenced by factors such as the distance to the nearest health facility and poor patient satisfaction. Patients who were dissatisfied were more likely to have diagnostic delays. Our findings are similar to a study in Ethiopia that demonstrated that dissatisfied patients were 1.6 times more likely to delay seeking care (24). The analysis revealed that individuals who had to travel longer distances were more likely to experience delays. Similarly, in West Bengal, India, distance from the nearest health facility was significantly associated with diagnostic delay, with those living farther away experiencing longer delays (2). All of these findings emphasize the critical role of healthcare accessibility in timely TB diagnosis

5.2 Limitations of the Study

In addition to the study's strengths, which included context-specific insights in a region with limited prior research, a comprehensive data collection process combining face-to-face interviews and patient file reviews, and the identification of critical patient-related factors like stigma whose public health implications, particularly concerning TB diagnostic delay, warrant further exploration and the use of a quantitative approach employing modified Poisson regression further strengthened the study's statistical analysis. However, the study also had several limitations.

Firstly, recall bias was a potential issue, as the data relied on the patient's recollection of past interactions with the healthcare system, which could affect the accuracy of the information collected. To mitigate this, research assistants trained in patient interviews and scientific methods were engaged, and efforts were made to cross-reference patient-reported data with medical records and lab results while maintaining patient privacy.

Secondly, the assessment of stigma presented a contextual challenge. Despite the stigma's complexity, this study partially utilized the Stop TB Stigma Assessment tool, developed by the Stop TB partnership, which was designed to be culturally sensitive and adaptable to diverse contexts where TB is prevalent. Although the tool was adopted for the rural setting

of Tarime DC the study acknowledges the limitations in addressing stigma within the specific cultural context.

Finally, the study recognizes that definitions of TB diagnostic delay vary across several literature, which may influence the comparability of the results. These differential differences were considered when interpreting the findings.

CHAPTER SIX

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Conclusion

This study found that the prevalence of diagnostic delay in pulmonary TB in Tarime DC, Mara region was relatively lower than in other regions. Key factors associated with patient-related delays include inadequate knowledge of TB, alcohol consumption, and cigarette smoking. Additionally, health system-related barriers such as long distances to health facilities and overall patient satisfaction with healthcare services contributed significantly to delays.

6.2 Recommendations

As for the implications and future directions, the risk factors identified in this study, particularly low knowledge of TB, stigma, and access barriers, highlight the need for targeted interventions. Public health strategies should focus on enhancing TB awareness, addressing stigma, and improving healthcare infrastructure, especially in rural areas. Addressing these delays is crucial for improving patient outcomes and reducing TB transmission within the community. Future research should explore interventions that can further mitigate these risk factors and facilitate timely diagnosis and ultimately treatment of TB. In detail, the recommendations are as follows:

1. **Enhance health literacy and TB awareness:**

   Community-based health education programs should be implemented. These programs should focus on improving awareness of TB symptoms. A practical example could be partnering with local community workers (CHWs) who already serve as trusted figures in rural communities. In the local context, where CHWs are deployed in hard-to-reach areas, they could conduct monthly health education sessions on TB symptoms, transmission, and the importance of early diagnosis.

2. **Improving access to TB diagnostic services:** This could be accounted for by increasing the number of health facilities conducting DOT services or introducing mobile diagnostic units to reduce travel time in rural areas. For example; introducing mobile TB diagnostic vans could reduce health system delays by bringing services directly to remote areas. The Rwandan mobile health initiative offers a successful model that could be adapted. A goal could be to ensure that no patient has to travel more than 3km to access TB diagnostic services. Telemedicine, where TB patients in remote areas can consult with healthcare providers via mobile phones, could also reduce travel and waiting times. In the context of Tanzania, several mobile health services are provided by both government and NGOs to improve healthcare services in rural areas. Programs by Amref Africa and World Vision offer mobile outreach for TB screening, maternal health, and vaccination. These existing mobile services can be expanded to include TB diagnostics, aligning with the study's recommendation.

3. **Strengthening healthcare infrastructure and provider training:** Addressing infrastructure issues in rural LMIC (Lower- and middle-income countries) settings by focusing on improving patient-provider interaction and reducing waiting times. This would be accomplished through capacity-building workshops for healthcare providers on effective TB diagnosis, treatment, and patient communication. Ensuring at least 80% patient satisfaction by improving diagnostic turnaround times (currently a median of 6 days) would reduce health system delays.

