The Quality of the Structural Domain of Tuberculosis Services at Public Health Facilities in Sidama Region, Southern Ethiopia: An Institution-Based Cross-Sectional Study Design

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Article

The Quality of the Structural Domain of Tuberculosis Services at Public Health Facilities in Sidama Region, Southern Ethiopia: An Institution-Based Cross-Sectional Study Design

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Abstract: Introduction: Poor structural quality of health facilities for tuberculosis (TB) diagnosis and treatment contributes to unfavorable health outcomes among TB patients. Improving the quality of healthcare services helps to avert TB-related morbidity. Despite these facts, the level of structural quality of health facilitieSs to deliver TB services is not in line with what the national TB and leprosy program (NTLP) recommends. Hence, the present study was conducted to assess the structural quality of health facilities to deliver quality TB services to TB patients among public health facilities in the Sidama region. **Objectives:** To determine the quality of the structural domain of TB services at public health facilities in the Sidama region of southern Ethiopia. **Methods:** An institution-based cross-sectional study was conducted from June to July 2023 among randomly selected public health facilities in the Sidama region. We included 40 randomly selected public health facilities that delivered TB services in the study area. Data was collected by experienced data collectors using facility audits, clinical observation checklists, structured questionnaires, and in-depth interviews. An Open Kit Mobile (ODK) application was used to collect data and exported to SPSS version 26. All statistical analysis was done using SPSS version 26. **Results:** The overall mean quality score for the structural dimension was 50.25 among the 40 health facilities audited in the study area. **Conclusion:** The quality of TB services regarding structural dimensions was poor in the study area. Therefore, any strategies must give careful attention to increasing the comprehensive structural dimension of quality TB services.

Keywords: quality; structure; TB services; cross-sectional design; Sidama region; Ethiopia

Introduction

Globally, an estimated 10 million people developed TB disease in 2023, and there were an estimated 1.4 million deaths from TB (1.2 million among HIV-negative people and an additional 251,000 deaths among HIV-positive people) [1]. Multidrug-resistant tuberculosis (MDR-TB) is now a serious threat to global health security, adding to the growing burden of antimicrobial resistance. In 2022, there were about one-half million new cases of rifampicin-resistant TB (RR-TB), but only one in three cases were reported by countries to have been treated [2].

Globally, 3.4 percent of new TB cases and 18 percent of previously treated cases had MDR- or RR-TB [2]. Ethiopia continues to be among the 30 high-burden TB, TB/HIV, and DR/MDR-TB countries in the world. According to the 2019 WHO Global TB Report, the incidence of TB is estimated to be 151 per 100,000 populations, and the mortality rate is 22 per 100,000 populations [2]. These figures remain high despite commendable efforts by the NTLP, which have resulted in a steady decline in incidence over the years. TB treatment coverage, derived from new and relapse-notified TB cases divided by estimated incidence, was 69 percent in 2018, indicating that 31 percent of TB

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cases were missed. Among the 114,233 notified drug-sensitive (DS) TB cases in 2018, 69 percent were pulmonary TB, and of the nationally notified pulmonary TB cases, 62 percent were bacteriologically confirmed [2,3]. The National strategic plan for tuberculosis and leprosy control [4], shows a remarkably steady decline in the estimated number of TB cases and a decline in case notifications since 2010 [5].

Ethiopia is committed to accelerating the fight to end the TB epidemic by 2035, has endorsed the post-2015 Global End TB Strategy and the UNHLM targets, and has aligned its National TB Strategic Plan with the National Health Sector Transformation Plan. The National End TB Strategy aims to end the TB epidemic by reducing TB-related deaths by 95 percent and cutting incident TB cases by 90 percent between 2015 and 2035 [4]. The strategy calls for the use of robust TB case finding and rapid diagnosis technologies to address the gap in finding missed cases and to decrease the threat of DR-TB. The NTLP has expanded TB services, through both public and private health facilities, to provide high-quality care [6]. The strategic focus is on providing care at the community- and health facility-levels to improve case finding. As of June 2018, all public hospitals and health centers provided TB services, and community TB care had been rolled out to most health posts. The community TB strategy, which was incorporated into the Health Extension Program package, has proved feasible, acceptable, effective, and efficient [7].

