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Perceptions, Enablers and Barriers of Utilization of Tuberculosis Screening Program Among Health Care Workers in Selected Healthcare Facilities in Mazabuka District of Southern Province

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Abstract

Tuberculosis (TB) remains a major occupational health risk among health care workers (HCWs), particularly in high TB burden settings such as Zambia. Despite the availability of TB screening programs, utilisation of these services among HCWs remains suboptimal. The World Health Organisation (WHO) recommends screening HCWs for TB in high burden settings, but this is often not implemented. The aim of the study was to explore the perceptions, enablers and barriers of utilisation of TB screening among HCWs in selected healthcare facilities in Mazabuka District of Southern Province. The study adopted a qualitative phenomenological research design, targeting 30 health care workers from selected public healthcare facilities in Mazabuka District. Data were collected using in-depth interviews (IDIs) and focus group discussions (FGDs). Thematic analysis was employed to analyse the data. Ethical considerations such as informed consent, confidentiality and voluntary participation were strictly observed. The findings revealed that HCWs generally hold positive perceptions toward TB screening and recognize its importance for occupational safety and infection prevention. However, positive perceptions alone did not guarantee consistent participation. Enablers included institutional support through provision of personal protective equipment (PPE), screening test kits, presence of TB focal persons or champions, peer mentorship, clear operational protocols and accessibility to rapid diagnostic tools. Conversely, major barriers included fear of stigma from colleagues and supervisors, high workload, staffing constraints, limited institutional awareness campaigns and poorly disseminated screening guidelines. TB screening participation among HCWs is influenced by interconnected individual, social and institutional factors. Strengthening screening uptake requires a comprehensive approach that addresses stigma, improves institutional support systems, enhances communication of guidelines and ensures operational feasibility. The findings provide evidence to inform policy and practice aimed at improving occupational health and TB control within healthcare facilities in Zambia.

Introduction

Tuberculosis (TB) remains one of the most serious global public health challenges and continues to rank among the top ten causes of death worldwide. According to the World Health Organization (WHO), an estimated 8.3 million people developed TB globally in 2024, a small increase from 8.2 million in 2023 with approximately 1.23 million deaths, 1.08 million among HIV negative people and 150 000 among people with HIV (WHO, 2024).

In high-income countries, TB screening for HCWs is commonly institutionalized within occupational health programs. Countries such as the United States of America and the United Kingdom have established mandatory baseline TB testing at employment, with periodic re-screening guided by risk assessments (CDC, 2020). These approaches have contributed to significant reductions in occupational TB transmission. However, in many low- and middle-income countries (LMICs), implementation of similar screening programs remains weak due to limited resources, competing health priorities and inadequate occupational health systems. Consequently, HCWs in high-burden settings continue to face elevated risks of TB infection (Baussano et al., 2021).

One major challenge undermining TB prevention among HCWs globally is the high prevalence of latent TB infection (LTBI). LTBI is asymptomatic and difficult to detect without systematic screening, yet it serves as a reservoir for future active TB cases. HCWs working in high-burden environments are at increased risk of progression from latent to active TB, particularly in the presence of immunosuppression (Getahun et al., 2025). In response to these challenges, the WHO and the International Labour Organization (ILO) have advocated for strengthened workplace TB infection prevention and control (IPC) measures. Despite these global recommendations, implementation remains inconsistent, especially in high-TB-burden countries (ILO/WHO, 2021).

Africa bears a disproportionate share of the global TB burden, accounting for a substantial proportion of TB cases and deaths worldwide. In 2022, the continent accounted for 24% of global TB cases and over 33% of TB-related deaths (WHO, 2023). Sub-Saharan Africa carries a disproportionate share of the global TB burden due to the dual epidemic of TB and HIV, which significantly increases susceptibility to infection and disease progression. Under-resourced health systems and inadequate IPC measures in clinical settings further increase risk for HCWs, who are estimated to be 2 to 3 times more likely to develop TB than the general population (Joshi et al., 2006). Routine TB screening for HCWs remains limited in many African countries, even where national guidelines recommend it. Studies in Nigeria and Ethiopia, for example, report that less than one-third of HCWs have ever been screened due to lack of enforcement, limited institutional support and inadequate diagnostic tools (Olufemi et al., 2019).

Zambia is among the countries with a high TB burden much of which is linked to HIV co-infection (WHO, 2023). HCWs in Zambia face increased occupational exposure, particularly in high-volume urban and peri-urban health facilities. Although the Ministry of Health has incorporated TB screening for HCWs into the National TB Strategic Plan (2022–2026), evidence suggests that screening coverage remains limited, especially in non-tertiary and peripheral health facilities (Kapata et al., 2016). Challenges such as inadequate IPC infrastructure, lack of designated occupational health personnel, limited diagnostic capacity and weak monitoring systems continue to hinder effective implementation (MoH, 2020).