4. **Advocacy for lifestyle modification programs:**.
   Developing local community-based campaigns in rural areas focused on alcohol and smoking behaviors, which were identified as key risk factors. Partner with existing community outreach programs to promote healthier lifestyle choices in areas where smoking and alcohol use are prevalent. For example, to incentivize community leaders to organize weekly health awareness talks, incorporating discussions on the

possible impacts of smoking and alcohol use concerning TB symptoms and diagnostic delays. Measurable targets could include a 20% reduction in alcohol and smoking rates among TB patients in 3 years.

5. **Policy advocacy and resource allocation:**
   Advocacy for policy changes that prioritize TB resource allocation in rural areas, emphasizes the findings of this study. Influencing the ministry of health to allocate at least 20% of TB funding to rural infrastructure, and collaboration with local and international partners to ensure consistent funding for TB diagnostic tools.

6. **Further research on diagnostic delays:**
   Conducting longitudinal studies specifically focused on rural populations in LMICs, where healthcare access and stigma play a larger role. Practical approaches could involve establishing TB patient registries in rural health facilities to track patient outcomes over time, with a goal to reduce diagnostic delays by 50% within 5 years. Partnering with academic institutions or NGOs to conduct ongoing assessments of intervention efficacy will provide further data to guide policy changes.

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8.0 APPENDICES

8.1 APPENDIX 1: DATA COLLLECTION TOOL (QUESTIONNAIRE) IN ENGLISH

MAGNITUDE AND FACTORS ASSOCIATED WITH DIAGNOSTIC DELAY OF TUBERCULOSIS AMONG ADULTS IN TARIME DC, MARA REGION, TANZANIA.

Date of interview (dd/mm/yyyy) ____/_____/_____

Interviewer initials: _____

District _____

Health Facility _____

Date of initiation of anti-TB medication (From TB-clinic file) _____

Date of TB diagnosis (From TB-clinic file) _____

Instruction: Read questions as written. Record answers carefully. Circle the correct answer number in the right.

SECTION 1: SOCIO-DEMOGRAPHIC INFORMATION

No	Questions	Coding categories
1	Sex	1. Male 2. Female
2	Age	_____Years
3	Residence	
4	Distance from Health facility	_____KMs
5	What is your marital status	1. Single 2. Cohabiting 3. Married 4. Divorced/ separated 5. Widow
6	Education	1. Advanced/ college 2. Primary-school 3. No formal education
7	Occupation	1. Employed 2. Self-employed / employer

		3. Others (student, etc) 4. Without occupation
8	Have you smoked at least 100 cigarettes in your entire life? (5packs=100 cigarettes)	1. Yes (If Yes, go to question 9) 2. No (Skip to question 10) 3. Don't know/ not sure (skip to question 10) 4. Refused (Skip to question 10)
9	Do you now smoke cigarettes?	1. Every day 2. Some days 3. Not at all 4. Don't know/ not sure 5. Refused
10	How often do you have a drink containing alcohol?	1. Never 2. Monthly or less 3. 2-4 times a month 4. 2-3 times a week 5. 4 or more times a week

SECTION 2: KNOWLEDGE ABOUT TB (Do not provide answers)

11	Do you know what TB is	1. Yes 2. No
12	Do you think TB is a serious disease?	1. Yes 2. No
13	What do you think are the causes of TB in your personal opinion?	1. Infection 2. Supernatural punishment 3. Unavoidable 4. Don't know 5. Others
14	What are the symptoms of TB infection?	1. Cough for more than 3 weeks 2. Fever 3. Weight loss 4. Cough with blood 5. Don't know
15	How is TB transmitted?	1. Sharing utensils with an infected person 2. Through germs present in the air droplets expelled through cough 3. Others 4. Don't know

16	Do you know how TB is diagnosed?	1. Through sputum examination 2. Through Xray 3. Other 4. Don't know
17	Is TB curable?	1. Yes 2. No
18	**TB knowledge [scored by the research assistant based on response of the 7 questions]**	1. High 2. Low (If responded **"No/Don't Know"** to more than 3 questions)

SECTION 3: STIGMA BASED ON TB (**On a scale of 1 to 3 how much do you agree or disagree on the following statement**) ***Research assistant***: Read the sentence to the patient and document the response

19	I feel hurt how others react to knowing I have TB	1. Disagree 2. No opinion 3. Agree
20	I lose friends when I share with them that I have TB	1. Disagree 2. No opinion 3. Agree
21	I am afraid to tell those outside my family that I have TB	1. Disagree 2. No opinion 3. Agree
22	I am afraid of going to TB clinics because other people might see me there	1. Disagree 2. No opinion 3. Agree
23	Have any of the above feelings inhibited you from seeking and accessing TB services? **[Ask if agreed to any one of the 4 statements]**	1. Yes 2. No
24	Have you ever felt stigmatized because of your TB status?	1. Yes 2. No
25	Have you experienced stigma from neighbors in your community that inhibited you from seeking and accessing TB services?	1. Yes 2. No
26	Have you experienced stigma at home that inhibited you from seeking and accessing TB services?	1. Yes 2. No

