

# COLLABORATIVE GOVERNANCE OF THE PENTAHHELIX MODEL IN TUBERCULOSIS CONTROL PROGRAMS IN PALOPO CITY, INDONESIA

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## ABSTRACT

Tuberculosis (TB) remains a significant public health issue in Indonesia, especially in Palopo City, South Sulawesi, where TB incidence has risen sharply in recent years. Effectively tackling TB necessitates integrated, cross-sectoral governance that fosters sustained collaboration among various stakeholders. This study explores the implementation of collaborative governance in the TB control program through a pentahelix framework.

A qualitative case study design with a phenomenological approach was employed. Data were gathered via in-depth interviews with pentahelix stakeholders, including representatives from government, academia, industry, community organizations, and the media. Data analysis was conducted using content analysis based on Miles and Huberman's interactive model.

The findings reveal that cross-sectoral collaboration has improved coordination, heightened public awareness, and enhanced the effectiveness of the TB control program. However, the collaborative process remains predominantly government-driven, with non-governmental actors' involvement being more formalistic than substantively institutionalized. In Palopo City, pentahelix collaboration is mainly focused on procedural coordination, while essential aspects of systemic transformation—such as shared authority, joint decision-making structures, and institutional sustainability—are still underdeveloped.

Collaborative governance in Palopo City's TB control program has made measurable progress in strengthening cross-sectoral coordination. Nonetheless, moving towards participatory, adaptive, and sustainable TB governance requires further institutional consolidation and enhanced collaborative capacity across all stakeholder groups.

## KEYWORDS

collaborative governance; pentahelix; tuberculosis; stakeholder collaboration; public health governance.

## INTRODUCTION

Tuberculosis (TB) is an infectious disease caused by *Mycobacterium tuberculosis*, primarily affecting the lungs. Globally, an estimated 10.6 million people develop TB each year. According to the Global Tuberculosis Report, Indonesia ranks among the countries with the highest TB burden, accounting for approximately 10% of all reported global cases. In recent years, national TB case detection in Indonesia has increased significantly. Within the country, South Sulawesi is one of the provinces with a high TB burden, with Palopo City identified as a significant contributor to reported cases [1-5].

This upward trend suggests that existing TB control efforts have not yet achieved optimal outcomes [6,7]. Current interventions outlined in the regional strategic plan include community- and school-based early detection initiatives, patient support programs, TB education classes, systematic contact tracing, and the referral of sputum specimens to designated diagnostic facilities to ensure accurate and timely case identification [5,8-10]. Moreover, the Indonesian government, particularly in Palopo regency, has adopted a pentahelix collaboration model in implementing its TB control program. The pentahelix framework emphasizes collaboration among five key actors: government, academia, industry, community or non-governmental organizations, and the media [11]. This approach underscores the importance of dynamic, cross-sectoral partnerships in fostering innovation, improving program effectiveness, and addressing complex public health problems [11]. However, several challenges must be addressed to ensure the effectiveness of this collaborative approach. One of the primary challenges is ineffective coordination among key stakeholders. Inadequate communication and limited intersectoral collaboration often result in TB control programs not being implemented as intended [12]. To date, no empirical study has evaluated the effectiveness of this collaborative governance approach in the local context. Therefore, to the best of our knowledge, this study is the first to investigate the implementation of pentahelix collaboration in TB prevention in Palopo City and to assess the extent to which this collaboration has been effective. Accordingly, this study aims to examine the implementation of collaborative governance in the TB control program through a pentahelix framework.

## METHODS

### STUDY DESIGN

This research employed a qualitative approach to investigate the implementation of collaborative governance involving pentahelix actors in tuberculosis control in Palopo City. A qualitative design is particularly suited for capturing the complexity of collaborative governance processes and understanding stakeholder perspectives across sectors. Additionally, this approach allows for an in-depth exploration of the dynamics of policy formulation and implementation [13].

### TIME AND LOCATION

The study was conducted from June to August 2025, following ethical approval from the Health Research Ethics Committee, Faculty of Public Health, Hasanuddin University (Approval No. 117/UN4.14.1/TP.01.02/2025). The research took place in Palopo City, South Sulawesi Province, Indonesia. The institutions involved included the Palopo City Health Office (*Dinas Kesehatan Kota Palopo*), the Regional Development Planning Agency (*BAPPEDA*), regional public and private hospitals (*RSUD dr. Palammal Tandi and RS Mega Buana*), the Indonesian National Nurses Association (*PPNI*), the Social Security Agency for Health (*BPJS*), a community-based foundation for TB awareness (*YAMALI TB*), and local media outlets (*Palopo Pos and Koran Seruya*).

