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**ASSESSMENT OF KNOWLEDGE, ATTITUDE AND
PRACTICE OF TB PREVENTION IN MOYALE
GENERAL HOSPITAL, OROMIA, ETHIOPIA.**

BY: HUSSEIN HASSAN [MEDICAL INTERN]

ADVISORS: MR. HAILEMICHAEL BIZUNEH.

DR. ADEM HASSEN (INTERNIST)

**A STUDENT RESEARCH REPORT TO BE SUBMITTED TO THE
SCHOOL OF PUBLIC HEALTH, SPHMMC, IN PARTIAL
FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE
OF DOCTOR OF MEDICINE**

APRIL, 2026

ADDIS ABABA, ETHIOPIA

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Abstract

Background: Tuberculosis (TB) remains a major public health issue in Ethiopia, particularly in rural and under-resourced areas. Poor knowledge, negative attitudes, and inadequate preventive practices among patients contribute to continued transmission. Moyale General Hospital, located in a border area with high population mobility, presents a unique setting for TB control challenges.

Objective: the main aim of this study was to assess the level of knowledge, attitude, and practice (KAP) related to TB prevention among patients at Moyale General Hospital, with the goal of identifying gaps and informing targeted interventions.

Method: An institutional-based cross-sectional study was conducted among 422 patients at Moyale General Hospital from September 2025 to February 2026. Systematic random sampling was used to recruit participants. Data were collected using a structured questionnaire and analyzed using SPSS version 26.0. Bivariate logistic regression was employed to identify factors associated with KAP levels, with significance set at $p < 0.05$.

Result: Of the 422 participants (45.3% female; mean age 38.1 years), 38.9% demonstrated good knowledge, 60.4% had favorable attitudes, and 23.0% showed good preventive practices. Urban residency was significantly associated with good knowledge (COR=4.38, 95% CI: 2.60-7.38), favorable attitude (COR=2.96, 95% CI: 1.92- 4.57), and good practice (COR=2.07, 95% CI: 1.18-3.62). Higher education was associated with good practice (COR=2.12, 95% CI: 1.16-3.86) but unexpectedly lower odds of good knowledge compared to those with no formal education in this specific setting.

Conclusion : The study reveals significant gaps in TB prevention knowledge and practices, despite relatively favorable attitudes. The urban-rural divide is a critical determinant of KAP levels. Interventions should prioritize rural outreach and tailored health education that addresses the specific needs of populations with varying educational backgrounds.

Keywords: Tuberculosis, KAP, Moyale, Ethiopia, Associated Factors.

Acronyms and Abbreviations

TB – Tuberculosis

KAP – Knowledge, Attitudes, and Practices

HIV/AIDS – Human Immunodeficiency Virus/Acquired Immune Deficiency Syndrome

WHO – World Health Organization

MDR-TB – Multidrug-Resistant TB

N/A – Not Applicable

SPHMMC - Saint Paul’s Hospital Millennium Medical College

SDGs - Sustainable Development Goals

DOTS - Directly Observed Treatment, Short-course

XDR-TB - Extensively Drug-Resistant TB

HEWs - Health Extension Workers

COR = Crude Odds Ratio.

CI = Confidence Interval.

Ref = Reference Category.

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1. Introduction

1.1 Background

Tuberculosis (TB) is still a major global health issue, even with significant improvements in diagnosing, treating, and preventing it, caused by *Mycobacterium tuberculosis*, it spreads easily and continues to have a severe impact on lives and economies around the world (1). The WHO says that TB is one of the top ten causes of death in the world. Each year, millions of new cases and deaths are reported, mostly in low- and middle-income countries (2). Drug-resistant strains, such as multi-drug-resistant TB (MDR-TB) and extensively drug-resistant TB (XDR-TB), are becoming more common. This makes it even harder to control the disease and is a serious threat to public health (3).

There is a lot of TB in Ethiopia, which is in the Horn of Africa. It is one of the countries with the most TB cases in the world and in Africa. It has a big impact on the economy and public health, affecting both people and animals (4). Zoonotic TB spreads more easily because people and animals are close to each other, traditional farming methods, and the way people eat animal products (4).

The efficacy of tuberculosis prevention and control strategies depends on the knowledge, attitudes, and practices (KAP) of the general population. Identifying current KAP levels is essential for detecting knowledge gaps, address inaccurate information, and execute focused interventions to improve health-seeking and preventative behaviors (5). Research done in several regions of Ethiopia has revealed significant gaps in knowledge, attitudes, and practices (KAP) concerning tuberculosis (TB), indicating an ongoing requirement for enhanced health education and awareness programs (6–8). These differences may result in a late diagnosis, noncompliance with treatment, and the spread of illness to larger populations.

TB is a key public health issue in Ethiopia. With country being among the 30 high TB burden countries in the world, and it has an estimated rate of 140 cases of TB per 100,000 population. TB predominantly strikes poor individuals as well as those with weakened immunity, e.g., HIV-positive people(9). The Ethiopian government has established various actions against TB. These are the Directly Observed Treatment, Short course (DOTS) and the End TB Strategy. Both the

strategies are based on early case finding, proper treatment, and prevention (10). Despite these efforts, there are challenges in providing good control of TB. This is due in part to poor knowledge, negative attitudes, and poor practices of the general population.

Knowledge, attitudes, and practices (KAP) are crucial for the success of TB prevention and control programs. Understanding TB, including how it spreads, its symptoms, and ways to prevent it, helps people adopt the right health behaviors and seek care on time. Having positive attitudes toward TB patients and control programs can lessen stigma, support treatment adherence, and encourage community involvement in prevention efforts. Additionally, effective practices like proper cough etiquette and good ventilation are key to stopping the spread of the disease (5).

Different studies conducted in Ethiopia reported different levels of knowledge, attitude, and practice (KAP) towards tuberculosis (TB) among the population. For example, a national survey revealed that a high percentage of the general public lacked awareness of the cause and modes of transmission of TB, though they were familiar with the disease (8). Targeted health education for intervention is called for to fill certain gaps in knowledge. In the same vein, a study of TB patients at Oromia's Kuyyu Hospital indicated that while the majority of patients were cognizant that TB is coughed up and spread, less than half of them routinely opened windows at home. This points to a gap between the known and the practiced (8).