Quantitatively, Zambia's TB burden is reflected in its high incidence and prevalence rates over time. Recent estimates indicate that the incidence of TB in Zambia was approximately 283 cases per 100,000 population in 2023, demonstrating that the disease remains widespread despite ongoing control efforts. Earlier national survey data further revealed an even higher estimated incidence of about 427 cases per 100,000 population, alongside a prevalence of approximately 455 cases per 100,000 population for all forms of TB. These statistics clearly illustrate that TB continues to affect a substantial proportion of the population, making it one of the leading infectious diseases in the country. The persistently high rates highlight gaps in early detection, prevention, and access to effective treatment services Trading Economics (2019)

In addition to incidence and prevalence, TB-related mortality and co-morbidities contribute significantly to Zambia's disease burden. Studies show that TB mortality remains high, estimated at about 86 deaths per 100,000 population, translating to roughly 15,000 TB-related deaths annually. Moreover, TB

distribution in Zambia shows notable geographic and demographic disparities, with urban areas and economically disadvantaged populations experiencing higher rates of infection. For instance, provinces such as Copperbelt and Lusaka have recorded particularly high prevalence rates, exceeding 900 cases per 100,000 population in some instances. These variations suggest that social determinants such as poverty, overcrowding and limited access to healthcare services play a critical role in disease transmission. Consequently, understanding these patterns is essential for designing targeted interventions. Overall, the high TB burden in Zambia, supported by strong quantitative evidence, justifies the need for continued research to inform policy, improve case detection and strengthen prevention and control measures World Health Organization (2020).

Southern Province consistently reports high TB notification rates, with Mazabuka District being a hotspot due to its dense population, migrant workforce, and strategic transport corridor. Health facilities in the district frequently manage large numbers of TB and general patients under constrained conditions, increasing occupational exposure for HCWs. Despite this elevated risk, TB screening for HCWs in Mazabuka remains poorly documented, and often reactive rather than regular. Understanding the perceptions, enablers and barriers of the utilization of TB screening services among HCWs in these settings is therefore essential to identify service gaps and inform targeted interventions to strengthen occupational health and reduce TB transmission.

Materials and Methods

Study design, time-period, and study setting

A qualitative research design was utilized to explore the perceptions, enablers, and barriers influencing the utilization of tuberculosis (TB) screening programs among healthcare workers (HCWs) in selected healthcare facilities in Mazabuka District, Southern Province. A qualitative approach was considered appropriate because it enabled the researcher to obtain detailed information regarding healthcare workers' experiences, opinions, attitudes, perceived challenges, motivating factors, and recommendations concerning TB screening. Unlike quantitative approaches that primarily focus on numerical measurement, the qualitative design allowed participants to describe their experiences and perceptions in their own words.

The study was conducted over a three-month period, from November 2025 to January 2026. Data collection was undertaken during this period using in-depth interviews (IDIs) and focus group discussions (FGDs). These methods provided an opportunity to obtain both individual and collective perspectives regarding TB screening practices among healthcare workers.

The study was conducted in four selected public healthcare facilities in Mazabuka District, namely Mazabuka General Hospital, Kaonga Urban Clinic, Kaleya Peri-Urban Clinic, and Nakambala Urban Clinic. The facilities were purposively selected because they provide TB-related services and have healthcare workers who are directly involved in patient care and therefore may have occupational exposure to TB.

The inclusion of both a district hospital and primary healthcare facilities allowed the study to capture experiences from different healthcare service delivery environments.

Study area

The study was conducted in Mazabuka District of Southern Province, Zambia. Mazabuka is predominantly an agricultural district, with sugarcane farming being one of the major economic activities. The district comprises both urban and peri-urban communities whose populations depend on public healthcare facilities for various health services, including TB screening, diagnosis, treatment, and follow-up.

The study was undertaken at four healthcare facilities: Mazabuka General Hospital, Kaonga Urban Clinic, Kaleya Peri-Urban Clinic, and Nakambala Urban Clinic. These facilities serve different catchment populations and provide an appropriate setting for exploring healthcare workers' perceptions and experiences regarding TB screening.

Mazabuka General Hospital functions as the main referral hospital in the district and provides a broad range of healthcare services to patients from Mazabuka and surrounding communities. The hospital has healthcare workers from different professional backgrounds and manages patients requiring both routine and specialized services.

Kaonga Urban Clinic and Nakambala Urban Clinic provide primary healthcare services to predominantly urban populations. Their services include outpatient care, maternal and child health services, health promotion, disease prevention, and TB-related services. Kaleya Peri-Urban Clinic serves a peri-urban population and provides primary healthcare services, including TB screening and referral of suspected cases.

The four facilities were selected because of their varying service environments, patient workloads, and professional composition. Their inclusion enabled the study to explore whether healthcare workers experienced similar or different perceptions, enablers, and barriers to TB screening across hospital and clinic settings. **See Figure (1)**

Source: Mazabuka District Health Office, 2019.