Health extension workers (HEWs) are tasked with identifying those with presumptive TB and referring them to health centers for diagnosis; providing treatment support; providing directly observed treatment, short course (DOTS) in some areas; tracing people lost to follow-up (LTFU); and carrying out contact investigation. This strategy has increased patient adherence and improved treatment outcomes [8].

Comprehensive public-private mix directly observed treatment-short course (PPM-DOTS) services, supported by the USAID-funded Private Health Sector Support Program, started in 2006. With support from this program, a mix of TB services is currently provided at 546 private health facilities across the country: 247 provide diagnosis and treatment services; 32 provide TB diagnosis and referral services; and 267 provide presumptive TB referral services. The PPM-DOTS initiative contributed 15 percent of the TB cases notified nationally in 2018, although it engaged fewer than 3 percent of the private health facilities in the country [3].

Although significant progress has been made towards ending tuberculosis (TB) as a public health burden, TB is still one of the leading causes of mortality in the world. Specifically, more than 1.8 million people die from TB every year, and approximately one-quarter of human immunodeficiency virus (HIV)-related deaths are due to TB [7].

Despite intensified worldwide efforts to diagnose and successfully treat TB patients, the World Health Organization (WHO) estimates that almost 3 million cases are missed each year not diagnosed, treated or reported to National TB Programs (NTP). Additionally, the rapid emergence of multidrug resistant TB (MDR-TB) has the potential of reversing the two decades of progress that has been made mitigating the impact of TB [9].

NTPs are increasing their efforts to improve the quality of TB diagnosis, care, and treatment services, in addition to improving access to TB care. Improving the basic standards of TB care can attract more clients by ensuring that they receive the care that they deserve. In addition, quality services help to improve adherence, diagnosis, and treatment and reduce the loss of follow-up, ultimately contributing to reducing the burden of TB disease, including drug-resistant TB (DR-TB). An improved understanding of what constitutes quality of care in TB programs would enhance the provision of integrated patient-centered TB care [10].

Ethiopia is grouped as one of the 30 countries with the highest TB, HIV/TB, and MDR-TB burdens in the world. Although both TB prevalence and incidence rates have been showing a steady decline, TB remains a major public health problem, claiming thousands of lives each year [11]. According to the first population-based national prevalence survey conducted in 2011/12, the prevalence rate of all forms of TB for all groups in Ethiopia was found to be 240 per 100,000 [8]. The incidence of all forms of TB was 247 per 100,000 in 2012 but had fallen to 164 per 100,000 populations, according to a 2018 WHO report [9]. During the year 2010/11, 159,017 TB cases were notified to the

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national program in Ethiopia; among these, 151,866 (95.5%) were new cases [10]. The current National TB and Leprosy Strategic Plan envisions an end to the TB epidemic in Ethiopia and aims to reduce the TB prevalence rate by 35%, the TB incidence rate by 30%, and the TB mortality rate by 45% between 2013 and 2020. The Strategic Plan targets have placed a strong emphasis on improving quality of care [12]. However, comprehensive evidence on the structural domain of quality TB service among health facilities is lacking in the Sidama region. Therefore, this study aimed to assess the quality of the structural domain of TB service at health facilities in the Sidama region of southern Ethiopia.

Methods and Materials

Study Area

This study was conducted in the Sidama National Regional State of southern Ethiopia. The Sidama National Regional State is located in the southern part of Ethiopia, bordering: in the north, the south, and the east with Oromia; and in the west with the Southern Nations and Nationalities Peoples Region (SNNPR). Sidama region has three agro-ecological zones comprising 29.3% lowland ("kola"), 55% midland ("woina-dega"), and 15.7% highland ("Dega"). In Sidama, the highest area is the tip of Garamba Mountain, which is 3300 m above sea level, and the lowest is located in Loka Abaya woreda, near Abaya Lake, which is 1200 m above sea level [13].

The region has an estimated population size of 4,569,336 (a projected estimate based on CSA 2012). The inhabitants are fairly distributed in all parts of Sidama except the western part of the region, where the inhabitants are sparsely distributed compared to the other parts. The average population density is 612 persons per km2. About 79% of the inhabitants are rural, and 21% are urban residents. The female population is 50.1% and the male is 49.9%, of which the working age groups (15–49 years) make up 23.3% [14].