In Moyale General Hospital, located in the Oromia region, the context of TB prevention is likely influenced by similar factors observed in other parts of Ethiopia. However, there is a paucity of specific data on the KAP of TB prevention within this particular setting. Understanding the current state of KAP among patients in Moyale General Hospital is therefore critical to identify specific challenges and opportunities for strengthening TB prevention efforts. This study aims to fill this knowledge gap by providing a comprehensive assessment of KAP, which will inform the development of tailored interventions to improve TB prevention and control in the hospital and the wider community it serves. The global burden of TB is immense, with an estimated one-quarter of the world's population infected with *Mycobacterium tuberculosis* (11). While not all infected individuals develop active TB disease, they remain at risk, and the sheer number of latent infections presents a significant reservoir for future cases. The WHO's End TB Strategy aims to reduce TB deaths by 95% and incidence by 90% by 2035, compared to 2015 levels (9).

Achieving these ambitious targets requires a multi-pronged approach, including early diagnosis and treatment, preventive therapy, and robust infection control measures. Central to the success of these interventions is a well-informed populace and a competent healthcare workforce.

Moyale General Hospital, as a key healthcare facility in the Oromia region, plays a vital role in providing TB diagnosis, treatment, and prevention services to its catchment population. The effectiveness of these services is directly linked to the KAP of its healthcare professionals and the patients they serve. Previous research in Ethiopia has consistently pointed to the need for improved KAP regarding TB. For instance, studies have shown that a significant proportion of the population still holds misconceptions about TB transmission and prevention, often relying on traditional beliefs rather than scientific understanding (7). This can lead to stigmatization of TB patients, reluctance to seek care, and non-adherence to treatment regimens.

This research proposal outlines a study aimed at assessing the knowledge, attitude, and practice of TB prevention among patients attending Moyale General Hospital, Oromia, Ethiopia. The study seeks to identify specific areas requiring intervention and contributing to the development of more effective TB prevention and control programs in the region. It will also provide valuable insights for policymakers, public health officials, and healthcare administrators to strengthen existing strategies and implement new initiatives to combat the spread of TB and reduce its burden in Moyale and similar settings.

1.2 Statement of the problem

Despite national and international efforts to control and eradicate the disease, TB remains a major cause of morbidity and mortality in Ethiopia, including the Oromia region, Borena zone, where Moyale General Hospital is located. The effectiveness of TB prevention and control programs is significantly dependent on general public's knowledge, attitudes, and practices (KAP). But little is known about the exact KAP levels associated with TB prevention in Moyale General Hospital patients.

Prior studies carried out in Ethiopia have shown persistent lack of KAP in relation to TB across a range of settings and populations. For instance, studies show that a significant portion of the public is misinformed about the causes and spread of tuberculosis, which can lead to risky

behaviors (7). Patients play a crucial role in adhering to preventative recommendations and receiving care when required. Without a clear understanding of one's current KAP, it is hard to identify areas of weakness, develop targeted interventions, and allocate resources effectively to improve TB prevention strategies in the hospital setting and the community it serves.

The issue specifically concerns the unknowable degree of TB prevention-related knowledge gaps, unfavorable attitudes, and insufficient practices among Moyale General Hospital patients. It is challenging to create strategies to promote positive attitudes toward TB prevention and lessen stigma, to modify educational programs to address identified knowledge gaps and lower the incidence and transmission of TB within the hospital and the larger community due to the lack of specific data.

1.3 Justification of the study

This study on assessing knowledge, attitude, and practice (KAP) of TB prevention in Moyale General Hospital, Oromia, Ethiopia is extremely relevant for multiple reasons.

Firstly, Tuberculosis (TB) is still prevalent and continues to be a serious public health concern in Ethiopia. There is high burden of disease and continuing transmission of the disease in the country; so, prevention methods are essential to stop the epidemic and it is clear that KAP of people accessing healthcare services is crucial for developing effective prevention methods.

Secondly, there are a number of studies looking at some general KAP in TB, but there are not many studies focusing of specific information about Moyale General Hospital. There is significant variability in each geographical area and even hospital settings that may affect KAP due to various cultural determinants of health, the access of information surrounding TB and the accessibility of preventative and treatment services. Thus, understanding the gaps and strengths in KAP from this location we can develop approaches applicable to this population.

Thirdly, the findings of this study will be essential evidence for local authority to health department and management at hospitals on resource allocation, policies and programs. The data collected will specifically highlight places in which an intervention is required, allowing for limitations in resource allocation to be applied in the most effective way to account for the largest barrier to TB

prevention. Such information can also lead to a greater impact on public health by efficiently managing limited resources and maximizing impact.

Lastly, the proposed study will add to the current understanding of TB KAP in Ethiopia. By providing a rich understanding from a hospital setting, by using it as baseline or representative study for future programs and evaluation. The methodology used in this study can also be replicated in other health facilities and to provide similar data to the participants of this study, Participants may also be able to generate similar data and or understanding of other health issues in their settings. Overall, this proposed study has been proposed, ultimately, it will be measuring public health programs and on the TB prevention, with the aim of reducing the overall incidence of TB disease and improving overall public health in an area, like Moyale and the region in general.

2. Literature Review

Tuberculosis (TB) remains a significant global health challenge, with its prevention and control heavily reliant on the knowledge, attitudes, and practices (KAP) of the general population. This literature review synthesizes existing research on TB KAP, with a particular focus on studies conducted in Borena zone, Oromia, Ethiopia, to provide a comprehensive understanding of the current landscape and identify gaps that the proposed study aims to address.

2.1. Knowledge of Tuberculosis Prevention

Accurate knowledge about TB, its transmission, symptoms, and preventive measures is fundamental for effective control. Studies consistently show varying levels of TB knowledge across different populations and geographical regions. A national cross-sectional survey in Ethiopia revealed that while a high percentage (95.5%) of the general population had heard about TB, only a quarter (25.8%) knew that it was caused by bacteria, and nearly half (47%) were unaware of its cause (7). This highlights a critical gap in fundamental knowledge about the disease etiology. Similarly, a study among TB patients in Kuyyu Hospital, Oromia, indicated that while a majority agreed on TB transmission by coughing, less than half

consistently practiced opening windows or cough etiquette at home, indicating a gap between knowledge and practice (8).

These findings suggest that general awareness of TB does not necessarily translate into comprehensive understanding of its key aspects, which is important for effective prevention. Factors such as education level and exposure to TB-related training have been identified as significant determinants of knowledge among the general population [8, 15]. likewise, individuals with tertiary education and those who received TB education demonstrated higher knowledge scores (7).