Study population and eligibility criteria

The study population consisted of frontline healthcare workers working in the selected healthcare facilities in Mazabuka District. The participants included doctors, clinical officers, nurses, and laboratory personnel who were directly involved in patient care, TB screening, diagnosis, treatment, or other activities related to TB management.

Healthcare workers were considered appropriate for the study because of their direct interaction with patients and their potential occupational exposure to TB. Their experiences were also important in understanding factors that may facilitate or hinder utilization of TB screening programs within healthcare settings.

Inclusion criteria

Participants were eligible for inclusion if they:

1. Were frontline healthcare workers, including doctors, clinical officers, nurses, or laboratory personnel, working in the selected healthcare facilities in Mazabuka District.
2. Had worked in the district for at least six months, ensuring that they had adequate experience within the healthcare setting to provide meaningful information regarding TB screening.
3. Were willing to participate in the study and provide informed consent.

Exclusion criteria

Participants were excluded if they:

1. Were non-frontline workers, such as administrators, cleaners, outdoor workers, or other staff who were not directly involved in patient care or management.
2. Were unavailable during the period of data collection. iii. Were unwilling to participate or declined to provide informed consent.

Sampling techniques and sample size determination

Purposive sampling was used to select participants for the study. This is a nonprobability sampling technique commonly used in qualitative research to deliberately select individuals who possess relevant knowledge, experience, or characteristics related to the research topic.

The use of purposive sampling enabled the researcher to select healthcare workers who had direct experience with TB screening and healthcare service delivery. Participants were selected from different professional categories to obtain diverse perspectives concerning the utilization of TB screening services.

A total of 30 healthcare workers were included in the study. The participants were distributed across the four selected healthcare facilities as follows: 8 participants from

Mazabuka General Hospital, 8 from Kaonga Urban Clinic, 7 from Nakambala Urban Clinic, and 7 from Kaleya Peri-Urban Clinic.

The sample size was considered appropriate for qualitative research because the primary objective was to obtain rich and detailed information rather than statistical representation of the entire healthcare worker population. The adequacy of the sample was also assessed in relation to data saturation, which occurs when additional interviews or discussions no longer produce substantially new information, concepts, or themes.

Data collection, procedure, and quality assurance

Data were collected using in-depth interviews (IDIs) and focus group discussions (FGDs). The use of two qualitative data collection methods enabled the researcher to obtain both individual experiences and collective perspectives regarding TB screening among healthcare workers.

In-depth interviews

In-depth interviews were conducted with healthcare workers to obtain detailed information about their individual experiences, perceptions, challenges, and experiences concerning TB screening. The interviews provided participants with an opportunity to discuss issues freely in a private environment without the influence of other participants.

A semi-structured interview guide was used to guide the interviews. The guide consisted mainly of open-ended questions covering participants' understanding and perceptions of TB screening, experiences with TB screening programs, perceived benefits, barriers, enablers, institutional support, stigma, and recommendations for improving utilization of TB screening services.

Each interview was conducted in a private setting within the respective healthcare facility to promote confidentiality and encourage participants to provide honest responses. Each interview lasted approximately 30 to 60 minutes. With participants' permission, interviews were audio-recorded to ensure accurate capture of the information provided. Field notes were also taken to document relevant observations and contextual information.

Focus group discussions

In addition to IDIs, four focus group discussions were conducted to obtain collective views and experiences regarding TB screening. Each FGD consisted of approximately 6 to 8 participants, with participants drawn from different professional backgrounds.

FGDs provided an opportunity for healthcare workers to interact with one another and discuss common experiences, perceptions, barriers, enabling factors, and possible solutions concerning TB screening. The group discussions encouraged participants to build upon each other's responses, thereby generating broader and deeper information.

Each FGD lasted approximately 60 to 90 minutes and was conducted in a private and comfortable environment within the healthcare facilities. A semi-structured FGD guide was used to ensure that similar key topics were discussed across all groups while allowing the researcher to probe emerging issues.

All FGDs were audio-recorded after obtaining participants' consent and were subsequently transcribed verbatim. Participants were debriefed at the end of each session and were given an opportunity to ask questions, clarify their responses, or provide additional information.

Data collection was conducted by the researcher assisted by three research assistants who were trained in qualitative data collection procedures. The research assistants were oriented on the study objectives, ethical considerations, interviewing techniques, use of the interview guides, recording procedures, confidentiality, and management of field notes.

Data collection instruments

The main instruments used for data collection were semi-structured IDI and FGD guides. The guides were developed based on the study objectives and a review of relevant literature concerning TB screening among healthcare workers.

The instruments included questions addressing participants' understanding of TB screening, perceptions of screening, experiences with TB screening services, perceived barriers, enabling factors, workplace support, stigma, and suggestions for improving utilization of TB screening programs. The interview used in this study was developed for the purpose of this study

Pilot study

Prior to the main data collection, the IDI and FGD guides were pilot-tested among a small group of healthcare workers from a healthcare facility that was not included in the final study.

