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# Strengthening the Governance of Tuberculosis Control Programs at the Primary Healthcare Level: A Case Study of Pancana Community Health Center, Barru Regency

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## ABSTRACT

Tuberculosis (TB) control requires more than clinical interventions; it also depends on governance, institutional capacity, coordinated services, and community engagement. This study examines strategies for strengthening the governance of TB control programs at Pancana Community Health Center, Barru Regency, Indonesia. A qualitative approach was employed, involving four informants representing health policy, health center management, medical services, and laboratory services. Data were collected through in-depth interviews, field observations, and documentary review, including program reports, healthcare records, laboratory documentation, institutional documents, and relevant regulations. Data management and thematic analysis were supported by NVivo 12 Pro, using open, axial, and selective coding to identify concepts and relationships. The findings identify six interconnected dimensions of TB control governance: institutional capacity, policy implementation, healthcare service delivery, intersectoral coordination, community participation, and monitoring and evaluation. The analysis highlights the importance of translating policy direction into operational practices at the primary healthcare level. It also underscores the roles of screening, diagnosis, laboratory support, treatment continuity, patient education, and monitoring. Coordination among the health office, health center, village institutions, healthcare personnel, families, and community members is important for supporting case identification, health education, patient assistance, and treatment adherence. Community awareness and efforts to reduce stigma are also relevant to strengthening prevention and care. The study concludes that sustainable TB control governance requires an integrated approach connecting institutional readiness, consistent policy implementation, accessible and continuous healthcare services, collaborative action, and accountable monitoring. These dimensions provide a basis for improving coordination and strengthening TB control implementation at the local level.

**Keywords:** Tuberculosis Control; Health Governance; Primary Healthcare; Community Participation; Institutional Capacity.

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## A.INTRODUCTION

Tuberculosis (TB) remains one of the most significant public health challenges because of its substantial impact on population health, healthcare systems, and socioeconomic development. Caused by Mycobacterium tuberculosis, the disease primarily affects the lungs and spreads through the air when an infected person coughs, sneezes, or speaks. Beyond its clinical consequences, TB can create economic burdens for patients and their families through treatment expenses, loss of productivity, and social stigma. Effective TB control therefore requires more than medical treatment, as it also involves accessible healthcare services, early detection, continuous treatment support, and community engagement. Primary healthcare facilities have a strategic position in delivering these interventions because they provide direct and continuous services to communities. Their responsibilities include identifying suspected cases, facilitating diagnosis, providing treatment, monitoring patient adherence, and conducting health promotion activities. The World Health Organization (WHO, 2025b) emphasizes that integrated and people-centred TB care is essential to improving prevention, diagnosis, treatment, and patient support. Consequently, strengthening governance at the primary healthcare level is an important component of efforts to accelerate TB elimination.

At the global level, tuberculosis continues to represent a major challenge despite advances in diagnostic technologies, treatment regimens, and public health interventions. According to the Global Tuberculosis Report 2025, approximately 10.7 million people developed TB worldwide in 2024, while an estimated 1.23 million people died from the disease (WHO, 2025a). The burden remains concentrated in several high-incidence countries, including Indonesia, demonstrating the need for stronger national and local responses. The WHO End TB Strategy promotes integrated, patient-centred care and prevention, bold policies, supportive systems, and intensified research and innovation (WHO, 2026a). These strategic priorities require effective government leadership, institutional accountability, community participation, and collaboration across sectors. Furthermore, the primary healthcare approach emphasizes accessible services, disease prevention, community empowerment, and coordinated action addressing broader health determinants (WHO, 2026b). The implementation of these principles requires healthcare institutions to develop responsive service systems that address patients' medical and social needs. Therefore, effective TB

control depends not only on clinical interventions but also on the quality of institutional governance and coordination within local healthcare systems.

In Indonesia, tuberculosis remains a critical public health priority because the country continues to contribute substantially to the global TB burden. The WHO estimated Indonesia's TB incidence at approximately 388 cases per 100,000 population in 2023, indicating the continuing magnitude of the national challenge (WHO, 2025c). In response, the Indonesian government established Presidential Regulation No. 67 of 2021 concerning Tuberculosis Control as a national policy framework for accelerating TB elimination. The regulation outlines national targets and strategies, central and regional government responsibilities, intersectoral coordination, community participation, monitoring, evaluation, reporting, and financing (Republic of Indonesia, 2021). Its implementation requires coordinated action among government institutions, healthcare facilities, village administrations, communities, and other stakeholders. At the operational level, community health centers, known in Indonesia as Pusat Kesehatan Masyarakat (Puskesmas), serve as frontline institutions responsible for delivering essential TB prevention and control services. Pancana Community Health Center in Barru Regency is therefore a relevant setting for examining how national TB control policies are translated into primary healthcare practices. Investigating this setting provides an opportunity to understand the institutional arrangements, service delivery mechanisms, and local governance conditions that shape TB control implementation.