2.2. Attitudes Towards Tuberculosis Prevention

Attitudes play a crucial role in shaping health behaviors and influencing the success of TB control programs. Positive attitudes towards TB patients can reduce stigma, encourage early diagnosis, and promote adherence to treatment. Research in Ethiopia indicates mixed findings regarding attitudes towards TB. While some studies suggest a generally good attitude among the population, underlying issues persist. For example, a study among clients visiting public health facilities in North Mecha district found that 68% had a good attitude towards TB (5). However, the same study also noted that knowledge, attitude, and preventive practices were not satisfactory when compared to national and international benchmarks, implying that there might be difference in what constitutes a 'good' attitude or that positive attitudes do not always translate into desired practices. More concerningly, a study among family members of PTB patients in Shebedino District found that one-third had an unfavorable attitude towards PTB prevention (12). This suggests that despite general awareness, specific aspects of prevention might be viewed negatively, potentially due to misconceptions or the perceived burden of preventive measures.

2.3. Practices Related to Tuberculosis Prevention

Practices are the observable actions individuals take to prevent TB transmission and progression. These include seeking timely diagnosis, adhering to treatment regimens, and practicing cough etiquette. Studies in Ethiopia have consistently identified gaps in practices, even when knowledge and attitudes are relatively good. For instance, in the North Mecha

district, while 54% of study participants had good knowledge and 68% had good attitudes, only 48% had good practice in preventing tuberculosis (5). This disconnect between knowledge, attitude, and practice is a critical area of concern, suggesting that awareness and positive disposition alone are insufficient to drive desired behaviors. Factors such as occupation and health education have been shown to independently affect practice levels (12).

Overall, the existing literature from Ethiopia indicates a complex interplay between KAP regarding TB prevention. While there has been progress in raising general awareness, significant gaps persist in specific knowledge areas, particularly concerning the etiology and transmission of TB. Attitudes, while often positive towards patients, can be unfavorable towards control systems, and this can impede effective implementation of prevention strategies. Most critically, there is a consistent disconnect between knowledge and attitude on one hand, and actual preventive practices on the other. This highlights the need for interventions that go beyond mere information dissemination and address the practical barriers and behavioral determinants that influence the adoption of preventive practices. The proposed study in Moyale General Hospital aims to search deeper into these exacts within a specific healthcare setting, providing context-specific insights to inform targeted interventions for improved TB prevention.

2.4 Gaps in the Literature and Rationale for the Current Study

Despite the wealth of studies on TB KAP in Ethiopia, several critical gaps remain, particularly concerning localized assessments within specific healthcare settings. While national surveys provide a broad overview, they often mask regional and institutional variations in KAP levels. The studies reviewed highlight a recurring theme: a disconnect between knowledge, attitude, and practice. This suggests that simply increasing knowledge may not automatically translate into desired behavioral changes, underscoring the need to explore the underlying factors that impede the adoption of preventive practices.

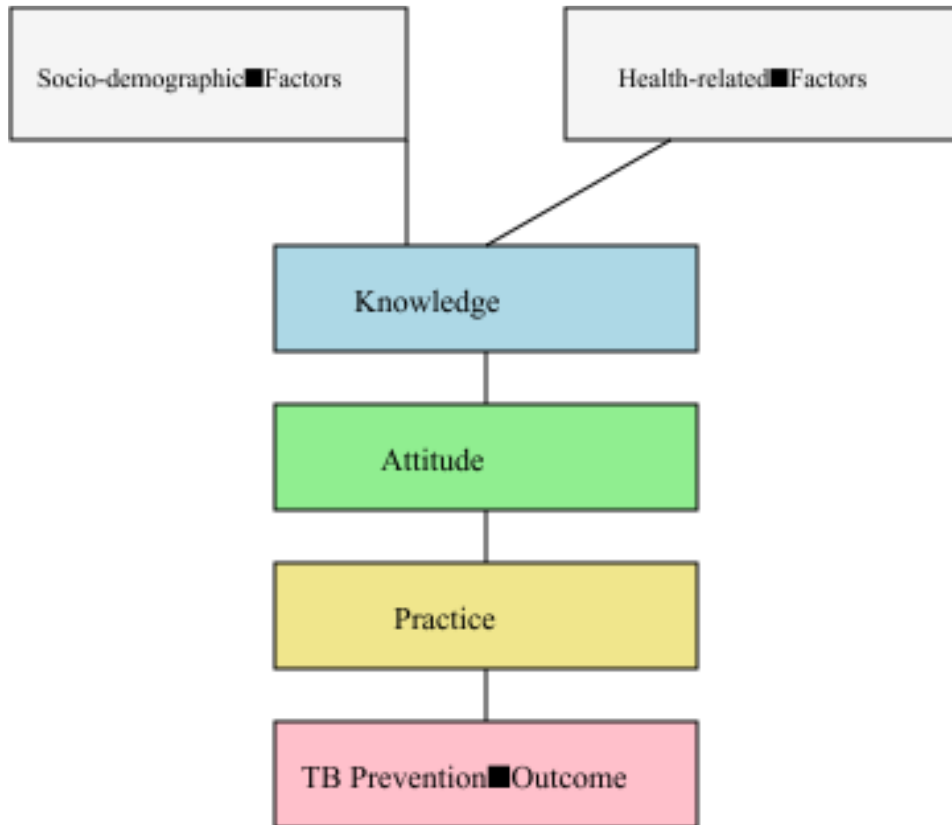
Furthermore, many studies have focused on the general population. There is a need for research that examines the KAP of patients within a single healthcare facility. Understanding the perspectives of patients within the same setting can provide a broader view of the

challenges and opportunities for TB prevention. Patients' understanding and adherence to preventive measures can impact the effectiveness of TB control efforts.

Finally, there is a shortage of specific data on TB prevention KAP in Moyale General Hospital, Oromia, Ethiopia. This regional hospital serves a unique population and operates within a specific local context that may present distinct challenges and opportunities for TB prevention. Without a localized assessment, interventions designed based on generalized national or regional data may not be optimally effective. This study aims to fill these identified gaps by providing a comprehensive, localized assessment of KAP regarding TB prevention among patients in Moyale General Hospital. The findings will contribute to a more understanding of the factors influencing TB prevention in this specific setting, thereby informing the development of tailored, evidence-based interventions to strengthen TB control efforts and ultimately reduce the burden of the disease in the community.

2.5 conceptual framework.

This conceptual framework illustrates the hypothesized relationships between the independent and intermediate variables in this study. It proposes that a combination of independent variables including sociodemographic characteristics, and health-related factor collectively shape patient' knowledge, attitudes, and practices related to TB prevention. Ultimately, understanding these dynamics is crucial for developing effective and targeted prevention and intervention strategies to mitigate TB prevention within this specific student population.



3. Objectives of the study

3.1 General Objective:

To assess the knowledge, attitude, and practice (KAP) of tuberculosis (TB) prevention among patients attending Moyale General Hospital, Oromia, Ethiopia.