Sidama National Regional State has a total of 31 districts and 636 *kebeles.* It has a total of 709 health facilities, which are comprised of 1 comprehensive specialized hospital, 4 general hospitals, 17 primary hospitals, 134 health center, and 553 health posts [4]. According to the 10-year prospective plan document of Sidama National Regional State (September 2021), the economic growth of the region was 9.9% in the 2009 Ethiopian fiscal year (EFY), 10.0% in the 2010 EFY, 9.0% in the 2011 EFY, and 8.3% in the 2012 EFY, and the past five-year average was 9.3%. And according to the national poverty headcount index in 2016, 20.7% of the Sidama population lives below the national poverty line. From this figure, 21.9% is rural and 14.4% is urban [6].

Study Design and Period

An institutional-based cross-sectional study was conducted between June-July, 2022.

Study Population

The study was carried out at tuberculosis (TB) case notification, diagnostic, and treatment health facilities located in Sidama regional state. All health facilities that provide TB care were included in this study. Based on the national protocol for tuberculosis service quality assessment guidelines, the structural indicators of TB quality service were studied. This was the facility auditing tool, and the data collection tools were prepared in English and then translated into Sidaamu affo and customized to the local terms and context as needed.

Sampling Techniques

The Sidama region has a total of 31 districts and seven town administrations. As the population distribution and climatic conditions are heterogeneous, the first 31 districts were clustered into 7 clusters, considering the minimum 20% sample from the total population. From each cluster, one district was selected by simple random sampling. Again, considering the minimum 20% sample from the total 167 health facilities that provide TB services in the region, 34 health facilities were

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considered. The 34 health facilities were selected from the 7 districts based on proportional allocation by simple random sampling techniques.

Study Variable

Structure refers to the foundational elements and the environmental factors that facilitate (or hinder) health facilities and service providers from providing high-quality TB services and care. This includes the physical infrastructure of the health facility; the availability and organization of specific TB services, as determined by the type and level of the health facility; the availability of and adherence to national TB standards and guidelines; appropriate human resources to provide services offered; staff training and competencies; the availability of drugs, medical equipment, and other supplies; adequate management and supervision structures and systems; and resources and funding for social support, such as payment schemes and incentives and transportation reimbursement, to facilitate the delivery and receipt of TB services. (QTSA: Global Implementation Guide, p. 15).

To conduct assessments on service qualities of TB in health facilities by using facility audit, tool was endorsed from Ethiopia QTSA which was adapted from WHO. This tool was developed by MEASURE: Evaluation (funded by the United States Agency for International Development (USAID). all countries of the world including Ethiopia used these tools to assess status of Quality of Tuberculosis Services [15].

Facility audit measures include the physical infrastructure of the health facility; the availability and organization of specific TB services; the availability of and adherence to national TB standards and guidelines; appropriate human resources to provide services offered; staff training and competencies; the availability of drugs, medical equipment, and other supplies; and adequate management and supervision structures and systems. The structural quality of TB services was measured according to the Donabedian quality measurement model [16].

The structural dimension was measured depending on the level of implementation of the Ethiopian NTLP guidelines, which were adopted from WHO-recommended structural inputs by health facilities [17]. The 54 major indicators were used to assess structural dimensions. These indicators were grouped under the following major TB service categories: TB screening and diagnosis services, TB treatments, infection control, laboratory networks, medical equipment's and supplies, TB drug supplies, linkage with other services and the community, management of TB-HIV patients, implementation of TPT, management of MD-TB patients, trained TB care providers, patient counseling about TB, adherence, TB policies and guidelines, privacy, waiting time, and supportive supervision [16].

Facility audit indicators that measure the structural domain of quality services for TB were summarized using the principles of the TB Quality of Care Framework. The percentage of each service indicator in the health facilities score was calculated, and structural quality was classified as: very good (90–100), good (80–89), marginal (70–79), poor (60–69), and very poor (50–59) [18].

Data Collection Techniques

Twenty data collectors were recruited for the actual data collection. All the data collectors were health professionals who have a bachelor's degree. The data collectors were selected based on their experience in data collection from similar previous studies. Two days of training were given by experts on how to use the Kobo data collection smart mobile phone application. Both the English and Sidamu afoo-translated questionnaires were fed into the Kobo collect server and the assigned data collector gathered the required information from each study facility.

Facility Audit

The facility audit was performed by using the structured questionaries' for the availability and functionality of TB services in each study health facility. On top of this, the data collectors performed on-site examinations using an observation check list.