Despite the existence of national policies and technical guidelines, translating TB control commitments into effective primary healthcare services may involve various institutional and operational challenges. These challenges can include limited human resources, inadequate diagnostic facilities, difficulties in identifying undiagnosed cases, weaknesses in patient monitoring, and limited coordination between healthcare providers and external stakeholders. Pradipta et al. (2022) identified organizational capacity, healthcare facilities, external coordination, case detection, diagnosis, treatment monitoring, and reporting as important factors influencing TB services at community health centers in Indonesia. In addition, the effectiveness of TB control depends on patients' access to responsive services and their ability to complete the prescribed treatment. A recent Indonesian study by Nafiu et al. (2026) also highlighted community responsiveness, internalized stigma, referral delays, and financing constraints as challenges affecting active TB case finding at the primary healthcare level. These findings suggest that TB

control cannot be evaluated solely through the availability of medical services or the number of reported cases. Instead, it requires an examination of institutional capacity, policy implementation, service coordination, accountability, and community engagement. In the context of Pancana Community Health Center, these dimensions need to be investigated empirically to determine the actual challenges affecting the implementation and sustainability of the TB control program.

Previous studies have examined various dimensions of tuberculosis control, particularly service delivery, organizational capacity, case detection, and treatment adherence. Pradipta et al. (2022) explored barriers to optimal TB treatment services at Indonesian community health centers and found that inadequate human resources, facilities, external coordination, and program management could constrain service effectiveness. Tuharea et al. (2014) examined factors associated with pulmonary TB case detection in community health centers in Semarang and identified communication, resources, staff disposition, and standard operating procedures as significant implementation factors. More recently, Nafiu et al. (2026) investigated active TB case finding at a primary healthcare center in Yogyakarta and emphasized the importance of institutional readiness, community engagement, health education, and referral systems. Research by the WHO (2025b) further highlights the importance of patient-centred treatment and care, including adherence support and integrated service delivery. In addition, the WHO operational handbook on TB treatment and care emphasizes practical approaches to treatment administration, patient support, health education, and counselling (WHO, 2025c). These studies provide important insights into the operational and service-related dimensions of TB control. However, their findings also indicate the need to examine how institutional governance, policy implementation, and stakeholder coordination interact within specific local healthcare settings.

Although previous research has contributed to understanding TB service delivery and program implementation, several aspects of governance at the primary healthcare level require further investigation. Studies by Pradipta et al. (2022) and Tuharea et al. (2014) primarily emphasize organizational barriers and factors influencing TB case detection and treatment services. Meanwhile, Nafiu et al. (2026) focuses on active case finding and the operational challenges of implementing outreach strategies in a primary healthcare setting. These studies provide valuable evidence but do not specifically examine the relationship between national policy implementation, institutional governance, local accountability, and stakeholder coordination in the

context of Pancana Community Health Center. Furthermore, the implementation of Presidential Regulation No. 67 of 2021 requires attention to the responsibilities of local healthcare institutions and the coordination of government and community stakeholders. The extent to which these policy principles are translated into institutional practices at the local level remains an important question for public administration research. Therefore, a context-specific investigation is needed to understand the governance mechanisms, institutional capacities, and implementation challenges influencing TB control at Pancana Community Health Center. This study seeks to address that gap by examining TB control through an integrated public governance perspective.

The novelty of this study lies in its emphasis on strengthening the governance of TB control programs rather than examining the disease exclusively from a clinical or epidemiological perspective. It positions the community health center as a local public institution responsible for translating national policy objectives into accessible, accountable, and sustainable healthcare services. The study integrates several governance dimensions, including institutional capacity, policy implementation, service delivery, intersectoral coordination, community participation, and monitoring and evaluation. These dimensions provide an analytical framework for understanding how institutional arrangements influence the implementation of TB control programs. In particular, the study connects the policy mandates established under Presidential Regulation No. 67 of 2021 with the operational responsibilities of primary healthcare institutions. It also considers the importance of collaboration between healthcare workers, local government, community health cadres, patients, families, and other relevant stakeholders. Through this approach, the research is expected to develop a context-specific understanding of governance strengthening in TB control at the primary healthcare level. Its contribution is therefore both conceptual, through the development of a public governance perspective, and practical, through recommendations for improving local TB program management.

Based on the background and research gap described above, this study aims to analyze strategies for strengthening the governance of tuberculosis control programs at Pancana Community Health Center, Barru Regency. Specifically, it examines how national TB control policies are translated into institutional practices and healthcare service delivery at the primary healthcare level. It also investigates the institutional capacity and responsibilities of healthcare personnel in implementing TB prevention, case detection, diagnosis, treatment, and patient

monitoring. Furthermore, the study analyzes coordination mechanisms among the community health center, local government institutions, community health cadres, and other relevant stakeholders. Another objective is to identify supporting and inhibiting factors affecting the implementation of the TB control program. The study also explores opportunities to strengthen community participation, institutional accountability, and the sustainability of healthcare interventions. The findings are expected to contribute to public administration scholarship, particularly in the areas of health governance, public policy implementation, and institutional capacity. Practically, the research is expected to provide recommendations for improving TB control governance and supporting the national goal of tuberculosis elimination in Indonesia.

