Interprofessional Approaches to Improve Tuberculosis Notification: A Systematic Review

Suryanti Chan[1], Hamzah Hamzah[2]

{suryanti_83@yahoo.com[1], anestesi.hamzah@gmail.com[2]}

[1]Faculty of Medicine, Universitas Dian Nuswantoro, Semarang, Jl. Imam Bonjol No.207, Pendrikan Kidul, Kec. Semarang Tengah, Kota Semarang, Jawa Tengah 50131, Indonesia
[2]Faculty of Medicine, Universitas Batam, Batam, Indonesia

Abstract. Background: Underreporting of tuberculosis (TB) in teaching hospitals is a challenge, where complex workflows and diverse healthcare teams hinder timely and accurate notification, impacting TB control efforts, especially in high-burden areas. Objective: To evaluate the role of interprofessional collaboration in improving TB notification rates in teaching hospitals. Methods: A literature search across PubMed, Scopus, and Web of Science identified studies from the last decade on multi-professional strategies for TB notification. Eleven studies were analyzed thematically to identify interventions, challenges, and outcomes. Results: Collaboration among clinicians, nurses, community health workers, and administrative staff enhanced TB detection and reporting. Effective strategies included in-service training, task shifting, and patient-centered communication, reducing knowledge gaps and stigma. Leadership support and integration with national reporting systems were crucial. Conclusion: Interprofessional collaboration improves TB notification by addressing structural and behavioral barriers. Recommendation: Invest in multi-professional training and explore digital reporting systems to enhance TB surveillance.

Keywords: Interprofessional Collaboration, Multidisciplinary Approach, Systematic Review, Tuberculosis Notification, Teaching Hospitals.

1 Introduction

Tuberculosis (TB) remains a major global health threat, with an estimated 10.3 million new cases and 1.3 million deaths reported globally in 2023, making it the second leading infectious cause of mortality after COVID-19 [1]. Timely and accurate notification of TB cases is a cornerstone of effective TB control, as it facilitates early diagnosis, initiation of treatment, interruption of transmission chains, and reliable epidemiological surveillance [2-7].

Despite clear international mandates for mandatory TB notification, underreporting continues to undermine TB control efforts in many healthcare settings. The causes are multifactorial, including gaps in clinical-laboratory communication, high patient loads, unclear responsibilities for reporting, lack of training, and weak integration of reporting systems with routine clinical workflows [8-9]. Furthermore, TB-related stigma and social discrimination persist both in communities and among healthcare workers, creating additional barriers to

FIC 2025, July 30-31, Serang, Indonesia

DOI 10.4108/eai.30-7-2025.2361020

reporting (8,10). These challenges are especially pronounced in low-resource and decentralized systems where notification procedures are often fragmented.

Interprofessional collaboration has been increasingly recognized as a critical strategy to improve TB notification. Multi-professional teams, comprising physicians, nurses, public health officers, laboratory technicians, and community health workers, can enhance detection and reporting through shared responsibilities, cross-training, and mutual accountability [11,12]. Studies have shown that involving community-based workers and empowering frontline staff with training and supportive supervision improves adherence to notification protocols and strengthens links with national TB programs [9].

In parallel, digital health innovations have opened new avenues for improving TB notification efficiency. Mobile applications, electronic case-based reporting platforms, and automated alerts are increasingly integrated into national TB systems to support real-time reporting and reduce the administrative burden on clinical staff [13,14]. While these technologies offer promise, challenges such as limited infrastructure, digital literacy, and policy gaps continue to affect their scalability and impact [15,16].

Despite the growing evidence on interprofessional strategies and digital health interventions, the available studies remain fragmented, often addressing single aspects in isolation and within specific contexts. There is limited synthesis that integrates these perspectives to provide a broader understanding of how collaborative and technological approaches can jointly enhance TB notification. This gap underscores the need for a systematic review, which enables the consolidation of diverse evidence, identification of best practices, and formulation of generalizable recommendations for policy and practice.