The pilot study was conducted to assess the clarity, relevance, sequence, and appropriateness of the questions. It also enabled the researcher to determine whether the questions generated sufficient information to address the study objectives.

Feedback obtained during the pilot exercise was used to refine the data collection instruments. Ambiguous questions were rephrased, repetitive questions were removed, and additional probes were introduced where necessary. The pilot exercise also helped the research team estimate the duration of interviews and discussions and improve interviewing and facilitation techniques.

Data quality assurance

Several measures were implemented to ensure the quality and credibility of the collected data. The researcher and research assistants were trained before commencement of data collection. The semi-

structured guides were used consistently across participants while allowing appropriate probing of emerging issues.

Audio recordings were made with participants' permission and were transcribed verbatim to minimize loss or alteration of information. Field notes were maintained to supplement recorded information. The researcher also reviewed transcripts regularly to identify incomplete information and clarify issues where necessary.

Data analysis

Qualitative data obtained from the IDIs and FGDs were analyzed using thematic analysis. Thematic analysis was considered appropriate because it allowed the researcher to identify, organize, analyze, and interpret recurring patterns within participants' responses.

The analysis commenced with familiarization with the data, whereby the researcher repeatedly listened to audio recordings and read the transcripts to develop a comprehensive understanding of participants' responses. The transcripts were then systematically coded by identifying meaningful statements and concepts relevant to the study objectives.

Similar codes were subsequently grouped into broader categories. These categories were examined to identify recurring patterns and relationships, which were then developed into major themes and sub-themes. The emerging themes were reviewed to ensure that they accurately represented participants' accounts and remained consistent with the research objectives.

The analysis also involved comparing information obtained from IDIs and FGDs to identify similarities and differences in participants' perceptions and experiences. Direct quotations from participants were retained to support the presentation and interpretation of the findings.

The interpretation of findings was further guided by the Health Belief Model (HBM).

The HBM was used to understand how healthcare workers' perceptions of susceptibility to TB, severity of TB, perceived benefits of screening, perceived barriers, cues to action, and self-efficacy may influence their utilization of TB screening services.

The final themes were therefore interpreted in relation to the study objectives and the HBM, allowing the researcher to provide a structured explanation of the perceptions, enabling factors, and barriers influencing TB screening utilization among healthcare workers.

RESULTS

The findings are structured into three key themes: perceptions of TB screening, barriers to TB screening, enablers of TB screening, and recommendations for improvement. Each section highlights the

perspectives of HCWs, supported by direct quotes, to provide a comprehensive understanding of the perceptions, enablers and barriers of utilization of TB screening services among HCWs.

Demographic characteristics of the participants

The participants were selected from four healthcare facilities namely Mazabuka

General Hospital, Nakambala Urban Clinic, Kaonga Urban Clinic and Kaleya Peri Urban Clinic. Participants were selected from different demographic backgrounds including age, gender, profession and professional experience. The participants included 11 males and 19 females. The majority of the participants were within the age range of 26 to 35 years, while a few participants were aged between 18 to 25 years and also above 46 years. The majority of the participants were nurses (17), followed by clinical officers (8), and a few were doctors (2) and laboratory technicians (3). Most of the participants had 3 to 5 years work experience, followed by those with 1 to 2 years working experience and a few who had more than 10 years working experience. **See Table (1)**

Table 1: Demographic Characteristics of Participants

Demographic Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	11	37%
	Female	19	63%
Age Group	18-25 years	3	10%
	26-35 years	13	43%
	36-45 years	10	33%
	46+ years	4	14%
Profession	Doctors	2	6%
	Clinical Officers	8	27%
	Lab Techs	3	10%
	Nurses	17	57%
Professional Experience	6 months to 12 months	4	13%
	1 year to 2 years	8	27%
	3 years to 5 years	11	37%
	6 years to 10 years	3	10%
	>10 years	4	13%

Perceptions, enablers and barriers of utilization of TB screening among HCWs in Mazabuka District

Utilization of TB screening among HCWs is influenced by an interplay of perceptions, enablers and barriers. Below is a summary of the analytical process used in the study, illustrating how the sub-themes generated from the in-depth interviews and focused group discussions were organized into major themes, forming the basis of the discussion. The themes and sub-themes have been enriched with direct quotes from the participants. **See Table (2)**

Table 2: Table of Themes and Sub-themes

Main Themes	Sub- Themes
Perceptions of TB screening	• Early detection of TB plays a crucial role in preventing TB transmission • Evolving perceptions • Screening as formality vs prevention
Enablers of TB screening	• Institutional support through provision of PPE, Protocols • Presence of TB focal point persons or champions • Peer influence to encourage colleagues to be screened • Mentorship from senior HCWs to junior staff on importance of routine TB screening • Accessibility to rapid diagnostic tools and screening kits
Barriers to TB screening	• Lack of institutional awareness campaigns on TB • Fear of stigma from supervisors and colleagues • Workload and staffing constraints • Poorly disseminated TB screening guidelines