### INFORMANTS

Informants in this study were selected through purposive sampling based on their relevance, expertise, and depth of knowledge regarding the research problem. Participants represented key stakeholders within the pentahelix framework, encompassing government, academia/health services, industry, non-governmental organizations, and the media. Informants were chosen as pivotal decision-making and implementation nodes within the tuberculosis governance network, rather than as representatives of larger populations. It is important to note that data saturation was achieved at

the level of governance processes and institutional roles, which was the primary analytical focus of the study. This clarification highlights that the study is actor-centric and process-oriented, aligning with qualitative governance research.

**TABLE 1. STUDY INFORMANTS BY PENTAHELIX SECTOR**

| Pentahelix sectors | Institutions                                     | Position  | Number of informants |
|--------------------|--|---|----------------------|
| Government         | Palopo City Health Office                        | TB Control Officer  | 1                    |
|                    |  | Technical Officer (TO) TB                                 | 1                    |
|                    | Palopo City Regional Development Planning Agency | Head of Socio-Economic and Community Development Division | 1                    |
| Academician        | <i>RSUD dr. Pallemai Tandi</i>                   | Nurse   | 1                    |
|                    | <i>RS Mega Buana</i>                             | Nurse   | 1                    |
|                    | The Indonesian National Nurses Association       | TB Manager at Wara Community Health Center                | 1                    |
| Industry (Private) | The Social Security Agency for Health            | Head of Benefits Assurance and Utilization                | 1                    |
| NGO                | Community-based foundation for TB awareness      | Monitoring and Evaluation Program Staff                   | 1                    |
| Media              | <i>Palopo Pos</i>                                | Journalist  | 1                    |
|                    | <i>Koran SERUYA</i>                              | Journalist  | 1                    |
| <b>Total</b>       |  |   | <b>10</b>            |

## PROCEDURES

The primary method for data collection involved face-to-face, in-depth interviews conducted using a phenomenological approach, with each session lasting about 15–20 minutes. All interviews were audio-recorded with participants' consent for later analysis. A semi-structured interview guide was employed to ensure consistency and effectiveness, addressing key aspects of collaborative governance, such as principled engagement, shared motivation, capacity for joint action, collaborative actions, and perceived impacts and adaptation [13].

## DATA ANALYSIS

Data analysis was performed using qualitative content analysis within an interactive and iterative process that took place concurrently with data collection, analysis, and interpretation [13]. This study utilized Miles and Huberman's interactive model, which consists of three main stages: (1) **data condensation**, which involves selecting, simplifying, and transforming raw data to enhance the understanding of the phenomena under study rather than merely reducing the data; (2) **data display**, where findings were organized into visual formats like matrices and diagrams to map interaction patterns among pentahelix actors, including government, industry, community organizations, media, and academia; and (3) **conclusion drawing and verification**, which involved generating findings based on emerging patterns and repeatedly testing them to ensure their consistency, contextual validity, and relevance. This analytic process was conducted iteratively until data saturation was achieved [14]. To enhance analytical rigor and efficiency, *Computer-Assisted Qualitative Data Analysis Software (CAQDAS)* was used to facilitate automatic transcription and systematic thematic coding.

## RESULTS

TABLE 2. CHARACTERISTICS OF INFORMANTS

| No. | Code | Age | Institution                                  | Position  | Highest Education | Sector                              |
|-----|------|-----|--|---|-------------------|-------------------------------------|
| 1   | P1   | –   | Palopo City Health Office                    | TB Control Officer  | Bachelor's Degree | Government                          |
| 2   | P2   | 26  | Palopo City Health Office                    | Technical Officer (TO) TB                                 | Bachelor's Degree | Government                          |
| 3   | P3   | 40  | Regional Development Planning Agency         | Head of Socio-Economic and Community Development Division | Bachelor's Degree | Government                          |
| 4   | A1   | 41  | dr. Pallemai Tandi Regional General Hospital | Outpatient Nurse  | Bachelor's Degree | Academia/Health Services            |
| 5   | A2   | 30  | Mega Buana Hospital                          | Outpatient Nurse  | Bachelor's Degree | Academia/Health Services            |
| 6   | A3   | 45  | Indonesian National Nurses Association       | TB Program Manager, Wara Community Health Center          | Bachelor's Degree | Academia/Health Services            |
| 7   | S1   | 39  | Social Security Agency for Health            | Head of Benefits Assurance and Utilization                | Bachelor's Degree | Industry (Private)                  |
| 8   | L1   | 26  | TB Awareness Community Foundation            | Monitoring and Evaluation Program Staff                   | Bachelor's Degree | Non-Governmental Organization (NGO) |
| 9   | M1   | 51  | <i>Palopo Pos</i>                            | Journalist  | Bachelor's Degree | Media                               |
| 10  | M2   | 29  | <i>Seruya</i> Newspaper                      | Journalist  | Bachelor's Degree | Media                               |