## B. RESEARCH METHOD

This study employed a qualitative descriptive approach to examine strategies for strengthening the governance of tuberculosis control programs at the primary healthcare level, with a particular focus on Pancana Community Health Center, Barru Regency, South Sulawesi, Indonesia. A qualitative approach was selected to obtain an in-depth understanding of policy implementation, institutional capacity, healthcare service delivery, intersectoral coordination, and community participation in tuberculosis prevention and control. The research focused on the implementation of Presidential Regulation No. 67 of 2021 concerning Tuberculosis Control as the main policy framework. Research informants were selected purposively based on their knowledge, responsibilities, and direct involvement in the implementation of the tuberculosis control program. They included the head of the community health center, the tuberculosis program coordinator, healthcare personnel, laboratory staff, community health cadres, and other relevant stakeholders. Primary data were collected through in-depth interviews, while secondary data were obtained from institutional documents, tuberculosis program reports, government regulations, and relevant scientific publications.

Data collection was conducted through semi-structured interviews, direct observations, and documentation. Interviews focused on several dimensions of tuberculosis control governance, including institutional capacity, policy implementation, availability of healthcare resources, early case detection, diagnostic services, treatment administration, patient monitoring, stakeholder coordination, and community participation. Observations were conducted to examine healthcare

service processes, patient registration procedures, tuberculosis screening activities, and the implementation of prevention and control programs at Pancana Community Health Center. Documentation was used to complement interview and observation findings through the examination of institutional records, program implementation reports, relevant administrative documents, and applicable policy guidelines. The collected data were analyzed using an interactive qualitative analysis model consisting of data condensation, data display, and conclusion drawing and verification (Miles et al., 2014). This process involved organizing the information, identifying relevant patterns, grouping findings into thematic categories, and interpreting relationships among the identified governance dimensions.

To ensure the credibility of the research findings, data triangulation was applied by comparing information obtained from different informants, data collection techniques, and documentary sources. The analysis focused on six main dimensions: institutional capacity, implementation of tuberculosis control policies, quality of healthcare service delivery, intersectoral coordination, community participation, and monitoring and evaluation. These dimensions were used to identify institutional strengths, implementation challenges, and opportunities for strengthening tuberculosis control governance at Pancana Community Health Center. The findings were subsequently interpreted in relation to the objectives of Presidential Regulation No. 67 of 2021 and the broader national strategy for tuberculosis elimination. Through this process, the study aimed to formulate practical and context-specific recommendations for improving institutional effectiveness, strengthening stakeholder collaboration, enhancing healthcare service accessibility, and ensuring the sustainability of tuberculosis control programs at the primary healthcare level.

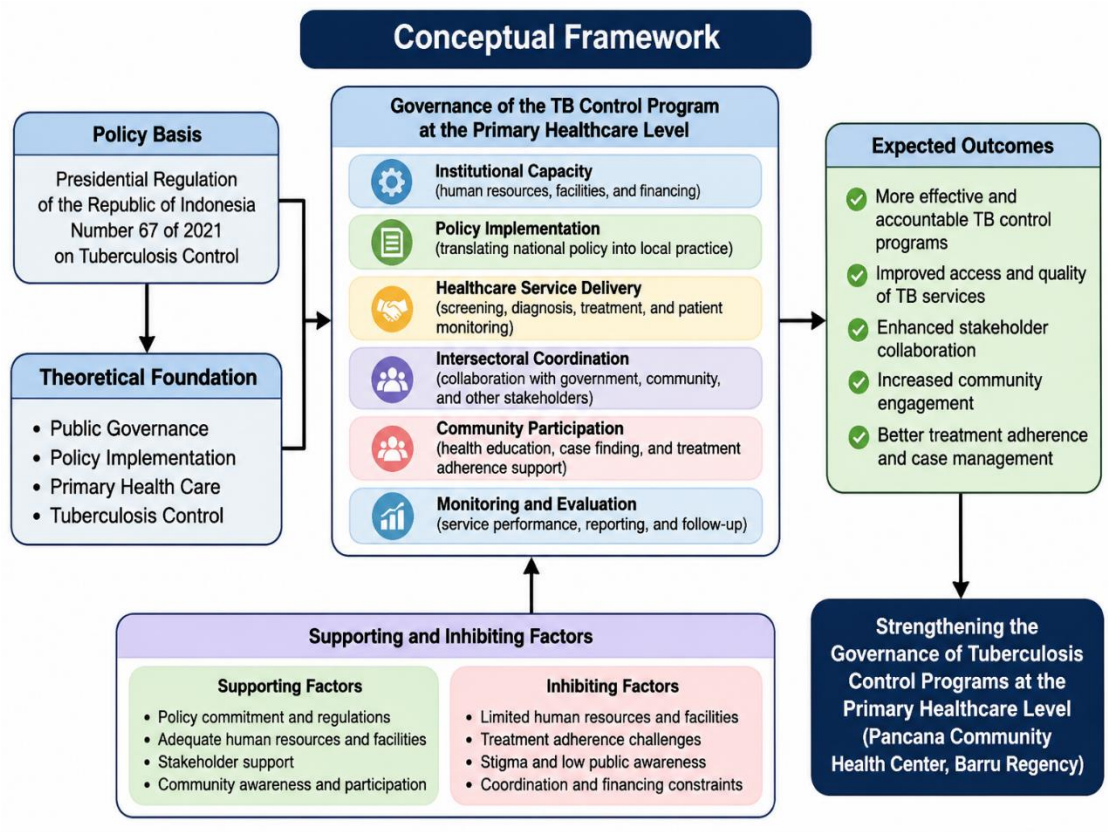



**Figure 1** Conceptual Framework for Strengthening the Governance of Tuberculosis Control Programs at Pancana Community Health Center, Barru Regency