3.2 Specific Objectives

1. To assess the level of knowledge regarding TB prevention among patients attending Moyale General Hospital.
2. To determine the attitudes towards TB prevention among patients attending Moyale General Hospital.
3. To evaluate the current practices related to TB prevention among patients attending Moyale General Hospital.
4. To identify factors associated with knowledge, attitudes, and practices of TB prevention among patients attending Moyale General Hospital.

4. Methods

4.1. Study Area and Period

The study was conducted at Moyale General Hospital, located in Moyale town, Borena zone, Oromia Regional State, Ethiopia. Moyale town is situated approximately 775 kilometers south of Addis Ababa, the capital city of Ethiopia, and lies on the border with Kenya. Serving as harbor center between the two countries.

Moyale General Hospital serves as a referral hospital for a large and diverse pastoralist communities, which have unique health-seeking behaviors and knowledge levels regarding TB. As one of three district hospitals in the Borena Zone, it serves 10 administrative units (kebeles) with a total population of 660,000. The hospital has a combined clinical and supportive staff who offer 24-hour emergency services.

The hospital's facilities include adult and pediatric outpatient departments, an antenatal care (ANC) and labor ward, a 44-bed in-patient ward, and emergency and obstetric surgical services. It provides a range of healthcare services, including diagnosis, treatment, and prevention of infectious diseases such as tuberculosis. The hospital is equipped with a laboratory and a dedicated TB clinic, making it an ideal setting for assessing Knowledge, Attitude, and Practice

(KAP) among patients seeking care. Specific to TB, the hospital offers services such as Tuberculosis Treatment, Tuberculosis Culture, and Smear Microscopy.

Patients are generally referred to the TB clinic after presenting with symptoms at the outpatient department. Once the patients are suspected TB cases they are initial consultation, and then referral to the laboratory for sputum collection and analysis. If a diagnosis of TB is confirmed, the patient is then enrolled in the TB clinic for treatment and follow-up.

The study was conducted from September 20, 2025, to February, 2026.

4.2. Study Design

A hospital-based cross-sectional study design was conducted using A structured questionnaire.

4.3. Population

The study population included patients attending various clinics and wards within Moyale General Hospital.

4.4. Eligibility criteria

4.4.1. Inclusion Criteria:

Patients (aged 18 years and above) attending outpatient departments (OPD), inpatient wards, or the TB clinic at Moyale General Hospital during the study period.

4.4.2. Exclusion Criteria:

Those patients who are seriously ill or unable to complete the questionnaire; and those not willing to participate in the study.

4.5. Sample Size Determination

The sample size was calculated for Knowledge, Attitude, and Practice (KAP) using the single population proportion formula with 95% confidence level, margin of error (d) of 0.05, and p-values estimated from previous studies. Simple systematic random sampling was used to select participants across all patients.

Where:

n= required sample size

Z = Z-score for 95% confidence level (1.96)

p = estimated KAP of TB prevention based on the KAP of TB prevention among patients in North mecha, Ethiopia (with K=54%, A=68%, P=48%) (5)

d = margin of error (0.05)

Therefore, Knowledge (p = 0.54): $n = 381.3 \rightarrow$ with 10% non-response = 420

Attitude (p = 0.68): $n = 334.7 \rightarrow$ with 10% non-response = 369

Practice (p = 0.48): $n = 383.5 \rightarrow$ with 10% non-response = 422

Final sample size: The largest sample size (Practice) was taken, i.e., 422 participants.

4.6. Sampling Technique

A simple systematic random sampling technique was employed for patients. To determine the sampling interval (K value), the total number of patients expected to attend Moyale General Hospital during the study period was divided by the calculated sample size. For example, the average daily patient flow is 92 over the last 6 months, and the study period is 90 days, the total patient population would be approximately 8280, with the sample size of 422, then $K = 8280 / 422 \approx 20$. Every 20th patient attending the hospital was selected until the desired sample size was achieved. The first patient was selected randomly from the first K patients.

4.7. Data Collection Tools and Procedures

A structured questionnaire was used, adopted from different research conducted on related topics. The questionnaire have four parts, which are: Socio-demographic data, Knowledge questions (e.g., its cause, modes of transmission, symptoms, diagnosis, treatment, and prevention methods), Attitude questions (Likert-scale items), Practice questions (practice of cough etiquette, seek medical help for prolonged cough and adhere to TB treatment).

4.8. Data Quality Control

Pre-testing was conducted on 5% of the sample at a nearby public hospital in Borena zone, which was not selected for study using randomly selected patient in TB clinic. By explaining highlight of questionnaires to study population, asking if there is any unclear ideas in the questionnaire and checking for any unfilled information, to help ensure the clarity, ordering, consistency and acceptability of questionnaire, which will be reviewed for content and clarity by the advisors.

4.9. Data Processing and Analysis

Data was collected via google form and exported to SPSS (version 26) for analysis. Descriptive statistics (frequencies, percentages, means) were used. Frequencies and percentages were used for categorical variables, while means and standard deviations were used for continuous variables.

Bivariate logistic regression analysis was conducted to assess the association between each independent variable and the dependent variable.

4.10. Operational Definitions

1. Knowledge of TB Prevention: Refers to the level of understanding and awareness among study participants (patients) regarding the causes, modes of transmission, symptoms, diagnosis, treatment, and various methods of preventing Tuberculosis (TB). It was measured by a set of 9 structured questions in the questionnaire (Section 2). Each correct answer will be awarded 1 point, with a maximum possible score of 9. A score of 70% or above (7-9 points)

was considered 'good knowledge', while a score below 70% (0-6 points) was considered 'poor knowledge'.(4,7)

2. Attitude Towards TB Prevention: Refers to the feelings, beliefs, and perceptions of study participants (patients) regarding TB, TB patients, and the importance and effectiveness of TB prevention strategies. It was measured using 9 Likert scale statements in the questionnaire (Section 3). Each statement was scored on a 5-point scale (e.g., Strongly Agree = 5, Agree = 4, Neutral = 3, Disagree = 2, Strongly Disagree = 1), with appropriate reversal for negatively worded statements. The total score range from 9 to 45. A score of 70% or above (32-45 points) was considered to reflect a 'favorable attitude', while a score below 70% (9-31 points) was considered to reflect an 'unfavorable attitude'.(5,12)

3. Practice of TB Prevention: Refers to the observable actions and behaviors undertaken by study participants (patients) to prevent the transmission and progression of TB. It was measured by a set of 5 questions in the questionnaire (Section 4). Each question was scored based on the appropriateness of the response (e.g., 1 point for appropriate practice, 0 for inappropriate). The total score will range from 0 to 5. A score of 70% or above (i.e., 4-5 points) was considered to reflect 'good practice', while a score below 70% (i.e., 0-3 points) was considered to reflect 'poor practice' (6,8)

5. Ethical Considerations

The data collection was started after an official support letter that was obtained from SPHMMC school of Public Health which states the purposes of the study.