Table 2 shows the characteristics of the ten informants who represent key stakeholders within the pentahelix framework for tuberculosis control in Palopo City. These participants include representatives from government institutions, academia and health services, the private sector, civil society, and the media. Government informants are officials from the Palopo City Health Office and the Regional Development Planning Agency. Representatives from academia and health services include nurses and TB program managers from both public and private hospitals, as well as members of the Indonesian National Nurses Association. The private sector is represented by the Social Security Agency for Health, civil society by a community-based foundation focused on TB awareness, and the media by journalists from local print outlets. All informants possess at least a bachelor's degree, with ages ranging from 26 to 51 years, reflecting a professionally qualified and diverse group with direct involvement and expertise in tuberculosis prevention and control.

**TABLE 3. GAPS IN COLLABORATIVE DYNAMICS**

| Components                | Ideal Conditions<br>(According to CGR Theory)  | Research Findings   |
|---------------------------|--|---|
| Principled Engagement     | Engage in structured interactions to foster a shared understanding, establish common goals, and develop theories of change through processes of discovery, definition, deliberation, and determination.                                | The implementation of shared principles in cross-sector collaboration for tuberculosis (TB) control in Palopo City is underway but remains less than optimal. Government actors continue to dominate leadership roles, while other sectors primarily act as implementers rather than equal partners. Existing coordination forums, such as local coordination meetings and monitoring and evaluation sessions, have yet to yield strong collective agreements or shared strategic directions, as participants often prioritize their sectoral mandates. As a result, the collaborative process remains largely procedural and formalistic, rather than genuinely participatory and integrative. The relationship among the pentahelix actors in TB control in Palopo City has been established through reasonably good cross-sector communication, but the trust built remains formal. While the common goal is understood, it has not yet been translated into concrete collaborative action. The roles of the actors are recognized, but there is still a high dependence on the Health Office. Commitment to collaboration is mostly expressed through decrees and memoranda of understanding without a sustainable framework, causing collaboration to follow the direction and momentum set by the government. |
| Shared Motivation         | Trust is established through consistent and reliable interactions, fostering a mutual understanding of each other's perspectives. Internal legitimacy stems from confidence in the process, while commitment is formalized and robust. | The pentahelix collaboration for TB control in Palopo City is far from ideal. Its institutional structure is temporary and lacks permanence, with leadership concentrated in the Health Office, leading to minimal participation from other sectors. Information and resources flow unidirectionally from the government, without a feedback mechanism, indicating that collaboration relies on structural command rather than participatory co-governance.   |
| Capacity for Joint Action | Clear institutional arrangements, distributed leadership, shared and collaboratively created knowledge, and collectively pooled resources.   |   |

Table 3 shows the significant discrepancies between the ideal conditions of collaborative governance, as described in Collaborative Governance Regime (CGR) theory, and the actual dynamics of cross-sectoral collaboration for TB control in Palopo City. While structured interactions and shared principles have started to take shape, the collaboration remains suboptimal and predominantly government-driven, with other actors serving more as implementers than as equal

partners. Although collaboration is formally recognized through decrees and memoranda of understanding, this has not translated into concrete joint actions or sustainable collaborative mechanisms. Institutional arrangements are vague and lack a permanent, inclusive structure, leading to limited participation from non-governmental sectors and a one-way flow of information dominated by the Health Office. Basic communication across sectors has helped establish an initial level of trust and a shared understanding of goals, yet this trust remains largely formal rather than substantive. Overall, the collaboration is still marked by hierarchical control, procedural engagement, and limited co-creation of resources, indicating that participatory and integrative collaborative governance has not yet been fully realized.