The conceptual framework illustrates the research approach to strengthening the governance of tuberculosis (TB) control programs at Pancana Community Health Center, Barru Regency, based on Presidential Regulation No. 67 of 2021 concerning Tuberculosis Control and supported by the perspectives of Public Governance, Policy Implementation, and Primary Health Care. Governance strengthening is examined through six key dimensions: institutional capacity, policy implementation, healthcare service delivery, intersectoral coordination, community participation, and monitoring and evaluation. These dimensions are influenced by various supporting and inhibiting factors, including policy commitment, the availability of human resources and healthcare facilities, stakeholder support, public awareness, stigma, and treatment adherence. By examining these dimensions and influencing factors, the study aims to provide a comprehensive understanding and develop strategic recommendations to strengthen TB control program governance, making it more effective, accountable, coordinated, and sustainable.

## C.RESEARCH RESULTS AND DISCUSSION

- Results

The findings of this study focus on strengthening the governance of tuberculosis (TB) control programs at Pancana Community Health Center, Barru Regency. The research examines how TB control policies are translated into healthcare practices at the primary healthcare level. Four informants were involved, representing different institutional and professional responsibilities. They consisted of Misbahuddin, Head of the Disease Prevention and Control Division at the Barru Regency Health Office; Halal, Head of Management at Pancana Community Health Center; Asmawati Syam, a medical professional; and Rismayanti, a laboratory officer. Their perspectives provide an institutional, managerial, medical, and diagnostic understanding of TB control activities. The analysis emphasizes policy implementation, institutional capacity, healthcare service delivery, intersectoral coordination, community participation, and monitoring and evaluation. These dimensions provide the foundation for assessing the governance of TB control programs.

The policy dimension highlights the role of the Barru Regency Health Office in directing and coordinating TB control activities across primary healthcare facilities. Misbahuddin, as Head of the Disease Prevention and Control Division, represents an important source of information regarding regional health policies and program coordination. This aspect of the research examines how national TB control policies are translated into regional programs and operational activities. Particular attention is given to policy dissemination, institutional guidance, supervision, and coordination with Pancana Community Health Center. The analysis also considers how program targets and implementation guidelines are communicated to healthcare providers. Effective institutional coordination is essential to ensure consistency between policy objectives and field-level implementation. Therefore, the relationship between the Health Office and the community health center constitutes an important component of TB program governance.

Institutional capacity represents another important dimension in strengthening TB control governance at Pancana Community Health Center. Halal, as Head of Management, provides a relevant managerial perspective for examining organizational readiness and resource management.

This dimension includes the availability of healthcare personnel, administrative arrangements, facilities, equipment, and financial support. It also considers the distribution of responsibilities among healthcare workers involved in TB control activities. Effective management requires clear organizational structures and coordination between different service units. Adequate institutional capacity can support the implementation of TB control policies and improve the continuity of healthcare services. Consequently, institutional readiness should be examined as a fundamental factor influencing the effectiveness of TB control programs.

Policy implementation concerns the extent to which established TB control regulations and guidelines are translated into operational practices. Information from Misbahuddin and Halal can be used to examine the relationship between regional policy direction and implementation at Pancana Community Health Center. The analysis focuses on policy dissemination, operational procedures, program responsibilities, and the mechanisms used to monitor implementation. It also considers whether healthcare personnel understand their respective roles in carrying out TB control activities. Consistency in implementing established procedures is important for maintaining service standards and achieving program objectives. Furthermore, reporting mechanisms and follow-up activities are relevant indicators of implementation performance. These aspects help explain how policy commitments are translated into practical healthcare interventions.

Healthcare service delivery is a central component of TB control because patients require appropriate identification, diagnosis, treatment, and continuous monitoring. Asmawati Syam, as a medical professional at Pancana Community Health Center, represents an important source of information regarding clinical service practices. This dimension examines the identification of individuals with suspected TB, initial medical assessments, health education, and referral procedures when necessary. It also considers communication between healthcare workers and patients throughout the treatment process. Accessible and responsive services are essential to encourage individuals to seek medical assistance at an early stage. Continuity of care is equally important in supporting patients throughout their treatment. Therefore, the quality of medical services is a key consideration in evaluating TB control governance.

Laboratory services play an essential role in supporting the identification and diagnosis of tuberculosis. Rismayanti, as a laboratory officer at Pancana Community Health Center, provides a

relevant professional perspective on diagnostic support within the TB control program. This dimension examines laboratory facilities, equipment availability, staff preparedness, specimen collection procedures, and the handling of examination results. Coordination between laboratory personnel and medical professionals is also important to ensure that diagnostic information is properly communicated. Timely and accurate laboratory services can support appropriate clinical decision-making and patient management. In addition, laboratory documentation and reporting contribute to the administrative monitoring of TB cases. Accordingly, laboratory capacity should be considered an integral element of effective TB control governance.