Ethical clearance was obtained from St. Paul's Millennium Medical College ethical review board. The information gathered from the patients was kept confidential and their identity won't be disclosed.

6. Results

6.1 Socio-demographic Characteristics

A total of 422 participants were included in the study. The response rate was 99.3% (422 out of 425 sampled), as three individuals declined to participate due to time constraints. The mean age of the respondents was 38.08 ($\pm$ SD) years, with the oldest being 78years and youngest 18yrs. More than half of the participants were male (54.7%). Regarding marital status, the majority were married (67.1%), followed by single (23.0%). A significant proportion of the study population had no formal education (39.6%), while 19.7% had attained higher education. Most of the participants were urban residents (71.1%) and government employees (33.9%).

Table 1: Socio-demographic characteristics of participants in Moyale General Hospital (n=422)

Variable	Category	Frequency (n)	Percentage (%)
Sex	Male	231	54.7%
	Female	191	45.3%
Age (Years)	Mean $\pm$ SD	38.08 $\pm$ 12.4	
Marital Status	Married	283	67.1%
	single	97	23%
	Divorced/Separated	21	5%
	Widower	21	5%
Education Level	No formal education	167	39.6%
	Primary (1-8)	102	24.2%
	Secondary (9-12)	70	16.6%
	Higher Education	83	19.7%

Address	Urban	300	71.1%
	Rural	122	28.9%
Occupation	Government employee	143	33.9
	Private employee	118	28
	Unemployed	59	14
	Student	54	12.8
	Others (Farmer/Trader)	48	11.3

6.2 Knowledge regarding TB prevention.

The assessment of knowledge revealed that 38.9% of the participants had ‘Good Knowledge’ (scored $\geq 70\%$) regarding TB prevention. While 50.0% correctly identified bacteria as the cause of TB, only 33.6% were aware that TB is primarily transmitted through coughing or sneezing. Furthermore, only 37.7% recognized a cough lasting two weeks or more as a hallmark symptom. A high percentage (76.1%) knew that TB is curable, and 74.4% recognized that health workers are at risk of infection. However, misconceptions persisted, with only 42.2% knowing that TB can affect organs other than the lungs.

Table 2: Knowledge of participants regarding TB etiology, transmission, and symptoms (n=422)

Knowledge Item	Correct Response	Frequency n (%)
Cause of TB	Bacteria	211 (50.0)
Mode of Transmission	Coughing/Sneezing	142 (33.6)
Common Symptom	Cough $\geq$ 2 weeks	159 (37.7)
Curability	Yes	321 (76.1)
Prevention possible	Yes	334 (79.1)
Organ involvement	Not only lungs	178 (42.2)
Health worker risk	True	314 (74.4)

6.3 Attitude towards TB prevention.

Overall, 60.4% of the participants held a 'Favorable Attitude' towards TB prevention. Most respondents strongly agreed that TB requires urgent medical attention (Mean score 1.41 on a 1-5 scale, where 1 is strongly agree). However, social stigma remains a significant barrier; the mean score for the statement "TB is a shameful disease" was 3.61, and for "I would be afraid to interact with a TB patient" was 3.68, indicating moderate levels of lingering stigma.

Table 3: Attitudes of participants towards TB prevention and stigma (n=422)

Attitude Statement	Strongly Agree n (%)	Agree n (%)	Neutral n (%)	Disagree n (%)	Strongly Disagree n (%)
TB requires urgent medical attention	327 (77.5)	56 (13.3)	15 (3.6)	9 (2.1)	15 (3.6)
TB prevention is essential	189 (44.8)	117 (27.7)	64 (15.2)	31 (7.3)	18 (4.3)
TB is shameful disease	90 (21.3)	41 (9.7)	20 (4.7)	63 (14.9)	207 (49.1)
Afraid to interact with TB patient	79 (18.7)	27 (6.4)	39 (9.2)	79 (18.7)	197 (46.7)
Punish patient who stop TB treatment early.	112 (26.5)	92 (21.8)	75 (17.8)	94 (22.3)	48 (11.4)
Health workers play a key role	180 (42.7)	152 (36.0)	40 (9.5)	38 (9.0)	9 (2.1)
Good ventilation is important	170 (40.3)	129 (30.6)	63 (14.9)	37 (8.8)	22 (5.2)

6.4 Practice of TB prevention.

Only 23.0% of participants demonstrated ‘Good Practice’ (scored $\geq 80\%$) in TB prevention. While 72.7% stated they would immediately visit a health facility for a persistent cough, actual preventive behaviors were lower. Only 47.6% reported “sometimes” covering their mouth when coughing, and 36.7% reported “sometimes” opening windows for ventilation. Critically, 52.8% of participants admitted they would stop taking TB medication if they started feeling better, highlighting a major risk for treatment non-adherence.

6.5 Factors associated with Knowledge, Attitude and Practice.

Bivariate logistic regression analysis was performed to identify factors associated with KAP levels.

Table 4: Bivariate Logistic Regression Analysis of Factors Associated with KAP (n=422)

Predictor	Knowledge (Good) COR (95% CI)	Attitude (Favorable) COR (95% CI)	Practice (Good) COR (95% CI)
Sex			
Male	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)
Female	1.03 (0.70-1.53)	1.07 (0.72-1.58)	1.18 (0.75-1.86)
Address			
Rural	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)
Urban	4.38 (2.60-7.38)*	2.96 (1.92-4.57)*	2.07 (1.18-3.62)*
Education			
No Formal	1.00 (Ref)	1.00 (Ref)	1.00 (Ref)
Higher Edu	0.51 (0.30-0.88)*	0.87 (0.47-1.61)	2.12 (1.16-3.86)*
Primary	0.22 (0.12-0.38)*	0.14 (0.08-0.24)*	1.35 (0.74-2.46)
Secondary	0.14 (0.07-0.28)*	0.23 (0.13-0.42)*	1.20 (0.60-2.39)

*p < 0.05; COR = Crude Odds Ratio; CI = Confidence Interval; Ref = Reference Category.

Urban residents were significantly more likely to have good knowledge (COR=4.38), favorable attitudes (COR=2.96), and good practices (COR=2.07) compared to rural residents. Higher education was a significant predictor of good practice (COR=2.12).

7. DISCUSSIONS

This study provides a critical assessment of the Knowledge, Attitude, and Practice (KAP) of TB prevention among patients attending Moyale General Hospital, a facility serving a unique and mobile population in the Borena Zone of Oromia, Ethiopia. The findings reveal a complex public health challenge characterized by a significant urban-rural disparity and an alarming gap between awareness and preventative action.