**TABLE 4. GAPS IN COLLABORATIVE ACTION**

| Action categories  | Ideal Conditions<br>(According to CGR Theory)  | Research Findings   |
|--|--|---|
| Substantive, Network, Development, and Operational Actions | All substantive actions, such as addressing core issues, networking to build legitimacy, development for mobilizing resources, and operational actions to maintain CGR, are strategically executed based on a shared theory of change. | The implementation of TB control collaboration in Palopo City remains in its nascent stages and lacks optimal cross-sector coordination. Each actor tends to operate within their own sector, failing to form an integrated chain of action aimed at achieving common results. The collaboration network is still informal, relying more on personal relationships than on systematic institutional connections. Joint capacity-building efforts have not been planned due to the absence of a permanent forum for knowledge sharing and evaluation. In practice, synergy among actors is still contingent on the government's agenda and resources, with other sectors playing only a supporting role. Consequently, a consistent and sustainable collaborative working pattern has yet to be fully established. |

Table 4 shows significant discrepancies between the ideal conditions for collaborative action as outlined in CGR theory and the actual implementation of TB control collaboration in Palopo City. While substantive actions such as core issue resolution, networking, capacity development, and operational activities are expected to be executed strategically and integratively, the current collaboration is still in its nascent stages and lacks effective coordination across sectors. Each actor tends to operate in a sectoral and fragmented manner, failing to form an integrated chain of action aimed at shared outcomes. The collaborative network remains informal, heavily reliant on personal relationships rather than systematic institutional arrangements. Furthermore, capacity-building efforts have not been strategically planned due to the absence of a permanent forum for knowledge sharing and joint evaluation. In practice, synergy among actors largely depends on government agendas and resources, with other sectors primarily playing supportive roles. As a result, a consistent, sustainable, and fully integrated pattern of collaborative action has yet to be achieved.

Table 5 shows a discrepancy between the anticipated collaborative impacts under CGR theory and the actual outcomes of TB control collaboration in Palopo City. Although collaboration has led to measurable improvements in coordination and program effectiveness—especially in process-related areas such as heightened cross-sectoral awareness, synergy among pentahelix actors, and increased participation in socialization, case detection, and reporting—these impacts largely remain at the individual or sectoral level. Broader systemic outcomes, including policy change, institutional strengthening, and a significant reduction in TB cases, have yet to be fully achieved. In terms of adaptation, collaborative adjustments are limited and lack structure; while some actors have modified field strategies, such as enhancing socialization methods and engaging local communities, joint learning and collective reflection have not been institutionalized. Consequently, adaptation tends to be reactive and short-term, and cross-sectoral forums have not been optimally utilized for shared learning and innovation. As a result, collaborative adaptation remains sporadic and unsustainable, limiting the long-term effectiveness of collaborative governance in TB control.

TABLE 5. COLLABORATIVE IMPACT GAPS

| Impact Categories | Ideal Conditions (According to CGR Theory)   | Research Findings   |
|-------------------|--|---|
| Results           | Significant changes have been observed in the targeted issues, with an increase in the internal capacity of actors and a bolstered external legitimacy of CGR. | The collaboration results indicate enhanced coordination and effectiveness in implementing TB control programs in Palopo City. This impact is particularly noticeable in processes such as the increased cross-sectoral awareness and synergy among pentahelix actors. While participation in socialization activities, case detection, and reporting has risen, it remains confined to individual or sectoral levels. Meanwhile, systemic impacts like policy changes, institutional strengthening, and a significant reduction in cases have yet to be fully realized. The adaptation process in TB control collaboration in Palopo City remains limited and unstructured. Some actors can adjust their strategies in the field, such as by modifying socialization methods and involving local communities, but joint learning and collective reflection have not been integrated into the collaboration mechanism. Changes tend to be reactive to immediate needs, and cross-sector forums have not been optimally utilized for sharing knowledge and innovation. Consequently, collaborative adaptation remains sporadic and unsustainable in strengthening the effectiveness of collaboration governance. |
| Adaptation        | Transformative adjustments in the objectives and dynamics of CGR have enhanced its resilience and sustainability.  | The adaptation process in TB control collaboration in Palopo City remains limited and unstructured. Some actors can adjust their strategies in the field, such as by modifying socialization methods and involving local communities, but joint learning and collective reflection have not been integrated into the collaboration mechanism. Changes tend to be reactive to immediate needs, and cross-sector forums have not been optimally utilized for sharing knowledge and innovation. Consequently, collaborative adaptation remains sporadic and unsustainable in strengthening the effectiveness of collaboration governance.  |

## DISCUSSION

This study advances collaborative governance theory by illustrating that in high-burden infectious disease contexts, pentahelix-based collaboration often develops into a lead-organization CGR rather than a shared-governance regime. In this scenario, government dominance highlights the structural aspects of public health accountability and legal mandates, indicating that power asymmetry might be a systemic feature rather than an implementation flaw in the early stages of TB governance.