Intersectoral coordination is necessary because tuberculosis control requires cooperation beyond the internal structure of healthcare institutions. The involvement of local government, village administrations, community health cadres, families, and other relevant stakeholders can strengthen prevention and case-finding activities. Information from Misbahuddin and Halal can help explain the coordination mechanisms established between the Barru Regency Health Office and Pancana Community Health Center. The analysis also considers communication channels, stakeholder responsibilities, information sharing, and collaborative activities. Strong coordination can facilitate the identification of suspected cases and improve support for patients undergoing treatment. Furthermore, collaboration with community-level stakeholders can expand the reach of health education activities. This makes intersectoral coordination an important foundation for sustainable TB control governance.

Community participation is an important factor in improving the effectiveness of tuberculosis prevention and control efforts. Public awareness influences whether individuals recognize TB symptoms, seek medical examinations, and follow recommended treatment procedures. Family support also contributes to encouraging patients to complete their treatment and attend scheduled medical appointments. Community health cadres can assist healthcare personnel in disseminating information and identifying individuals who may require further examination. However, stigma, misinformation, and limited understanding of tuberculosis may create barriers to community engagement. Healthcare professionals therefore need to strengthen health education and promote a supportive environment for people affected by TB. The involvement of communities and families should consequently be considered an essential component of TB program governance.

Monitoring and evaluation are necessary to assess the implementation and performance of TB control programs at both regional and healthcare facility levels. At the regional level, Misbahuddin can provide information regarding program supervision, performance monitoring, and reporting mechanisms within the Barru Regency Health Office. At the facility level, Halal can explain management responsibilities related to administrative monitoring and program evaluation. Information from Asmawati Syam and Rismayanti can further support the examination of medical service records and laboratory reporting procedures. Important aspects include case recording, patient treatment monitoring, reporting accuracy, and follow-up activities. Effective monitoring enables healthcare institutions to identify implementation gaps and determine appropriate corrective measures. These processes also strengthen institutional accountability and support evidence-based decision-making.

Overall, strengthening TB control governance at Pancana Community Health Center requires an integrated approach involving institutional capacity, policy implementation, healthcare service delivery, intersectoral coordination, community participation, and monitoring and evaluation. The four informants provide complementary perspectives that can help explain the relationship between regional policy direction and operational practices at the primary healthcare level. Their professional roles allow the research to examine managerial arrangements, medical services, and laboratory support within the TB control system. The analysis should identify the factors that facilitate implementation as well as the challenges that may limit program effectiveness. Particular attention should be given to institutional readiness, service accessibility, coordination mechanisms, and patient treatment support. These findings can provide an analytical basis for developing recommendations to improve TB control governance. Ultimately, the study aims to promote a more effective, accountable, coordinated, and sustainable TB control program in Barru Regency.

- Data Analysis Using NVivo 12 Pro

Data analysis in this study was conducted using a qualitative approach supported by NVivo 12 Pro software. The utilization of NVivo was intended to assist the researcher in managing, organizing, coding, and systematically analyzing qualitative data related to strengthening the governance of tuberculosis (TB) control programs at the primary healthcare level, particularly at

Pancana Community Health Center, Barru Regency. The analyzed data were obtained from in-depth interviews with four key informants who have direct institutional and professional responsibilities in TB control activities. These informants consisted of Misbahuddin, Head of the Disease Prevention and Control Division (Pencegahan dan Pengendalian Penyakit or P2P) at the Barru Regency Health Office; Halal, Head of Management at Pancana Community Health Center; Asmawati Syam, a medical professional at Pancana Community Health Center; and Rismayanti, a laboratory officer at the same healthcare facility. These informants were selected to obtain different perspectives on regional health policy, institutional management, medical service delivery, and laboratory support in implementing TB control programs. To strengthen the credibility of the findings, interview data were complemented by field observations and documentary evidence, including TB control program reports, healthcare service records, laboratory documentation, institutional administrative documents, and relevant regulations concerning tuberculosis control. The application of NVivo enabled the researcher to systematically organize qualitative data, identify recurring patterns, and explore relationships among emerging concepts. Through this process, themes related to institutional capacity, TB policy implementation, healthcare service delivery, intersectoral coordination, community participation, and monitoring and evaluation were identified and analyzed comprehensively.

Through NVivo, the analysis was organized using three coding stages: open coding, axial coding, and selective coding. During the open coding stage, the researcher identified initial concepts emerging from interview transcripts, field observations, and supporting documents. Several preliminary codes were developed, including regional TB control policies, institutional commitment, availability of healthcare personnel, healthcare facilities and infrastructure, program management, distribution of responsibilities, TB screening activities, diagnostic procedures, laboratory services, patient treatment monitoring, healthcare accessibility, public health education, stakeholder coordination, community participation, treatment adherence, data recording, and program evaluation. These initial codes reflected the institutional, managerial, medical, and community dimensions of TB control governance at the primary healthcare level. The coding process also enabled the researcher to examine the different perspectives of the four informants regarding the implementation of TB control policies and the operational responsibilities of healthcare institutions. Misbahuddin's perspective was particularly relevant to understanding

regional policy direction and institutional coordination, while Halal's perspective provided insights into organizational management and program implementation at the community health center. Meanwhile, the information from Asmawati Syam and Rismayanti supported the analysis of medical service delivery and laboratory diagnostic activities. By organizing interview statements into relevant coding categories, the researcher could identify similarities, differences, and relationships among the informants' perspectives concerning the governance of TB control programs.