Given the diversity of healthcare settings and system capacities globally, it is essential to synthesize evidence on how interprofessional strategies can be effectively implemented to improve TB notification. This systematic review aims to examine the roles, outcomes, and enabling conditions for interprofessional approaches in enhancing TB notification across different contexts. The findings are expected to inform the design and adaptation of collaborative models that support more robust, integrated TB surveillance systems worldwide.

By synthesizing evidence from diverse healthcare settings, this review will identify key facilitators, barriers, and best practices that can inform hospital-based TB notification policies and contribute to more robust TB surveillance systems. Ultimately, understanding the role of collaborative healthcare models in TB notification can help bridge existing gaps in case reporting and enhance global TB control efforts.

2 Methods

This systematic review aimed to synthesize evidence on the effectiveness of interprofessional approaches in improving tuberculosis notification. The review adhered to established guidelines for conducting and reporting systematic reviews, incorporating comprehensive search strategies, explicit inclusion and exclusion criteria, standardized data extraction procedures, and quality assessment of the included studies.

2.1 Search Strategy

A structured search was conducted in three major databases: PubMed, Scopus, and Web of Science. The search was limited to peer-reviewed articles published between January 2020 and April 2025. Keywords and controlled vocabulary terms were combined using Boolean operators (AND, OR), focusing on terms such as “tuberculosis notification,” “interprofessional collaboration,” “healthcare workers,” “training,” and “digital health.” The full search strategy

was tailored to each database. Only studies published in English were included. Additional references were identified through manual screening of the bibliographies of relevant articles.

2.2 Inclusion and Exclusion Criteria

Studies were included if they met the following criteria: (1)examined interventions or strategies involving interprofessional or multi-professional collaboration aimed at improving TB notification, (2)evaluated outcomes such as notification rates, provider adherence to notification protocols, or barriers/enablers to collaborative practices, and (3)were conducted in any healthcare or community setting. Studies were excluded if they (1)did not provide original data (e.g., editorials, commentaries), (2)were not focused on TB notification, or (3)were not published in English.

The review was guided by the PICO framework: Population: healthcare providers engaged in TB care and notification; Intervention: interprofessional or multi-professional strategies (e.g., training, digital tools, task-shifting, community health worker involvement); Comparison: routine practice without interprofessional collaboration; Outcome : TB notification outcomes, including reporting rates, adherence to notification protocols, and identification of barriers and enablers.

Both primary studies and review articles (systematic, scoping, or narrative) were considered eligible if they provided original data analysis or synthesized evidence directly relevant to interprofessional approaches in TB notification. Review articles were included because they aggregate findings from fragmented primary studies across settings, offering insights into common strategies and barriers.

2.3 Data Extraction

Data were extracted using a standardized form that included the following: author(s), publication year, country, study design, sample size (if applicable), intervention type, healthcare professional roles involved, and key outcomes related to TB notification.

2.4 Quality Assessment

Given the diversity of study designs, different quality assessment tools were applied appropriately. Systematic reviews and scoping reviews were evaluated using the AMSTAR 2 tool; qualitative studies were assessed using the CASP checklist; and mixed-methods studies were assessed using the MMAT. Each of these tools includes domains that address potential sources of bias (e.g., selection, reporting, and methodological rigor). Thus, the risk of bias was considered as an integral component of our quality assessment, and the results are reported in the Quality Assessment section.

2.5 Data Synthesis

A narrative synthesis approach was employed to analyze and summarize the findings due to heterogeneity in study design, settings, and outcomes. Key themes related to the effectiveness of interprofessional collaboration, digital tools, training programs, and CHW engagement in TB notification were identified. No meta-analysis was performed given the variability of the included studies. Findings were categorized into thematic domains to illustrate enablers, barriers, and best practices across settings.

3 Results

3.1 Study Selection

A total of 773 records were identified through the initial database search. After removing duplicates, 137 records were screened based on titles and abstracts, resulting in 41 full-text articles assessed for eligibility. Ultimately, 11 studies met the inclusion criteria and were included in this systematic review (Figure 1).