### PRINCIPLED ENGAGEMENT IN PENTAHELIX-BASED TB COLLABORATION

Principled engagement is the fundamental interactional process through which diverse actors develop a shared understanding, define collective problems, deliberate on solutions, and make joint decisions within a collaborative governance framework [14–17]. In the context of TB control in Palopo City, findings suggest that while principled engagement is emerging, it remains largely procedural and government-centered, rather than truly co-creative. The discovery phase was primarily driven by a mutual awareness of capacity limitations across individual sectors. Government institutions, health services, civil society organizations, and media actors recognized that TB control could not be

effectively tackled through isolated sectoral efforts. This aligns with the pentahelix framework, which underscores multistakeholder collaboration as essential for addressing complex public health issues [14]. However, the findings indicate that discovery was still predominantly shaped by government-defined priorities, limiting the emergence of alternative problem framings from non-government actors. Discovery did not occur solely at the initiation stage but continued throughout implementation as actors faced operational constraints and coordination challenges. This reflects the dynamic nature of collaboration, where partnerships evolve through repeated recognition of capacity gaps and asymmetric relationships [18]. Nonetheless, the lack of structured deliberative forums hindered the translation of continuous discovery into shared strategic commitments, as highlighted in collaborative governance theory [16,17].

## **DETERMINATION PROCESS AND INSTITUTIONAL DOMINANCE**

Within the CGR framework, determination signifies the shift from dialogue to collective decision-making and action [17]. In Palopo City, this was implemented through agenda setting, task allocation, and scheduling of key TB control activities. This progression indicates that collaboration has moved beyond symbolic interaction to operational coordination, a pattern often seen when dominant institutions engage in stabilizing "institutional work" during early collaborative arrangements [19]. However, determination remained heavily centralized within the Palopo City Health Office. Although multiple stakeholders participated in implementation, strategic agendas were largely formulated before broader engagement. This pattern reflects a lead-organization model rather than a shared-governance regime [20]. Such dominance marks a critical point in collaboration where power asymmetries influence the trajectory and depth of collective action, potentially limiting co-ownership and shared accountability [21]. Determination was further evidenced by concrete actions such as contact investigation and tuberculosis preventive therapy (TPT). These activities align with evidence showing that contact screening is a cornerstone of TB control for identifying latent and active cases among household contacts [22]. However, the limited involvement of non-health actors in planning these interventions suggests that determination functioned more as administrative coordination than as collective decision-making.

However, the prominence of the Palopo City Health Office within the collaborative governance framework should not be viewed merely as a coordination failure or an imbalance in stakeholder engagement. Instead, it should be seen as a structural condition shaped by the institutional design of tuberculosis governance. As an infectious disease of national priority, tuberculosis control is governed by statutory mandates that assign formal authority, accountability, and reporting obligations to government health agencies. This legal responsibility is reinforced by centralized control over surveillance data, program financing, and performance evaluation mechanisms, positioning the health office as the primary locus of decision-making and risk management. Consequently, the observed government-centered collaboration reflects a lead-organization governance model, where authority concentration is driven by institutional accountability pressures rather than the exclusion of non-governmental actors. Understanding government dominance as a structural feature rather than a procedural weakness provides a more nuanced explanation of power asymmetries within the pentahelix collaboration.

## **GAPS IN COLLABORATIVE DYNAMICS AND SHARED MOTIVATION**

The findings reveal that collaborative dynamics—comprising principled engagement, shared motivation, and capacity for joint action—have not yet formed a mutually reinforcing cycle as envisioned in CGR theory [16,23]. Trust among actors has developed through repeated interaction, but it remains largely formal and institutional, rooted in official mandates rather than relational legitimacy. This condition mirrors challenges identified in multisectoral TB governance, where shared objectives are acknowledged but difficult to translate into sustained collective action due to institutional silos and hierarchical decision-making structures [24]. Internal legitimacy in Palopo City was derived mainly from formal decrees and memoranda of understanding, rather than from confidence in inclusive and deliberative processes [25].