Perceptions of TB Screening

Healthcare workers (HCWs) generally recognized TB screening as an essential component of occupational health. They understood that early detection of TB not only protects individual staff members but also prevents the spread of infection to colleagues and patients, thus reducing the risk of outbreaks within healthcare facilities. Participants noted that their perception of TB screening evolved over time, particularly as they observed the consequences of undiagnosed TB cases in their facilities. Awareness of occupational exposure to TB and its potential complications strengthened their appreciation of routine screening, although some HCWs initially viewed it as a routine formality rather than a critical preventive measure.

"TB screening is crucial for us healthcare workers. We are on the frontline, and early detection is key for our safety and that of our patients. Without screening, we could unknowingly spread TB to colleagues or patients, which makes it a responsibility rather than just a personal choice." (Laboratory Technician, male 37, IDI)

"At first, I thought TB screening was just another routine check, but over time, I have seen how it can prevent outbreaks in our facility. Now, I actively encourage my colleagues to participate because early detection can save lives." (nurse, female 29, IDI)

In conclusion, HCWs' perceptions of TB screening were largely positive, reflecting an understanding of its value in safeguarding health. However, these perceptions alone were insufficient to guarantee consistent participation, as external factors like institutional support and stigma influenced behaviour.

Institutional Support through Provision of PPE and Protocols

Support from management was identified as a key facilitator for TB screening. Participants indicated that having adequate personal protective equipment (PPE), clear operational protocols, and sufficient TB screening kits provided reassurance and motivation to engage in screening activities. The provision of resources signalled institutional commitment to staff well-being, reducing fears of occupational exposure and making participation in TB screening more practical and feasible.

"Support from management makes a huge difference. When we have adequate PPE and screening kits, it becomes easier to carry out our work. Knowing that we are protected and that the supplies are always available encourages us to participate without worrying about our safety." (nurse, female 32, IDI)

"Having clear guidelines and protocols for TB screening has really helped us stay consistent. It gives us confidence that we are following the correct procedures and protecting both ourselves and our patients." (nurse, male 35, IDI)

Thus, institutional support was a critical enabler of TB screening, highlighting the importance of management commitment and resource allocation in encouraging staff participation.

Presence of TB Focal Persons or Champions

The presence of dedicated TB focal persons or champions enhanced TB screening by serving as advocates and coordinators within healthcare facilities. These individuals ensured adherence to guidelines, addressed staff concerns, and promoted a culture of proactive health monitoring. Their visible presence reassured HCWs that TB screening was prioritized institutionally, which encouraged greater engagement.

"The presence of TB focal persons in some facilities has helped increase screening rates by ensuring that guidelines are followed. They answer questions, remind us about scheduled screenings, and make the process smoother for everyone." (COG, female 31, FGD)

In conclusion, TB champions played a pivotal role in reinforcing screening practices and maintaining motivation among staff, demonstrating the value of leadership and advocacy in health interventions.

Peer Influence and Mentorship

Peer influence and mentorship emerged as strong motivators for HCWs to participate in TB screening. Junior HCWs are more likely to participate when they see senior and experienced staff members prioritizing screening and leading by example. Departmental sensitization meetings also reinforced routine participation, creating a supportive environment in which TB screening was normalized.

"Having regular sensitization meetings within our departments has encouraged more of us to participate in TB screening actively. Seeing senior staff take it seriously makes it easier to prioritize it in our own schedules." (nurse, female 24, FGD)

"If senior staff took the initiative to mentor new employees on TB screening, more people would see it as a routine practice rather than an optional procedure. Mentorship makes staff feel confident about following procedures correctly." (COG, male 35, FGD)

Overall, mentorship and peer influence fostered a culture of proactive health monitoring, showing that social and professional support networks can significantly increase screening participation.

Accessibility to Rapid Diagnostic Tools

The availability of rapid TB diagnostic tools was identified as an enabler for screening. HCWs highlighted that quick and reliable results reduced anxiety and improved willingness to undergo testing, while long waiting times discouraged participation due to uncertainty and disruption of work schedules. Access to rapid testing made the process more convenient and less intimidating, promoting regular engagement.

"When we know that results will be available quickly, more people are willing to get screened. Long waiting times discourage many of us because we cannot afford to stay away from our duties for hours." (Laboratory Technician, male 33,

FGD)

In summary, the accessibility of rapid diagnostic tools positively influenced screening uptake by making the process more efficient and reassuring for HCWs.