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Quality Control (Assurance)

To assure the quality of the data, properly designed data collection instruments were developed in English after thoroughly revising related literature, and they were contextualized to suit the research objective, local situations, and language. The English version of the questionnaire was translated into the local language (Sidamu afoo) and translated back to English to check consistency by medical professionals. Before the actual data collection, the questionnaire was pre-tested on two public and one private clinic in rural areas of Boricha district, and necessary modifications were made specifically to the understanding ability of specific items. Every day, the completeness and consistency of the collected data were reviewed and checked by supervisors and the principal investigator. Discussions were made with the interviewers at the end of the day and in the morning, and corrective actions were taken timely to minimize errors committed during the interview. The principal investigator and supervisors select a few health posts and individuals who work in public and private health care centers to check the validity of the data. All study tools were pre-tested, training provided for the data collectors and supervisors, daily field supervision, and data completeness were conducted to assure data quality assurance.

Data Analysis Techniques

The data analysis was linked to the structural domains of quality of care described in the four pillars of TB quality service. The data were exported to SPSS version 25 for data preparation and analysis. Missing data (less than 5%) was ignored since it was small compared to the total data set count. Univariate analysis established proportions, frequencies, and percentages regarding the performance of the health units on the different parameters of TB service delivery. For confidentiality reasons, the health facility names were replaced with letters when reporting tests were done. For each problem, the number of times it was mentioned by the different health care workers was tallied and the total recorded. A descriptive statistic was used to obtain the descriptive measures of important and outcome variables.

Results

Major Structural Domain and Indicators of Quality TB Services in Health Facilities

Availability of TB Services

In this study, the structural (input) dimension was assessed using standardized facility audit tools. 39 (97.5%) of health facilities were providing screening services for TB, and 92.5 percent of health facilities also provided TB diagnosis services (either clinical or laboratory). This study also revealed that only 37.5 percent of health facilities had first-line drug susceptibility testing; however, there was no availability of second-line drug susceptibility testing. When it comes to TB treatment and care, out of a total of 40 health facilities audited, 33 (82.5) facilities provided care and treatments for TB in the last 12 months; moreover, only 29 (72.5%) reported that they had dispensed drugs for TB (Table 1).

Table 1. Overall structural indictors on quality TB services in the Sidama region, Southern Ethiopia, 2022.

Variables	Frequencies	Percentage
Facility providing Screening services for TB	39	97.5
Facility provide TB diagnosis services (either clinical or laboratory)	37	92.5

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Availability of first-line drug susceptibility testing	15	37.5
Availability of second-line drug susceptibility testing	0	0
Facilities providing care and treatments for TB	29	72.5
Facilities providing care and treatments for TB in the last 12months	33	82.5
Facilities providing care and treatments for TB-HIV co-infection	13	32.5
Facilities providing care and treatments for drug – resistant TB	8	20
Facilities providing pediatric TB care and treatments	27	67.5
facilities implementing standards for infection prevention and control	36	90
facilities following guidelines for specimen transportation	29	72.5
Facilities received specimen results for smear microscopy from the onsite laboratory within 1 working day	18	45
specimens returned to facility within specified period	31	77.5
Facilities had Ziehl-Neelsen test for AFB	27	67.5
GeneXpert module at least one functional	5	12.5
Facilities practicing laboratories quality control (Both internal and external QC/QA)	24	60
facilities with basic items and equipment required for the diagnosis of TB	16	40

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facilities with all (approved) drugs and medicines available on the day of the assessment	26	65
facilities with a buffer stock	28	70
facilities reporting a stock out of any TB drug in the past 6moths	15	37.5
patients reporting that drugs were always available	28	70
facilities storing drugs and medicines	34	85
facilities linked to community-based TB services	21	52.5
facilities providing contact investigation and management w/c includes	27	67.5
for all TB contacts		
under 5 years child		
adult contacts (who are symptomatic or HIV-positive adults)		
5-14 years old child contacts		
Facilities provides Cotrimoxazole preventive therapy for HIV-positive TB patients	12	30
Facilities provides TPT for HIV positive adults	16	40
Facilities provides TPT for children under 5 years	29	72.5
Facilities provides TPT for children 5-15 years	33	82.5
Facilities provides TPT available through differentiated services delivery model in the community	25	62.5
Facilities trained on screening algorithm,	19	47.5