The second stage involved axial coding, in which related concepts were connected and grouped into broader thematic categories. The identified categories included institutional capacity and organizational readiness, implementation of tuberculosis control policies, quality of healthcare service delivery, laboratory capacity and diagnostic support, intersectoral coordination, community participation and public awareness, and monitoring and evaluation of TB control programs. This stage facilitated a deeper understanding of how institutional arrangements, healthcare resources, service procedures, and stakeholder collaboration influence the implementation of TB control activities at Pancana Community Health Center. Particular attention was given to the relationship between policy direction at the regional level and operational practices at the primary healthcare level. The analysis also examined supporting and inhibiting factors, including institutional commitment, human resource availability, healthcare infrastructure, coordination mechanisms, public awareness, treatment adherence, and potential challenges associated with stigma. Finally, selective coding was employed to identify the central theme integrating all major categories, namely strengthening TB control program governance through institutional capacity, effective policy implementation, integrated healthcare service delivery, intersectoral collaboration, community engagement, and accountable monitoring and evaluation. The analytical framework was designed to examine the relationship between institutional governance, service quality, and the effectiveness of TB control activities. The findings were interpreted by comparing information from the four institutional and professional informants and examining its consistency with observational and documentary evidence. Therefore, the use of NVivo not only facilitated the systematic organization and interpretation of qualitative data but also supported analytical transparency, methodological rigor, and the development of an evidence-

based understanding of strategies for strengthening tuberculosis control governance at Pancana Community Health Center, Barru Regency.