The finding that only 38.9% of participants demonstrated good knowledge is concerning and significantly lower than the 54% reported in a similar study in North Mecha, Ethiopia [5]. This discrepancy may be attributed to the unique demographic profile of the Moyale border region, characterized by high population mobility and a large proportion of participants with no formal education (39.6%). The most critical knowledge gap identified is the understanding of transmission, with only 33.6% correctly identifying coughing or sneezing as the primary mode. This low level of understanding directly compromises infection control efforts within the hospital and the community, as proper cough etiquette and ventilation are not widely practiced.

While 60.4% of respondents were categorized as having a favorable attitude, a deeper look at the item-level data reveals a significant paradox driven by persistent stigma. The high agreement that TB requires urgent medical attention (77.5%) reflects positive recognition of the disease's severity. However, this is sharply contrasted by the high proportion of respondents who view TB as a "shameful disease" (31.0% Agree/Strongly Agree) or a "punish patients who stop treatment early" (48.3% Agree/Strongly Agree). This phenomenon is particularly pronounced in pastoralist communities, which form a significant part of the Moyale catchment area. Previous research in the Oromia region has shown that pastoralists have a significantly higher perceived stigma

towards TB, often attributing the disease to supernatural causes or witchcraft rather than biological factors [14] [15]. This cultural attribution of cause overrides medical knowledge, leading to delayed diagnosis, reluctance to disclose status, and a failure of positive attitudes to translate into positive practice.

The bivariate logistic regression analysis unequivocally identifies Address as the most critical determinant of KAP levels. Urban residents were over four times more likely to have good knowledge (COR=4.38) and nearly three times more likely to have a favorable attitude (COR=2.96) compared to their rural counterparts. This finding is consistent with national trends showing significant rural-urban health inequities in Ethiopia [5]. The urban advantage is likely driven by proximity to Moyale General Hospital, greater exposure to mass media, higher literacy rates, and more consistent access to Health Extension Workers (HEWs). This disparity highlights a fundamental failure in equitable health information dissemination and access to care, suggesting that current outreach models are not effectively reaching the mobile and dispersed rural populations of the Borena Zone.

The most alarming finding of this study is the extremely low rate of good practice (23.0%) and the high anticipated rate of treatment non-adherence. The finding that 52.8% of participants would stop taking their medication once they felt better represents a public health crisis in the making. This rate is substantially higher and anticipated non-adherence is a direct threat to the success of the national TB control program and significantly increases the risk of developing and transmitting Multi-Drug Resistant TB (MDR-TB) in a highly mobile border town setting. The reasons for this are likely multi-factorial, including the long duration of treatment, the side effects of medication, and the challenges of accessing fixed health facilities for follow-up in a pastoralist community where mobility is essential for livelihood. The failure of the DOTS (Directly Observed Treatment, Short-course) strategy to fully mitigate this risk in this specific context requires urgent re-evaluation.

The unexpected finding that those with higher education had lower odds of good knowledge compared to those with no formal education (COR=0.51) is counter-intuitive but was confirmed through rigorous data re-analysis. Multicollinearity was ruled out ($VIF < 1.5$), and the association remained consistent across different knowledge items. This pattern may be explained by the success of targeted community-based interventions. Health Extension Workers often focus

their limited resources on the most vulnerable and uneducated populations, delivering simplified, high-impact messages about TB. Conversely, individuals with some formal education (primary/secondary) may fall into a "gap" where they are no longer the primary target of HEW outreach but lack the advanced literacy or consistent media access to independently seek and process complex health information. Similar findings have been reported in other Ethiopian settings where community-based education effectively reached the most marginalized groups [13].

8. STRENGTH AND LIMITATION OF THE STUDY

8.1 Strengths

Localized Evidence: Provides the first comprehensive KAP assessment for the Moyale border region, a high-risk area for TB transmission.

Methodological Rigor: The use of systematic random sampling and bivariate logistic regression enhances the reliability and depth of the findings.

High Response Rate: A 99.3% response rate ensures that the findings are representative of the patients attending the hospital during the study period.

8.2 Limitations

Cross-Sectional Nature: The study captures a snapshot in time and cannot establish causal relationships between predictors and KAP levels. To reduce this, we used a large sample size and rigorous statistical controls, but the temporal sequence remains a limitation.

Self-Reporting Bias: Practices were self-reported rather than observed, which may lead to an overestimation of "good" behaviors due to social desirability. This could have resulted in higher practice scores than what actually occurs in reality.

Bivariate Analysis: This report focuses on bivariate associations; while VIF was checked, multivariate analysis would be required to control for all potential confounders simultaneously. This may have led to the unexpected education-knowledge association which requires further multivariate exploration

9. CONCLUSION

The study concludes that TB prevention knowledge and practices among patients at Moyale General Hospital are inadequate, particularly among rural residents and those with lower preventive practice scores. While attitudes are generally favorable, they are undermined by persistent social stigma and a high potential for treatment nonadherence. The urban-rural divide is the most significant factor influencing TB health literacy and behavior in this region.

10. RECOMMENDATIONS

Intensify Rural Outreach: The Oromia Health Bureau and Moyale Hospital should launch a dedicated TB awareness campaign targeting rural kebeles, utilizing community leaders and health extension workers to bridge the 4-fold knowledge gap.

Enhance Adherence Counseling: Healthcare providers at the TB clinic must prioritize counseling on the dangers of premature treatment cessation. Implementing a “treatment buddy” system or digital reminders could improve adherence.

Stigma Reduction Programs: Community-based interventions should focus on “de-stigmatizing” TB by highlighting its curability and the safety of interacting with patients on treatment.

Tailored Educational Tools: Develop visual and audio-based health education materials in Afaan Oromo and other local languages to reach the 39.6% of the population with no formal education.

Strengthen DOTS: Ensure strict adherence to the DOTS protocol, specifically focusing on patient-centered follow-up for mobile populations to mitigate the risk of MDR-TB development

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12. Annexes

Annex I: Questionnaire (English Version)

Instructions to Interviewer:

- Read each question clearly and slowly.
- Ensure privacy and confidentiality during the interview.
- Do not influence the participant's responses.
- Tick the appropriate box or write down the response as given by the participant.