27	Have you experienced stigma at work that inhibited you from seeking and accessing TB services?	1. Yes 2. No

SECTION 4: PATIENT WAITING TIME AND PATIENT SATISFACTION

28	How long did you have to wait for results?	_____Days
29	How satisfied were you with the explanation of your diagnosis and treatment plan?	1. Very Dissatisfied 2. Dissatisfied 3. Neutral 4. Satisfied 5. Excellent
30	How would you rate the overall TB clinic care services?	1. Very Poor 2. Poor 3. Fair 4. Good 5. Excellent
31	How would you satisfied with the amount of time you spent with your healthcare provider during your visit?	1. Very Dissatisfied 2. Dissatisfied 3. Neutral 4. Satisfied 5. Excellent

SECTION 5: ESTIMATION OF DELAYS

32	How long were you sick before you sought treatment?	_____Days
33	What were the first symptoms you experienced to seek treatment?	1. Cough for more than 3 weeks 2. Fever 3. Weight loss 4. Sputum with blood 5. General body weakness 6. Night sweat 7. Chest pain 8. Other
34	Did you take any treatment before you were diagnosed?	1. Yes (Go to question 35) 2. No (Go to question 37)
35	Which treatment?	
36	After treatment how were your symptoms?	1. Improved 2. Worsened

		3. Same
37	Why did you choose to come to this facility?	1. Close 2. I've been here before 3. Recommended by family/friend 4. Referred 5. Familiarity with the healthcare providers 6. Other
38	Were you informed about the possibility of having TB	1. Yes (Go to question 39) 2. No → (Go to question 42)
39	When were you informed?	1. First visit (Go to question 43) 2. Other visits (Go to question 40)
40	How many more visits did it take to be informed on the possibility of TB?	_____(Number)
41	With whom did you have repeated visits?	1. With the same health provider 2. Different providers in the same facility 3. Different providers (healers, private, government, etc.)
42	If not, what other diagnoses were sought?	1. Respiratory infection 2. Malaria 3. HIV/AIDS 4. Other
43	What type of health facility made the initial TB diagnosis?	1. Government 2. Private
44	How long did it take since you first seek medical attention until you were informed you had TB?	1. _____Days 2. _____Weeks 3. _____Months
45	What reasons may have made you delay seeking treatment for symptoms that led to the diagnosis of TB?	1. Not aware of the severity of my symptoms 2. Fear of rejection/ losing my job 3. Lack of time 4. Expensive 5. Difficulty to access healthcare/ transportation challenges 6. Not having a previous satisfactory experience with the health system 7. Others

8.2 APPENDIX 2: INFORMED CONSENT ENGLIGH VERSION

INFORMED CONCENT ENGLISH VERSION

INFORMED CONCENT

Hello my name is (*interviewer identifies him/herself to the study participant*), we are on an academic clinical research that is based on the **barriers of early TB diagnosis**.

I would like to ask you a few questions about the disease, care you've received and the medical education you've been given. Your opinions are very important, your answers will be kept confidential and your name will not be required or written in this survey. Your participation in this study is voluntary hence you can withdraw from the interview at any moment without any negative consequences for you.

This survey will only take 30 minutes of your time. Do you have any questions?

Do you agree to participate? Yes____ No____

Signature of interviewer _____

Name of interviewer _____

8.3 APPENDIX 3: INFORMED CONCENT SWAHILI VERSION

KIBALI CHA KUSHIRIKI KATIKA UTAFITI

Habari, kwa majina naitwa (*Joshua A Karaba*), tupo katika tafiti ya kiafya juu ya changamoto katika utambuzi ya mapema ya kifua kikuu.

Ningependa kuuliza maswali machache juu ya ugonjwa wa kifua kikuu, huduma ulizopata na elimu ya afya uliyopata. Mawazo yako na mchango wako ni wa muhimu sana, majibu utakayotoa yatawekwa siri pia majina yako hayatohitajika katika utafiti huu. Ushiriki wako katika utafiti huu ni wahiari hivyo pale utakapojisikia kutokuendelea na maswali utaruhusiwa.

Maswali haya yatachukua nusu saa tu. Je una maswali yoyote?