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Facilities trained on Screening or diagnosis of TB based on X-rays	6	15
Facilities trained on Diagnosis of TB based on clinical symptoms or examination (for adults)	25	62.5
Facilities trained on Diagnosis of TB based on sputum tests using smear microscopy	13	32.5
Facilities trained on Diagnosis of TB using GeneXpert	9	22.5
Facilities trained on Diagnosis of TB based on sputum tests using culture.	9	22.5
Facilities trained on dispensing of drugs for TB treatments	24	60
Facilities trained on managements of DS-TB treatments	23	57.5
Facilities trained on identifications of presumptive DR-TB	18	47.5
Facilities trained on managements of DR-TB	16	42.5
Facilities trained on managements of TB/HIV co-infections	16	42.5
Facilities trained on TB infection control	24	60
Facilities trained on TB kit reconstitution	21	52.5
facilities with up-to-date Flowcharts or algorithms on TB screening	22	55
facilities with up-to-date National Guideline for TB, TB/HIV, DR TB, and Leprosy in Ethiopia (6th edition)	18	45
facilities with up-to-date A training manual for DOT providers or volunteers	10	25

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facilities with up-to-date TB posters on walls, leaflets, brochures, and/or pamphlets in local languages for distribution, i.e., educational materials about TB	16	40
facility uses an onsite X-ray Guidelines on the use of chest X-ray for TB screening and diagnosis	3	7.5
facility does Smear microscopy manual or guidelines	24	60
facility has Algorithms for GeneXpert	4	10
Essential drug or medicines list	25	62.5
facilities offering a private space for counseling and diagnosis	25	62.5
Health facilities a supervised within the last 3 months from Woreda Health office on TB-related activities	16	40
Health facilities a supervised within the last 6 months from Regional Health office on TB-related activities	9	22.5
Health facilities a supervised within the last 6 months from Federal Health office on a TB-related activities	8	20
Average Total	20.1	50.25

Infrastructures of Health Facilities

Health care settings present a high risk for the transmission of TB. It is therefore critical to follow infection prevention and control (IPC) procedures to limit the transmission of the airborne disease and infection. As part of the assessment, 36 (90%) study facilities had implemented standards for infection prevention and control.

The turnaround time for receiving specimen results varied depending on the type of test done and whether the laboratory was located onsite at the facility or offsite at a different facility. This study revealed that more than 90 percent of the health facilities had an onsite laboratory capacity for conducting smear microscopy. Of these facilities, 45 percent reported receiving test results in one day

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or less. More than 72.5 percent of facilities had followed guidelines for specimen transportation. This study also revealed that 67.5 percent of facilities had a Ziehl-Neelsen test for AFB, and 12.5 percent of health facilities reported that at least one valid Xpert MTB/RIF cartridge was available. From a total of 40 health facilities, 60 percent practiced laboratory quality control (both internal and external QA/QC). In addition to this, the 40 present facilities had the basic items and equipment required for the diagnosis of TB.

In this facility audit assessment of TB drug supply, 65 present facilities had all (approved) drugs and medicines available on the day of the assessment, and 70 percent of the facilities had a buffer stock. 70 percent of HF patients reported that drugs were always available; however, 37.5 percent of HFs reported a stockout of any TB drug in the past six months.

Storage conditions for commodities and supplies at all study facilities were evaluated against NTLP guidelines. More than 80 percent of the facilities had storage facilities where the commodities and supplies were stored away from direct sunlight, were properly lit, and were arranged to facilitate the separation of usable supplies from expired and damaged ones.

Regarding facilities linked to community-based TB services 52.5 percent of HFs who had worked with community/HEWs reported that the HEWs provided services for patient tracing, community TB education, screening for TB symptoms, referrals to facilities, collections and delivery of specimens to HF, community-based DOT programs, adherence counseling, and contact tracing. In addition to these, HEWs provided sliding-fixed referrals, psychosocial support, and HIV testing and counseling.

67 present health facilities have provided contact investigation and management, which includes all TB contacts, under-5 year old children, adult contacts (who are symptomatic or HIV-positive adults), and 5–14 year old child contacts). Moreover, health facilities had provided cotrimoxazole preventive therapy for HIV-positive TB patients, TPT for HIV-positive adults, TPT for children under 5 years, TPT for children 5–15 years, and TPT available through a differentiated service delivery model in the community. This study also found that health facilities had trained manpower with d/t topics that were new or refresher training that was audited during data collection. TB guidelines, policies, and supervision of TB-related activities were audited. Apparently, the average quality score was calculated for each health facility at the first step, and then the overall quality of this component was calculated by taking the average of all health facilities. Therefore, the average quality of structural components was 50.25% (Table 1).