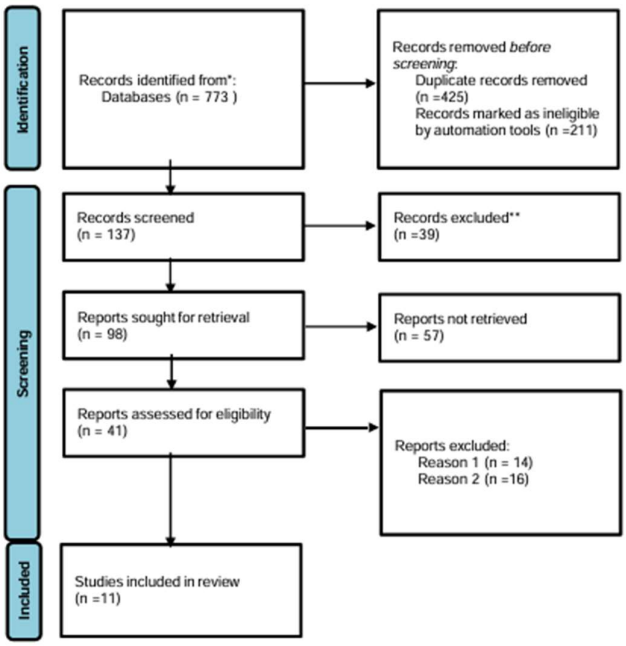

Fig. 1. PRISMA Flow Diagram.

3.2 Study Design and Characteristics

The 11 included studies varied in design and methodology. Three were systematic reviews and meta-analyses [2,9,10], while others included narrative reviews [16,17], scoping reviews [13], mixed-methods studies [8,15], and qualitative research [12]. The studies represented a wide range of countries, including India, Kenya, South Africa, Papua New Guinea, Pakistan, and Yemen, reflecting diverse healthcare settings and contexts. Sample sizes ranged from 24 healthcare workers in a qualitative study to more than 3,800 TB cases in a mixed-methods study from India

Table 1. Summary of Included Studies on Interprofessional Approaches to Tuberculosis Notification

No	Author(s)	Year	Country	Study Design	Sample Size	Intervention	Key Findings
1	Siddaiah et al.[18].	2019	India	Mixed-methods	3,820	Strengthening notification system via Nikshay	Only 23.2% TB cases notified; barriers include poor awareness and system limitations.
2	Amare et al. [9].	2023	Multiple (Systematic Rev.)	Systematic review and meta-analysis	8 studies	Training healthcare workers and volunteers	Training significantly improved TB case detection (RR: 1.60, 95% CI: 1.53–1.66).
3	Coleman et al. [17].	2024	Australia, Global	Narrative Review	Not applicable	Community-wide active case finding (ACF)	Evidence supports ACF to reduce transmission, but implementation is lacking in high-burden areas.
4	Marme et al. [12].	2025	Papua New Guinea	Qualitative	24 healthcare workers	Implementation of TB IPC policy	Interprofessional gaps and leadership challenges identified in IPC policy implementation.
5	Shrisunder et al. [2].	2025	India	Systematic Review	25 studies	Onion model: patient- and provider-related gap analysis	Provider-related factors predominantly contribute to undernotification of TB cases.
6	Mbuthia et al. [8].	2020	Kenya	Mixed-methods	208 patients	Stigma reduction awareness in TB care	TB stigma is high; associated with HIV and social isolation, impeding diagnosis and treatment.
7	Kılıç et al. [10].	2025	Global (17 studies)	Systematic Review	17 studies	Analysis of TB stigma's impact on TBI uptake	Stigma reduces engagement in TB infection testing and treatment adherence.
8	Liebenberg et al. [16].	2022	South Africa	Narrative Review	Not applicable	Addressing drug-resistant TB	Interprofessional strategies needed to curb transmission and manage drug

								resistance effectively.
	9	Mumtaz et al. [14].	2023	Pakistan	Mini Review	Not applicable	Digital health for TB notification	Digital tools can enhance TB notification but require infrastructure and training.
0	1	Al Kalali et al. [15].	2021	Yemen	Mixed-methods evaluation	28 public health facilities; 10 districts	Evaluation of national TB surveillance system	TB surveillance was useful with good sensitivity, but weaknesses include poor simplicity, limited funding, and need for digitalization.
1	1	Lee et al. [13].	2023	Multiple (Scoping Review)	Scoping review	27 studies	Digital health interventions: SMS, reminders, video DOT	DHIs promote TB self-management; bidirectional tools like interactive SMS are underused but recommended for better adherence.