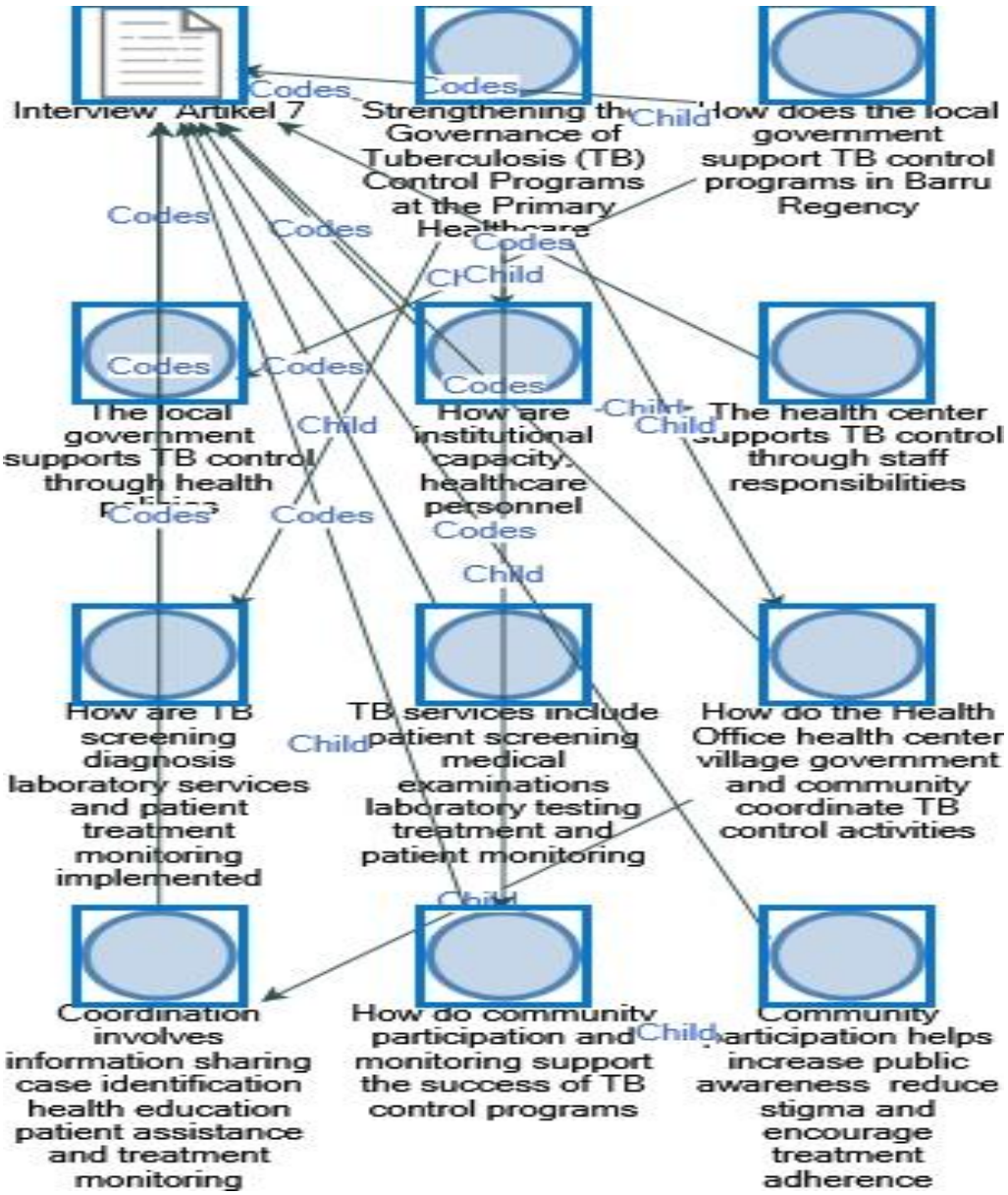



**Figure 2** NVivo Coding Structure of Local Government and Community Support for Tuberculosis (TB) Control Programs in Barru Regency

Figure 2 illustrates the NVivo coding structure developed to analyze the role of local government and community participation in supporting tuberculosis (TB) control programs in Barru Regency. The diagram identifies several interconnected research dimensions, including the

role of local government in supporting TB control through healthcare facilities, institutional capacity, healthcare personnel, and the coordination of TB control activities. It also highlights the contribution of health centers (Puskesmas) in providing screening, diagnosis, laboratory examinations, medical treatment, and patient monitoring. These dimensions are connected to the central interview document, indicating how qualitative information was organized into research questions and thematic categories. The coding structure provides an overview of the institutional responsibilities and healthcare service mechanisms involved in implementing TB control programs.

Furthermore, the diagram highlights the importance of coordination, information sharing, case identification, health education, patient assistance, and treatment monitoring. Community participation is also identified as an important dimension, particularly in increasing public awareness, reducing stigma, and encouraging treatment adherence. The connections labeled Child and Codes represent the hierarchical relationships between research questions, thematic categories, and coded interview data. These relationships indicate that effective TB control requires collaboration between local government, health centers, healthcare personnel, village governments, and local communities. Overall, the NVivo visualization provides an analytical framework for understanding how institutional capacity, healthcare service delivery, inter-organizational coordination, and community engagement contribute to the implementation of TB control programs in Barru Regency.




**Figure 3** NVivo Word Cloud of Interview Data on Tuberculosis (TB) Control Programs in Barru Regency

Figure 3 presents a word cloud generated through NVivo analysis of interview data concerning the implementation of tuberculosis (TB) control programs in Barru Regency. The visualization displays frequently occurring words and concepts, with larger words representing terms that appear more frequently in the analyzed data. The most prominent terms include health, community, services, program, treatment, monitoring, institutional, and health center. These terms reflect the central focus of the research, particularly the relationship between healthcare service delivery, institutional support, community involvement, and the implementation of TB control programs. The prominence of these concepts indicates that TB control is closely associated with the availability and quality of healthcare services, the role of health centers, and the participation of local communities.

Furthermore, the word cloud highlights several supporting themes, including screening, laboratory, diagnosis, coordination, government, healthcare personnel, awareness, prevention, and treatment adherence. These concepts suggest that effective TB control requires an integrated approach involving early case identification, accurate diagnosis, appropriate treatment, continuous patient monitoring, and coordination among relevant institutions. The appearance of terms related to community and government also emphasizes the importance of collaboration between healthcare facilities, local authorities, and community members in supporting TB prevention and treatment activities. Overall, this visualization provides an overview of the dominant vocabulary emerging from the interview data and supports further thematic interpretation of institutional capacity, healthcare service implementation, government support, and community participation in strengthening TB control programs in Barru Regency. However, word frequency alone does not establish the relative importance or causal influence of each theme.

- Discussion

The findings demonstrate that tuberculosis (TB) control in Barru Regency requires an integrated approach involving local government, primary healthcare facilities, healthcare personnel, and community participation. The NVivo coding structure presented in Figure 2 identifies several interconnected dimensions, including local government support, institutional capacity, healthcare personnel responsibilities, screening and diagnosis, treatment services, patient monitoring, and coordination. Meanwhile, the word cloud in Figure 3 highlights prominent concepts such as health, community, services, treatment, monitoring, health center, and institutional. These themes indicate that TB control is not merely a clinical responsibility but also an institutional and governance challenge requiring coordination among different actors. The prominence of health centers and healthcare services reflects the central role of primary healthcare facilities in implementing TB control activities at the local level. Accordingly, strengthening TB control in Barru Regency requires the integration of government policies, institutional resources, healthcare service delivery, and community engagement to ensure that prevention, detection, treatment, and monitoring activities operate continuously and effectively.

The findings also emphasize the importance of early detection through systematic screening, diagnosis, and laboratory examination. Figure 2 identifies TB screening, diagnosis,

laboratory testing, and patient examination as important components of healthcare service delivery. These activities are essential for identifying suspected cases, confirming diagnoses, and facilitating timely access to appropriate treatment. The World Health Organization (WHO, 2025a) emphasizes the use of recommended rapid diagnostic technologies to improve the detection of TB and drug resistance, thereby supporting more accurate and timely clinical decisions.