Discussion

This study assessed the quality of TB care in the Sidama region and helped program implementers and coordinators, service providers, and all those concerned improve the quality of care delivered to TB patients so as to reduce the burden of the disease in the region and country at large. The study also serves as a base line for other studies and is used as a benchmark for continuous quality improvement processes in the regions in particular and in the country in general. The study identified major constraints in delivering quality TB care in the study area. Multiple quality problems were identified in all structural components of tuberculosis services.

A facility audit assessed the quality of TB services based on the national guidelines for TB services in public health facilities. Structural factors in health facilities were used to assess the quality of TB services. The key TB control structural indicators were evaluated for their systemic and direct effects on the quality of TB care. The study revealed that the required structural factors were not optimally implemented during the study period, as mentioned in Table 1. The poor implementation of these structural factors affects the accessibility and effectiveness of the quality of TB services and adherence to treatment. The study shows that the poor quality of TB service delivery and suboptimal implementation in public health facilities were key determinants of poor outcomes for TB treatment. The provision of TB care by poorly trained and inadequately supervised TB focal persons was related to high treatment interruptions. Patients were more likely to miss their daily treatment when their follow-up was made in structurally poor health facilities and they had limited access to daily TB care consultations. Moreover, health facilities face high patient defaults and poor capacity to treat minor illnesses.

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In this cross-sectional study conducted to assess the quality of TB health services in health facilities, we found that TB quality services are the cornerstone of any National Tuberculosis Program (NTP) [17]. Assessing the quality of TB treatment services is important because it tells us how the health system is performing and leads to improved care. In this study, efforts have been made to identify constraints in all structural components of TB care using Donabedian's quality assessment model in healthcare facilities in Sidama regional states. In this study, the overall quality score of structural components was 50.25%, which indicates that the majority of the studied facilities were structurally poor. The structural quality score found in our study is lower than a study conducted in the Jimma Zone with an overall structural quality score of 56% [19]. Moreover, it is lower than a study conducted in Sidama Zone previously, which reported an overall structural quality score of 85% [20].

This might be due to a discrepancy in the program managers' attention for the program evaluation, poor leadership quality and withdrawal of support for NGO, constraints on resource allocation and infrastructure variations, and the COVID-19 pandemic.

Regarding the availability of TB services, the main deficiencies observed were screening services, diagnosis services (either clinical or laboratory), availability of first-line drug susceptibility testing, availability of second-line drug susceptibility testing, providing care and treatments, providing care and treatments for TB-HIV co-infection, providing care and treatments for drug-resistant TB, and providing pediatric TB care and treatments, in which the score ranged from 0% to 97.5% among the health facilities. This was not in line with the national guideline for TB screening, diagnosis, and treatment [17].

The drug and diagnostic components of the structural quality of TB care were a shortage of laboratory reagents, slides for sputum smear microscopy, flip charts, and TB posters in the local language, in which the score ranged from 10% to 67.5% among the health facilities. A study conducted in Ethiopia showed a higher score in this respect (75% and 81%) due to the availability of a copy of the NTP guidelines, essential TB drugs, and diagnostic tests in the facility [18].

The current study found weak supervision patterns. Only 16 (40%) and 9 (22.5%) health facilities were supervised in the last 6 months, from the woreda and regional health bureaus, respectively, and the supervision pattern was also unplanned and lacked the clean, time-bound written form of feedback. Our facility audit findings are lower than the findings of a study conducted previously in Sidama Zone, South Ethiopia [20]. Planned supervision patterns from upper-level program leaders will help to identify and fill the health facility gaps needed to deliver quality TB services.

From the drug and diagnostic supplies of structural quality of TB care, only 26 (65%) facilities had all approved drugs and medicines available on the day of the assessment. This indicated that all health facilities had no sufficient first-line anti-TB drugs and other supplies for one month. This is not consistent with the national minimum recommendation that every facility should have at least a one-month stock level for existing patients [17].