Barriers to TB Screening

Lack of Institutional Awareness Campaigns on TB

Limited institutional campaigns and educational initiatives reduced HCWs' understanding of the purpose and benefits of TB screening. Participants reported that insufficient communication about TB risks and preventive practices led to low engagement in routine screening, especially for asymptomatic individuals.

"We all agree that TB screening is important, but the level of awareness among HCWs needs to be improved. Many colleagues still do not know when and why they should be screened." (Doctor, female 28, IDI)

Hence, the absence of structured awareness programs emerged as a major barrier, indicating the need for comprehensive education initiatives at the facility level.

Fear of Stigma from Supervisors and Colleagues

Fear of stigma was a pervasive deterrent. HCWs reported concerns about negative social and professional consequences, including judgment, discrimination, or reassignment to high-risk units. Such fears discouraged voluntary screening and led to delayed reporting of symptoms, increasing the potential for TB transmission within healthcare facilities.

"If people see you going for TB screening, they immediately start talking and assuming you are sick, so most of us avoid it." (nurse, female 47, FGD)

"People start treating you differently once they know you have TB. Even though it's curable, there is still a lot of fear and stigma around it." (nurse, male 42, IDI)

"Some colleagues avoid screening because they fear that if they test positive, they will be transferred to a ward with more TB patients." (nurse, male 44, IDI) In conclusion, stigma strongly influenced HCWs' willingness to engage in TB screening, highlighting the need for confidential services and campaigns to normalize testing.

Workload, Inadequate Human Resources, and Long Working Hours

High workload, long shifts, and staff shortages limited HCWs' capacity to participate in TB screening. Many prioritized patients care over their personal health, delaying or avoiding screening entirely. Participants emphasized that these systemic issues were a major practical barrier, beyond individual motivation.

"Sometimes you want to go for screening, but the workload is too much and there is no one to cover for you." (nurse, male 29, FGD)

"We are few and the patients are many, so personal health checks like TB screening are usually postponed. It is not because we do not want to, but we cannot leave patients unattended." (COG, male 35, IDI)

Thus, operational constraints significantly reduced screening participation, underscoring the need for adequate staffing and scheduling flexibility.

Poorly Disseminated TB Screening Guidelines

Unclear or poorly communicated guidelines led to confusion about screening eligibility, frequency and procedures. HCWs reported that lack of visibility and enforcement of guidelines reduced adherence, even among those aware of TB risks.

"I have heard about TB screening guidelines, but they are not clearly explained to us or displayed anywhere. Sometimes I am not sure when the next screening is supposed to happen." (Doctor, male 36, FGD)

"If the guidelines were clear and followed strictly, more health workers would go for screening. Right now, we rely on word of mouth or reminders from colleagues." (nurse, male 28, FGD)

In conclusion, unclear guideline dissemination limited participation, emphasizing the importance of well-communicated, accessible, and enforced screening policies.

Integration of Findings and Data Triangulation

The identified themes were closely aligned with the study's specific objectives, and a comparison of data sources further strengthened the validity of the findings through triangulation. Data from in-depth interviews (IDIs) and focus group discussions (FGDs) largely converged on key issues such as knowledge of TB transmission, perceived risk among healthcare workers and barriers to consistent use of infection prevention measures. However, notable differences emerged in the depth and openness of responses. Participants in IDIs managed to express more personal and sensitive concerns, particularly around stigma, fear of diagnosis, and reluctance to disclose TB status as compared to FGDs, where social desirability and peer presence appeared to limit full disclosure. In contrast, FGDs were more effective in generating shared experiences and collective norms, especially regarding workplace practices and institutional challenges. This complementarity between IDIs and FGDs enhanced the richness of the data and provided a more comprehensive understanding of the phenomenon under study.

Overall, the findings revealed that while participants demonstrated a general awareness of TB and its transmission, gaps in practical knowledge and inconsistent adherence to infection prevention protocols persisted. Perceived susceptibility was high among healthcare workers, yet this did not always translate into protective behaviours due to barriers such as limited resources, inadequate training and stigma associated with TB. The themes collectively highlight a disconnect between knowledge and practice, influenced by both individual perceptions and systemic constraints. These insights provide a coherent narrative that links participants' beliefs, experiences, and behaviours, thereby setting the stage for the discussion chapter, where these findings will be critically compared with existing literature and theoretical perspectives.

DISCUSSION

The discussion critically interprets the results in relation to the study objectives and existing empirical literature. It moves beyond mere presentation of findings by examining underlying meanings, identifying patterns and highlighting implications for policy and practice within healthcare settings.

The chapter is structured around the three major themes that emerged from the data analysis: perceptions of TB screening, enablers of TB screening and barriers to TB screening. Each theme is discussed critically, drawing comparisons with existing scholarly work and global policy recommendations, including those advanced by the WHO. The discussion emphasizes how individual, institutional and contextual factors interact to influence HCWs' engagement in TB screening practices.