Je, umekubali kushiriki? Ndio _____ Hapana _____

Sahihi ya mtafiti _____

Jina la mtafiti _____

8.4 APPENDIX 4: ETHICAL CLEARANCE

UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

OFFICE OF THE DIRECTOR – RESEARCH, PUBLICATIONS AND INNOVATIONS

Ref. No.DA.282/298/01.C/2250 Date: 17/05/2024

MUHAS-REC-05-2024-2250
JOSHUA KARABA
SCHOOL OF PUBLIC HEALTH AND SOCIAL SCIENCES
MUHAS

RE: APPROVAL FOR ETHICAL CLEARANCE FOR A STUDY TITLED: MAGNITUDE AND FACTORS ASSOCIATED WITH DIAGNOSTIC DELAY OF TUBERCULOSIS AMONG ADULTS IN TARIME DC, MARA REGION, TANZANIA.

Reference is made to the above heading,

I am pleased to inform you that the Chairperson has on behalf of the University Senate, approved ethical clearance of the above-mentioned study, on recommendations of the Senate Research and Publications Committee meeting accordance with MUHAS research policy and Tanzania regulations governing human and animal subjects research.

APPROVAL DATE: 17/05/2024
EXPIRATION DATE OF APPROVAL: 17/05/2025

STUDY DESCRIPTION:
Purpose:
The purpose of this study is to determine the magnitude and associated factors of TB diagnostic delay amongst adults in Tarime DC, Mara region in Tanzania.

The approved protocol and procedures for this study is attached and stamped with this letter, and can be found in the link provided: https://irb.muhas.ac.tz/storage/Certificates/Certificate%20-%2015619.pdf and in the MUHAS archives.

The PI is required to:

1. Submit bi-annual progress reports and final report upon completion of the study.
2. Report to the IRB any unanticipated problem involving risks to subjects or others including adverse events where applicable.
3. Apply for renewal of approval of ethical clearance one (1) month prior its expiration if the study is not completed at the end of this ethical approval. You may not continue with any research activity beyond the expiration date without the approval of the IRB. Failure to receive approval for continuation before the expiration date will result in automatic termination of the approval for this study on the expiration date.
4. Obtain IRB amendment (s) approval for any changes to any aspect of this study before they can be implemented.
5. Data security is ultimately the responsibility of the investigator.
6. Apply for and obtain Data Transfer Agreement (DTA) from NIMR if data will be transferred to a foreign country.
7. Apply for and obtain Material Transfer Agreement (MTA) from NIMR, if research materials (samples) will be shipped to a foreign country.
8. Apply for and obtain permission to publish the results from National Institute for Medical Research. The application should be before submitting to a publisher and not concurrently through the email publications@nimr.or.tz.
9. Any researcher, who contravenes or fail to comply with these conditions, shall be guilty of an offence and shall be liable on conviction to a fine as per NIMR Act No. 23 of 1979, PART III section 10 (2)
10. The PI is required to ensure that the findings of the study are disseminated to relevant stake holders.
11. PI is required to be versed with necessary laws and regulatory policies that govern research in Tanzania. Some guidance is available on our website https://drp.muhas.ac.tz/.

Dr. Nahya Salim Masoud,
Chairperson, MUHAS Research and Ethics Committee

Muhimbili University of Health and Allied Sciences
DIRECTOR
Research, Publications & Innovations
Box 65001

8.5 APPENDIX 5: INTRODUCTION LETTER

UNITED REPUBLIC OF TANZANIA

MINISTRY OF EDUCATION, SCIENCE AND TECHNOLOGY

MUHIMBILI UNIVERSITY OF HEALTH AND ALLIED SCIENCES

OFFICE OF THE DIRECTOR – POSTGRADUATE STUDIES

In reply quote;
Ref. No. HD/MUH/T.617/2020

27th May, 2024

Tarime District Council,
P.O. Box 16,
DAR ES SALAAM

RE: INTRODUCTION LETTER OF JOSHUA KARABA

We would like to inform you that the carrier of this letter is Joshua Karaba with registration number HD/MUH/T.617/2020 a student at Muhimbili University of Health and Allied Science (MUHAS), pursuing MPH-Distance Learning.

As part of his studies, he will be doing an elective research titled **"Magnitude and Factors Associated with Diagnostic Delay of Tuberculosis Among Adults in Tarime DC, Mara Region, Tanzania".**

The Ethical Clearance for doing the said research has been given by the University.

Kindly request your assistance and cooperation to our student.

Yours Sincerely,

Mr. Sebe Mohamed
For DIRECTOR, POSTGRADUATE STUDIES

cc: Joshua Karaba

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