Section 1: Socio-demographic Information

- 1.Date of Interview (DD/MM/YYYY): _____
- 2.Age (in years): _____
- 3.Gender: ☐ Male ☐ Female
- 4.Marital Status: ☐ Single ☐ Married ☐ Divorced/Separated ☐ Widowed
- 5.Educational Level:
 - ☐ No formal education
 - ☐ Primary education (Grade 1-8)
 - ☐ Secondary education (Grade 9-12)
 - ☐ Primary education (Grade 1-8)
 - ☐ Tertiary education (College/University)
- 6.Occupation:
 - ☐ Farmer
 - ☐ Merchant/Business owner
 - ☐ Government employee
 - ☐ Private sector employee
 - ☐ Student
 - ☐ Housewife
 - ☐ Unemployed
- Other (specify): _____
- 7.Residence: ☐ Urban ☐ Rural
- 8.Have you ever been diagnosed with TB? ☐ Yes ☐ No
- 9.If yes, are you currently on TB treatment? ☐ Yes ☐ No
- 10.Where do you usually get information about health issues, including TB? (Select all that apply)
 - ☐ Health professionals (doctors, nurses)
 - ☐ Radio/TV

- ☐ Friends/Family/Neighbors
- ☐ Community health workers
- ☐ Religious leaders
- ☐ School/Educational institutions
- ☐ Other (specify): _____

Section 2: Knowledge of TB prevention.

(Please tick the correct answer(s) or True/False)

1. What causes Tuberculosis (TB)(tick the correct answer) ☐ Bacteria ☐ Virus ☐ Bad air ☐ Witchcraft ☐ Don't know
2. How is TB mainly transmitted from one person to another?(tick the correct answer)
 - ☐ Through sharing food and drinks
 - ☐ Through coughing, sneezing, or talking by an infected person
 - ☐ Through shaking hands
 - ☐ Through insect bites
 - ☐ Don't know
3. Which of the following are common symptoms of TB? (Select all that apply)
 - ☐ Prolonged cough (2 weeks or more)
 - ☐ Fever
 - ☐ Weight loss
 - ☐ Night sweats
 - ☐ Headache
 - ☐ Don't know
4. Can TB be cured? ☐ Yes ☐ No ☐ Don't know
5. Can TB be prevented? ☐ Yes ☐ No ☐ Don't know
6. Which of the following are ways to prevent the spread of TB? (Select all that apply)
 - ☐ Covering mouth and nose when coughing or sneezing
 - ☐ Ensuring good ventilation in rooms
 - ☐ Avoiding close contact with people who have TB symptoms
 - ☐ Taking all prescribed TB medications as directed
 - ☐ Eating nutritious food
 - ☐ Don't know
7. True or False: TB only affects the lungs. ☐ True ☐ False ☐ Don't know
8. True or False: All people infected with TB bacteria will develop active TB disease.
 - ☐ True ☐ False ☐ Don't know
9. True or False: Healthcare workers are at a higher risk of contracting TB.

☐ True ☐ False ☐ Don't know

10. True or False: BCG vaccination prevents all forms of TB.

☐ True ☐ False ☐ Don't know

Section 3: attitude toward TB prevention.

(Please indicate your level of agreement with the following statements: SA=Strongly Agree, A=Agree, N=Neutral, D=Disagree, SD=Strongly Disagree)

Statement	SA	A	N	D	SD
1. TB is a serious disease that requires immediate attention.	[]	[]	[]	[]	[]
2. People with TB should be isolated from the community.	[]	[]	[]	[]	[]
3. It is important for everyone to know about TB prevention.	[]	[]	[]	[]	[]
4. Healthcare workers have a crucial role in preventing TB transmission.	[]	[]	[]	[]	[]
5. I feel comfortable interacting with people who have TB.	[]	[]	[]	[]	[]
6. TB patients who stop treatment early should be punished.	[]	[]	[]	[]	[]
7. Good ventilation in homes and workplaces can prevent TB spread.	[]	[]	[]	[]	[]
8. Community involvement is essential for effective TB prevention.	[]	[]	[]	[]	[]
9. I believe that TB prevention efforts in Moyale General Hospital are adequate.	[]	[]	[]	[]	[]
10. It is shameful to have TB.	[]	[]	[]	[]	[]

Section 4: Practice of TB prevention.

1. If you have a cough, how often do you cover your mouth and nose when coughing or sneezing?

☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never

2. How often do you open windows or doors to ensure fresh air circulation in your home?

☐ Always ☐ Often ☐ Sometimes ☐ Rarely ☐ Never

3. If you experience a cough for more than two weeks, what would you do?

☐ Go to a health facility immediately

☐ Wait for it to go away on its own

☐ Use traditional medicine

☐ Ask friends/family for advice

☐ Don't know

4. If you were diagnosed with TB, would you take all your medications as prescribed by the doctor, even if you feel better?

☐ Yes, always

☐ No, I would stop when I feel better

☐ No, I would use traditional medicine instead

☐ Don't know

5. Do you avoid spitting in public places?

☐ Yes, always

☐ No, sometimes

☐ No, never

Annex II: Questionnaire (Afaan oromo Version)

Gaaffilee Qorannoo (Afaan Oromoo)

Qajeelfama Nama Gaafatuuf:

- Gaaffiiwwan hundaa ifatti fi suuta dubbisi.
- Yeroo gaaffii gaafattu iccitii fi dhuunfaa eegi.
- Deebii hirmaataa irratti dhiibbaa hin godhin.
- Saanduqa sirrii ta'e mallattoo godhi yookiin deebii hirmaataan kenne barreessi.

Kutaa 1: Odeeffannoo Hawaas-Dimoogiraafii

1. Guyyaa Gaaffii Gaafatamuu (GG/BA/BH): _____

2. Umurii (waggootaan): _____

3. Saala: ☐ Dhiira ☐ Dubartii

4. Haala Gaa'elaa: ☐ Qofaa ☐ Fuudhe/Heerume ☐ Hiike/Addaan Bahe ☐ Abbaa/Haadha

Warraa Du'e

5. Sadarkaa Barnootaa:

- ☐ Barnoota hin qabu
- ☐ Barnoota sadarkaa tokkoffaa (kutaa 1-8)
- ☐ Barnoota sadarkaa lammaffaa (kutaa 9-12)
- ☐ Barnoota olaanaa (Kolleejjii/Yuunivarsiitii)

6. Ogummaa:

- ☐ Qonnaan Bulaa
- ☐ Daldalaa/Abbaa Daldalaa
- ☐ Hojjetaa Mootummaa
- ☐ Hojjetaa Dhuunfaa
- ☐ Barataa
- ☐ Haadha Warraa