By situating the findings within broader theoretical and empirical frameworks, this chapter demonstrates how knowledge, social dynamics, structural conditions, and organizational culture collectively shape occupational health behaviours. The analysis highlights areas of convergence and divergence with previous studies and identifies practical implications for strengthening TB screening programs in healthcare facilities. Ultimately, this chapter provides a foundation for the conclusions and recommendations presented in the subsequent chapter.

The study revealed that healthcare workers (HCWs) generally possess a positive perception of TB screening, recognizing its significance for personal health and public safety within healthcare facilities. Participants highlighted that early detection helps prevent TB outbreaks, reduces occupational risk, and protects patients, reflecting an awareness of the responsibilities inherent in healthcare provision. Participants reported that their perception of TB screening evolved over time, particularly through direct exposure to undiagnosed TB cases in their facilities demonstrating that experiential learning plays a critical role in shaping occupational health behaviours. However, despite this awareness, actual participation in TB screening was inconsistent, suggesting that knowledge alone is insufficient to influence behaviour. The findings imply that while HCWs appreciate the importance of screening intellectually, external factors such as workplace culture, logistical constraints and perceived risks influence their decision-making, highlighting the complex nature of translating knowledge into practice (Thomas, 2019).

The positive perception of TB screening observed in this study aligns with findings from sub-Saharan Africa, where HCWs are reported to be aware of occupational TB risks and the importance of early detection (Getahun et al., 2015). Similar studies indicate that healthcare workers generally recognize screening as a critical preventive health measure. However, unlike some literature that suggests knowledge directly predicts regular participation, this study demonstrates a gap between perception and practice, reinforcing the argument that awareness alone cannot overcome structural and social barriers to routine screening. This discrepancy emphasizes the need for supportive institutional and social environments to complement knowledge-based interventions. Participants' concerns regarding exposure risks during screening procedures resonate with literature reporting that perceived inadequacy of protective measures can deter HCWs from engaging in preventive health practices (Ayele et al., 2017). This study provides contextual insight into the specific fears of HCWs in Zambia, where lack of

confidence in safety protocols discourages screening despite understanding its importance. The findings suggest that improving perceptions of safety through visible protective measures and training is crucial for translating awareness into action.

Finally, the study's observation that perceptions of TB screening improved with experience extends the existing literature, which often focuses on formal education and knowledge as the primary drivers of behaviour. The current findings highlight the importance of experiential learning, peer modelling, and mentorship in shaping HCWs' attitudes toward preventive health measures. This emphasizes that creating opportunities for staff to witness and engage in safe screening practices can strengthen positive perceptions and reinforce adherence to TB screening protocols.

Institutional support emerged as a major enabler of TB screening, with participants emphasizing that the provision of adequate PPE, clear protocols and sufficient screening kits significantly enhanced their participation. HCWs reported that when resources were available and guidelines were communicated effectively, they felt more confident and motivated to engage in screening activities. This underscores the critical role of organizational commitment and practical support in promoting preventive health behaviours, demonstrating that staff are more likely to comply with TB screening when institutions visibly invest in their safety and provide the necessary tools to perform screenings effectively.

Mentorship, peer influence and departmental sensitization were strong enablers of TB screening, as senior staff participation and leadership modelling helped normalise screening and build a culture of responsibility. Rapid diagnostic tools as an enabler aligned with global recommendations that quick turnaround times increase adherence to preventive health measures (Getahun et al., 2015). Unlike some literature that focuses primarily on the presence of screening services, the present findings demonstrate that timeliness and accessibility of results are critical for motivating HCWs to participate. This highlights the need for facilities to not only provide screening services but also ensure they are efficient and convenient. The enablers identified in this study are consistent with previous research highlighting the role of institutional support in increasing TB screening uptake (WHO, 2018; Hurry, 2016). Similar studies indicate that resource provision, such as PPE and operational guidelines, is a key determinant of HCWs' participation in preventive health programs (Mark, 2018). However, the current study expands upon this literature by emphasizing that social and relational factors, such as mentorship and peer influence, are equally important, suggesting that technical support alone may not achieve the desired outcomes.

Finally, the influence of TB focal persons and champions in improving screening participation corroborates literature that identifies leadership and advocacy as key enablers of preventive health programs (Datiko et al., 2016). However, this study adds nuance by demonstrating that personal interaction, guidance, and visible commitment from facility champions significantly enhance engagement, complementing the structural and resource-based enablers identified in prior research.

Fear of stigma was the most prominent barrier to TB screening among HCWs, with concerns about judgement, negative professional consequences and reassignment to high-risk units, leading to delayed diagnosis and increased transmission risk. The findings underscore that social perceptions and

workplace culture strongly influence occupational health behaviour, suggesting that interventions addressing stigma are essential to improving TB screening uptake. High workload, inadequate staffing and long working hours also prevented participation, as HCWs often prioritized patient care over personal health. These findings reveal that structural and operational constraints strongly shape preventive health behaviour, and that individual motivation may be insufficient when systemic support is lacking. Addressing these organizational challenges is critical for enabling HCWs to participate in TB screening without compromising service delivery. Poorly disseminated TB screening guidelines further created uncertainty about eligibility and procedures, highlighting that stigma, operational constraints and unclear policies must be addressed together to improve uptake.