The health education program and other community-related TB services that were conducted by HEWS and community volunteers for TB control activities were found to be poor in all health facilities. It was found that only 52.5% of health facilities had community linkage, and 16 (40) facilities had up-to-date TB posters on walls, leaflets, brochures, and/or pamphlets in local languages for distribution, i.e., educational materials about TB that were not recommended by NTLP. This is also comparable to a study conducted in the Sidama zone previously in Addis Ababa, Ethiopia [20,21]. This might be due to the poor attention given by health care providers. Even if health facilities had the responsibility to make linkages and support community level TB services, small health facilities had community linkages and program coordinators for health education activities, even if they played a great role in the prevention of TB transmission.

Only 67 percent of health facilities reviewed the progress of each TB patient registered for TB treatments at least once a month during treatment; this showed poor adherence. This is also not in line with the study conducted in Jimma and Addis Ababa [19,21]. This might be due to a lack of adequate access to training regarding the management of TB, weak follow-up from health facility managers, and weak system integration.

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This study also revealed that all health facilities sampled had no essential requirements for TB diagnosis and treatment. This could be attributed to a lack of consistent monthly and quarterly supervision by the district team, regions, and a few times by the ministry of health officials as recommended by the ministry of health and the presence of development and implementing partners who worked on TB-related activities. This study was not in line with a study carried out on the quality of tuberculosis care in Ethiopia, which revealed that the delivery of materials, drugs, and supplies for tuberculosis control activities was fairly good [22].

This study also found that health facilities had trained manpower with d/t topics that are new or refresher training was audited during data collection, which ranges from 15% to 60% of health facilities. This is lower than the study conducted in Gana at rural districts in which all health center service providers were trained on all necessary training on TB [23].

Only 24 (60%) of the health facilities had a waiting area for patients, 25 (62.5%) health facilities had a private area for counseling, and no health facility had a separate area for sputum specimen collection. This is lower than the study conducted in South Africa, which reported a far better score in this category in public health facilities (67% and 82%), and higher than the study conducted in the Jimma Zone, which had a score 50% [19,24]. Moreover, only 24 (60%) of health facilities had internal and external quality assurances for smear microscopy. This leads to low quality control for sputum smears, and this is a major quality problem given the burden of the disease in the community as a whole since smear-positive patients are the source of Mycobacterium tuberculosis infection [17]. This may occur due to a lack of trained manpower, less control over laboratory activities from upper-level health authorities, and resource scarcity. However, each parameter used to measure structural dimensions may not have an equal contribution to the quality of care.

Conclusions

The basic structural and essential requirements for TB diagnosis and treatment were poor in the Sidama region of southern Ethiopia. Comprehensive strengthening of the health system, focusing on the structural quality of health facilities, is crucial. The regional TB department should maintain all structural indicators mentioned under the categories of availability of TB services, infrastructure, capacity building for all service providers, and management of TB services for all accessible health facilities in Sidama regions, according to the NTLP guidebook and WHO.

The regional and woreda health authority offices should expand the TB M&E system to monitor all TB activities by including routine performance indicators for TB screening and diagnosis practices, including all supplies, through regular supportive supervision. All health facilities should fulfill all necessary supplies, like first- and second-line drugs, laboratory equipment, and diagnostic supplies. All health facilities should start first- and second-line drug-sensitivity testing. All health facilities should control infection protocols. Regional health authorities should integrate with NGO to fill resource and capacity problems.

Declarations

Funding

The president's office of the Sidama region provided support for this work. the conception, design, analysis of data, manuscript preparation, and publication were all done independently of the funding agencies.

Ethics Approval and Consent to Participate

Ethical clearance and approval were obtained from the institutional review board (IRB) of Hawassa University, college of medicine and health science, and a letter of permission was sent to the district health officer. Informed consent was sought from the respondents to fully participate in the study. The privacy of the respondents was maintained, and the confidentiality of the information was respected (personal identification and ideas were not used in a way that might threaten the respondent). The research team acknowledges the respondent for their valuable time.

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Authors' Contributions

AA: conceptualized, ensured data curation, did the formal analysis, and wrote the manuscript. aa: wrote the manuscript. **TMS:** wrote the manuscript. **MTT:** wrote the manuscript. ttd: wrote the manuscript. BAB: wrote the manuscript. **DDG:** wrote the manuscript. **AY:** conceptualized, ensured data curation, did the formal analysis, and wrote the manuscript. All authors read and approved the final manuscript.

Competing Interests

The authors declare that they have no competing interests.

Consent for Publication

Not applicable.

Availability of Data and Materials

The datasets supporting the conclusions of this article are included within the article.

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