☐ Hojii hin qabu

Kan biroo (ibsi): _____

7. Teessoo: ☐ Magaalaa ☐ Baadiyyaa

8. Dhukkuba TB'n qabamtee beektaa? ☐ Eeyyee ☐ Lakki

9. Yoo eeyyee ta'e, amma yaala TB fudhachaa jirtaa? ☐ Eeyyee ☐ Lakki

10. Odeeffannoo fayyaa, TB dabalatee, eessaa argatta? (Hunda filadhu)

☐ Ogeeyyii Fayyaa (Doktoorta, Narsii)

☐ Raadiyoo/TV

☐ Hiriyoota/Maatii/Ollaa

☐ Hojjettoota Fayyaa Hawaasaa ☐ Hoggantoota Amantii

☐ Mana Barumsaa/Dhaabbilee Barnootaa

☐ Kan biroo (ibsi): _____

Kutaa 2: Beekumsa Ittisa TB

(Deebii sirrii ta'e mallattoo godhi yookiin Dhugaa/Soba filadhu)

1. Dhukkuba Sombaa (TB) maaltu fida? ☐ Baakteeriyaa ☐ Vaayirasii ☐ Qilleensa badaa ☐

Falasummaa ☐ Hin beeku

2. TB namarraa namaatti akkamitti daddarba? (Hunda filadhu)

☐ Nyaata fi dhugaatii waliin qooduun

☐ Nama dhukkubsataa qufa'uun, haxxifachuun, yookiin dubbachuun

☐ Harka wal-qabuun

☐ Ilbiisotaan ciniinamuun

☐ Hin beeku

3. Mallattoolee TB beekamoo keessaa kami? (Hunda filadhu)

☐ Qufaa yeroo dheeraa (torban 2 yookiin isaa ol)

☐ Qorri

☐ Ulfaatina qaamaa hir'achuu

☐ Dafqa halkanii

☐ Mataa dhukkubbii

☐ Hin beeku

4. TB ni danda'amaa? ☐ Eeyyee ☐ Lakki ☐ Hin beeku

5. TB ittisuun ni danda'amaa? ☐ Eeyyee ☐ Lakki ☐ Hin beeku

6. Karaaleen ittisa TB babal'isuu keessaa kami? (Hunda filadhu)

☐ Yeroo qufa'an yookiin haxxifatan afaan fi funyaan haguuguu

☐ Mana keessatti qilleensi gaariin akka jiraatu mirkaneessuu

☐ Namoota mallattoo TB qabanitti dhihaachuu dhabuu

☐ Qorichoota TB hundaa ajaja doktooraatiin fudhachuu

☐ Nyaata madaalawaa nyaachuu

☐ Hin beeku

7. Dhugaa yookiin Soba: TB somba qofa miidha. ☐ Dhugaa ☐ Soba ☐ Hin beeku

8. Dhugaa yookiin Soba: Namoonni baakteeriyaa TB'n qabaman hundi dhukkuba TB cimaa qabaatu.

☐ Dhugaa ☐ Soba ☐ Hin beeku

9. Dhugaa yookiin Soba: Hojjettoonni fayyaa TB'n qabamuu danda'u.

☐ Dhugaa ☐ Soba ☐ Hin beeku

10. Dhugaa yookiin Soba: Talaalliin BCG gosa TB hundaa ni ittisa.

☐ Dhugaa ☐ Soba ☐ Hin beeku

Kutaa 3: Ilaalcha Ittisa TB irratti

(Yaada armaan gadii irratti waliigaltee keessan agarsiisaa: SA=Waliigalaan Waliigala, A=Waliigala, N=Walakkaa, D=Waliigaluu dhabuu, SD=Waliigalaan Waliigaluu dhabuu)
Yaada

1. TB dhukkuba cimaa fi xiyyeeffannoo hatattamaa barbaadu dha. ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
2. Namoonni TB qaban hawaasa irraa adda baafamuu qabu. ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
3. Namni hunduu waa'ee ittisa TB beekuu qaba. ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
4. Hojjettoonni fayyaa daddarbaa TB ittisuuf gahee guddaa qabu. ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
5. Namoota TB qaban waliin wal-qunnamuun natti tola. ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
6. Namoonni TB qoricha isaanii yeroon dhaaban adabamuu qabu. ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
7. Qilleensi gaariin mana fi bakka hojii keessatti daddarbaa TB ittisuu danda'a. ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
8. Hawaasni ittisa TB milkaa'aa ta'uuf murteessaa dha. ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
9. Ittisa TB Hospitaala Waliigalaa Mooyyalee keessatti hojjetamu ga'aa dha nan amana. ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐
10. TB qabaachuun qaanii dha. ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

Kutaa 4: Gocha Ittisa TB

1. Yoo qufaa qabaatte, yeroo qufaatu yookiin haxxifattu afaan fi funyaan kee yeroo meeqa haguugda?

☐ Yeroo hundaa ☐ Baay'ee ☐ Yeroo tokko tokko ☐ Xiqqoo ☐ Gonkumaa

2. Qilleensi qulqulluun mana kee keessa akka seenuuf yeroo meeqa foddaa yookiin balbala banaa?

☐ Yeroo hundaa ☐ Baay'ee ☐ Yeroo tokko tokko ☐ Xiqqoo ☐ Gonkumaa

3. Yoo qufaan kee torban lamaa ol ture, maal goota?

☐ Battaluma mana fayyaatti deema

☐ Ofumaan akka deemu eega

☐ Qoricha aadaa fayyadama

☐ Hiriyoota/Maatii irraa gorsa gaafadha

☐ Hin beeku

4. Yoo TB'n si qabame, qoricha kee hundaa ajaja doktooraatiin fudhatta, yoo fooyya'eellee? ☐ Eeyyee, yeroo hundaa

☐ Lakki, yoo fooyya'e nan dhaaba

☐ Lakki, qoricha aadaa fayyadama

☐ Hin beeku

5. Bakka ummataa keessatti tufuu ni dhabda?

☐ Eeyyee, yeroo hundaa

☐ Lakki, yeroo tokko tokko

☐ Lakki, gonkumaa

DECLARATION

I, the undersigned student, declare that this research project is my original work in partial fulfillment of the requirement for the **Degree of Doctor in Medicine, MD**. I also declare that it has never been presented in this or any other higher institution and that all resources and materials used in the research work have been duly acknowledged.

Name of the student: HUSSEIN HASSAN

Signature:



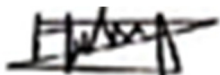
Date: 17/04/2026

Approval of Advisors

This research work has been submitted for examination with my approval.

Name of School of Public health advisor 1: Mr. HAILEMICHAEL BIZUNEH

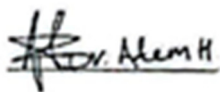
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Date: 17/04/2026

Name of Clinical advisor 2: Dr. ADEM HASSEN

Signature:



Date: 15/04/2026