The influence of stigma on HCWs' participation in TB screening aligns with prior research, which reports that fear of social and professional repercussions significantly deters preventive health behaviour (Datiko et al., 2016). The present study expands on this by identifying specific forms of stigma in the Zambian context, including potential reassignment and workplace judgment, emphasizing the need for confidential services and stigma-reduction strategies tailored to local cultural and organizational contexts.

Workload and human resource constraints as barriers mirror findings from other high TB-burden countries (Ayele et al., 2017). However, unlike some studies that examine barriers in isolation, this study illustrates the interconnected nature of multiple barriers, showing that stigma, workload and unclear guidelines combine to discourage participation. This underscores the need for a holistic approach to intervention, addressing both social and systemic challenges simultaneously.

Finally, TB screening policies fail without clear communication, consistent enforcement and visible leadership to ensure HCWs actually follow them. This aligns with emerging research emphasizing that organizational clarity and reinforcement are critical to ensure HCWs engage in routine preventive measures, including TB screening, (Derick, 2019).

Conclusion

Healthcare workers view TB screening positively and recognize its importance, but favourable perceptions alone do not ensure consistent participation. Knowledge and awareness must be reinforced by strong institutional and social support systems to translate into sustained engagement.

Institutional and social support systems strongly boost TB screening uptake. Adequate PPE, availability of screening kits, clear protocols, and access to rapid diagnostics build confidence and motivation, while TB champions, peer influence and mentorship normalize screening as a professional responsibility. Effective programs therefore require structural resources, committed leadership, and a supportive workplace culture.

Despite positive perceptions and existing enablers, TB screening faced several barriers such as stigma, high workload, staff shortages, inadequate awareness campaigns and poorly disseminated guidelines,

underscoring the need for a comprehensive approach that tackles both psychosocial and systemic challenges in healthcare settings.

In summary, TB screening participation among HCWs is influenced by interconnected individual, institutional, and contextual factors. Strengthening TB screening programs requires not only increasing awareness but also building supportive systems that address stigma, improve resource allocation, enhance communication, and reduce operational barriers.

Declarations

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Ethics approval and consent to participate

This study involved human participants and was conducted in accordance with the ethical principles of the Declaration of Helsinki and applicable national and institutional requirements for research involving human participants. Ethical approval was obtained from Lusaka Apex Medical University Biomedical Research Ethics Committee (LAMUBREC), under reference number LAMUBREC No. 0420/02/11/2024, with approval issued on 20 March 2025. The committee is registered under FWA 00029892 and IRB 00001131. The study was therefore commenced and conducted under the oversight of the appropriately constituted research ethics committee.

Written informed consent was obtained from all participants before participation in the study. Participants were informed about the purpose and procedures of the study, the voluntary nature of participation, their right to decline to answer any question or withdraw from the study without penalty, and the measures that would be taken to protect confidentiality. Permission for audio-recording of interviews and focus group discussions was obtained from participants before data collection.

To protect participant confidentiality, no names or other direct personal identifiers were recorded in the manuscript. In addition, individual ages, sex and potentially identifying professional or facility descriptors

have been removed from the revised results section and from participant quotations. Quotations are presented using anonymous participant codes to minimize the possibility of deductive identification.

Consent for publication

Written informed consent for participation and publication of anonymized study findings was obtained from all participants before data collection. Participants were informed that anonymized quotations from the interviews and focus group discussions could be used in publications arising from the study. To protect confidentiality, each participant was assigned an anonymous identification code, and potentially identifying personal information was removed or appropriately generalized. Where demographic characteristics were necessary to provide contextual information, they were presented in coded or generalized form, such as age categories rather than exact ages, without combining information in a manner that could reasonably identify an individual. No participant names or other direct identifiers are reported in the manuscript. These measures were implemented to preserve participant confidentiality while retaining the contextual meaning and evidentiary value of their accounts.

Data availability

The qualitative data generated and analyzed during this study are not publicly available because the transcripts and interview materials contain potentially sensitive information relating to healthcare workers and their workplace experiences. Making the complete transcripts publicly accessible could compromise participant confidentiality, particularly given the relatively small number of participants and the limited number of participating healthcare facilities. De-identified information relevant to the findings may be made available from the corresponding author on reasonable request, subject to the conditions of the ethical approval granted by the Lusaka Apex Medical University Biomedical Research Ethics Committee (LAMUBREC) and applicable institutional requirements.

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Figures



Figure 1

Map showing Mazabuka District and selected healthcare facilities where the study was conducted.

Source: Mazabuka District Health Office, 2019.