## **FRAGMENTED COLLABORATIVE ACTION**

Ideally, collaborative action should arise from strategies and theories of change that are jointly constructed [15,26]. However, in Palopo City, actions remained fragmented and sector-focused, with actors working in parallel rather than as part of an integrated collaborative system. The lack of a permanent cross-sector forum limited opportunities for co-design, joint capacity development, and collective evaluation. This fragmentation stands in contrast to co-creation and co-production approaches in public health, which emphasize shared problem definition, joint design, and mutual

accountability throughout the implementation process [26]. Without institutionalized mechanisms for collaboration, collective action risks being transactional rather than transformational.

The fragmentation of collaborative action in Palopo City can be attributed to the lack of an integrated governance framework that aligns structure, process, and action. Despite the involvement of multiple actors in tuberculosis control activities, their collaborative efforts are not guided by a collectively developed theory of change or an institutionalized mechanism for joint planning. Consequently, these actors tend to operate independently within their own mandates rather than as parts of a cohesive action system aimed at shared outcomes. The absence of a permanent cross-sector forum further limits opportunities for co-design, coordinated capacity development, and collective evaluation. This structural disconnect between collaborative intent and operational execution restricts the transformative potential of the pentahelix framework and reinforces sectoral silos within the governance regime.

### **LIMITED COLLABORATIVE IMPACT AND WEAK ADAPTIVE CAPACITY**

From an impact perspective, collaboration has primarily led to process-level improvements, such as increased awareness, better coordination, and higher participation in TB-related activities. These outcomes are typical of early-stage collaborative governance, where relational and procedural gains usually precede systemic change [16,23]. However, broader impacts—such as policy reform, institutional strengthening, and sustained reductions in the TB burden—have not yet been realized. Adaptive capacity also remains limited. Although some actors adjusted implementation strategies in response to field conditions, joint learning and collective reflection were not institutionalized. This finding aligns with evidence that collaborative governance evolves sustainably only when learning and adaptation are formally embedded into governance structures [23]. Furthermore, the absence of integrated organizational and digital tools hindered knowledge sharing and innovation across sectors. As collaboration increasingly relies on mechanisms that support transparency, coordination, and joint problem-solving, the lack of such enabling tools may limit the transformative potential of collaborative governance [27].

The limited epidemiological impact observed in this study, particularly the lack of significant reductions in tuberculosis incidence, should be interpreted with caution and within the framework of collaborative governance's temporal logic. According to CGR theory, early-stage collaboration is anticipated to yield process-level and relational outcomes—such as improved coordination, increased participation, and enhanced mutual awareness—before leading to broader systemic or population-level effects. In the context of tuberculosis control, epidemiological outcomes are shaped by various structural determinants, including socioeconomic conditions, health system capacity, and long treatment timelines, which extend beyond the immediate scope of governance arrangements. Consequently, the findings of this study suggest that the collaborative governance regime in Palopo City has primarily bolstered governance capacity and implementation processes, representing a necessary but insufficient condition for long-term reduction in disease burden. In addition, adaptive capacity within the collaborative governance regime remains constrained due to the lack of institutionalized mechanisms for joint learning and collective reflection. Although individual actors have shown situational adaptability by adjusting implementation strategies in response to field conditions, these modifications occur independently rather than through coordinated learning processes. From a CGR perspective, sustainable collaboration necessitates formal structures that enable shared reflection, feedback loops, and knowledge integration across sectors. In Palopo City, the absence of regular cross-sector evaluation forums and integrated information systems has hindered the development of collective learning and institutional memory. As a result, adaptation remains reactive and short-term, limiting the collaborative regime's ability to evolve strategically and address emerging challenges in tuberculosis control.

## **CONCLUSION**

This study concludes that tuberculosis control in Palopo City, executed through a pentahelix collaborative approach, has enhanced cross-sector coordination, communication, and the execution of key program activities, particularly in contact investigation and tuberculosis preventive therapy. However, the collaborative governance regime is still in its nascent stage and is structurally centered around the local health office, where decision-making authority and resource control are concentrated. Although multiple stakeholders are formally involved, their roles are largely instrumental rather than co-

creative, leading to fragmented actions, limited shared leadership, and weak institutionalized learning. As a result, while collaboration has yielded significant process-level gains, it has not yet achieved broader systemic or transformative impacts. Strengthening collaborative governance will require institutional consolidation beyond ad hoc coordination. Establishing a permanent cross-sector forum, formalizing shared decision-making mechanisms, and integrating joint monitoring and learning systems are essential to foster sustainable co-governance. By embedding deliberation, shared authority, and collective accountability within institutional structures, the pentahelix framework can evolve from a procedural coordination model into a more adaptive and resilient governance regime capable of supporting long-term tuberculosis control.

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