In this context, local government support is important for ensuring that health centers have adequate diagnostic facilities, trained personnel, and effective referral mechanisms. Strengthening screening and diagnostic capacity can help reduce delays in identifying TB cases and improve access to treatment. Therefore, the implementation of TB control programs in Barru Regency should prioritize accessible screening services, reliable laboratory facilities, and coordination between healthcare personnel and relevant institutions.

Another important finding concerns the role of institutional capacity and healthcare personnel in ensuring continuity of TB treatment and patient monitoring. The NVivo coding structure identifies health center responsibilities, healthcare personnel, treatment services, patient monitoring, and coordination as interconnected dimensions of TB control implementation. These themes suggest that successful TB management requires continuous services extending beyond initial diagnosis. Patients need appropriate medical treatment, clear information about medication, regular monitoring, and support to maintain treatment adherence. WHO (2025b) recommends that health education and counseling regarding TB and treatment adherence should be provided to patients receiving TB treatment. The guidelines also emphasize the importance of appropriate patient care and support interventions.This indicates that healthcare personnel should not only provide medical services but also establish effective communication with patients and their families. Consequently, improving the capacity of health centers in Barru Regency requires strengthening personnel competencies, patient education, treatment monitoring, and coordination to address barriers that may interfere with treatment continuity.

Community participation represents another essential dimension in strengthening TB control programs. Figure 2 identifies community participation, information sharing, case identification, health education, patient assistance, and treatment monitoring as important components of local TB control activities. The word cloud in Figure 3 also highlights the prominence of community, awareness, coordination, and support, indicating the relevance of social

involvement in TB prevention and care. Community members can contribute by promoting awareness, encouraging individuals with symptoms to seek medical examination, supporting contact investigations, reducing stigma, and assisting patients in maintaining treatment adherence. Chavez-Rimache et al. (2023), in a scoping review of community participation in TB prevention and care, found that community involvement can strengthen case detection, prevention activities, identification of treatment barriers, and treatment supervision.

These findings reinforce the importance of involving community leaders, local volunteers, families, and village institutions in supporting healthcare facilities. Thus, community engagement should be developed as a collaborative component of TB control rather than being limited to the dissemination of health information.Overall, strengthening TB control in Barru Regency requires an integrated governance strategy that connects local government commitment, institutional capacity, healthcare service quality, and community participation. The NVivo findings suggest that coordination and information sharing are important for connecting local government institutions, health centers, healthcare personnel, village governments, and communities. Preventive activities should also include identifying individuals at increased risk, conducting contact investigations, providing appropriate preventive treatment, and monitoring program implementation. WHO (2024) emphasizes that effective tuberculosis preventive treatment requires a programmatic approach involving risk identification, screening, assessment, treatment selection, adherence support, and monitoring.

These recommendations provide a relevant framework for strengthening local TB control efforts through coordinated institutional action. In practical terms, local government and health centers need to establish clear responsibilities, improve access to healthcare services, strengthen community-based activities, and conduct regular monitoring and evaluation. Therefore, sustainable TB control depends on the ability of local institutions to transform policy commitments into coordinated, accessible, and community-supported healthcare interventions.

## D. CONCLUSION AND RECOMMENDATIONS

- Conclusion

This study concludes that tuberculosis (TB) control in Barru Regency requires an integrated approach involving local government, primary healthcare facilities, healthcare

personnel, and community participation. The NVivo analysis identifies several important dimensions, including government support, institutional capacity, TB screening and diagnosis, laboratory examinations, treatment services, patient monitoring, and inter-institutional coordination. These findings highlight the important role of health centers (Puskesmas) in providing accessible healthcare services, identifying TB cases, facilitating treatment, and monitoring patients. Furthermore, local government commitment and adequate institutional resources are essential to ensuring the continuity and effectiveness of TB control programs.

The findings also indicate that community participation, information sharing, health education, patient assistance, and treatment adherence are important components of sustainable TB control. Effective implementation requires collaboration among local government institutions, health centers, village governments, healthcare personnel, and community members. Strengthening institutional coordination and community engagement can support early case identification, reduce social stigma, improve public awareness, and encourage treatment continuity. Therefore, the success of TB control programs in Barru Regency depends on integrating healthcare service quality, institutional commitment, and active community involvement into a coordinated and sustainable governance framework.

- Recommendations

The local government of Barru Regency should strengthen institutional support for TB control programs by improving healthcare facilities, laboratory capacity, availability of trained healthcare personnel, and coordination among relevant institutions. Health centers should intensify TB screening, early diagnosis, patient education, treatment monitoring, and assistance to improve treatment adherence. Furthermore, village governments, community leaders, families, and local volunteers should be actively involved in disseminating information, reducing TB-related stigma, identifying suspected cases, and supporting patients throughout treatment. Regular monitoring and evaluation should also be conducted to assess program implementation and identify challenges requiring further intervention. Future research should incorporate broader perspectives from healthcare personnel, government representatives, patients, and community members to provide a more comprehensive assessment of TB control implementation in Barru Regency.

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