3.3 Quality Assessment

The methodological quality of the included studies varied. Among the three systematic reviews, two were rated as high quality and one as moderate using the AMSTAR 2 tool. Qualitative studies assessed with CASP demonstrated moderate methodological rigor, with some concerns related to reflexivity and generalizability. Mixed-methods studies evaluated using MMAT showed adequate reporting and methodological integration, although limitations included small sample sizes and incomplete follow-up data. Overall, the body of evidence was judged to be of moderate-to-high quality, supporting the reliability of the synthesized findings.

3.4 Intervention Strategies

Interventions assessed in the included studies encompassed interprofessional collaboration models, digital health technologies, training programs for healthcare providers, and community health worker (CHW) engagement. Several studies explored the use of digital reporting tools such as Nikshay (India's national TB reporting platform), mobile applications, and video-supported directly observed therapy (vDOT). Structured training programs were emphasized as crucial to improving notification adherence, while stigma reduction strategies and community-based outreach were also featured prominently.

3.5 Challenges in TB Notification

Several recurring challenges were identified across studies: First, fragmented reporting mechanisms remain a persistent barrier. Many facilities reported gaps in electronic notification systems and poor integration with hospital workflows, which reduced the consistency and reliability of case reporting [2,15]. These structural weaknesses undermine the efficiency of surveillance systems, particularly in resource-limited settings.

Second, workload and systemic barriers were frequently noted. High patient loads, competing clinical responsibilities, and insufficient staffing limited the capacity of healthcare providers to complete notification tasks [12,16]. This reflects a broader problem of under-resourced health systems where notification is deprioritized amidst clinical pressures.

Third, limited knowledge and training created uncertainty and low compliance among healthcare professionals. Several studies highlighted that without targeted training, many providers were unaware of notification procedures or lacked clarity regarding their reporting responsibilities [2,9]. This suggests a need for institutionalized capacity-building strategies.

Finally, TB-related stigma emerged as a cross-cutting barrier. Stigma, particularly when intersecting with HIV or poverty, deterred both patients from disclosing illness and providers from reporting cases openly [8,10]. This highlights the importance of addressing socio-cultural determinants alongside technical interventions.

Taken together, these findings indicate that challenges are not merely technical gaps but reflect deeper systemic, institutional, and social constraints. Addressing them requires multi-level strategies that combine stronger infrastructure with workforce development and stigma reduction interventions.

3.6 Effectiveness of Interprofessional Approaches

The majority of studies supported the role of interprofessional strategies in improving TB notification outcomes:

1. Enhanced Detection and Reporting: Collaborative case management involving physicians, nurses, and public health officers led to improved notification adherence and follow-up [11,12].
2. Training-Driven Compliance: Systematic reviews confirmed that structured training for both healthcare workers and volunteers significantly improved TB case detection rates [9].
3. Digital Tools to Support Collaboration: Platforms such as Nikshay and mobile-based reminders facilitated better coordination between healthcare providers and national TB programs [13,14].

3.7 Role of Community Health Workers (CHWs)

CHWs emerged as pivotal actors in bridging clinical care and public health surveillance. Their involvement in contact tracing, education, and referral mechanisms contributed to higher notification rates and improved patient engagement in TB care [8,17]. Furthermore, CHWs played a role in reducing stigma by delivering culturally sensitive information and facilitating trust between patients and health systems [10].

3.8 Summary of Findings

Across diverse settings, interprofessional approaches demonstrated tangible benefits in enhancing TB notification. Key enabling factors included clear task-sharing among professionals, continuous training, integration of digital health tools, and active community engagement. However, challenges such as systemic underfunding, digital infrastructure gaps, and provider-related stigma remain significant barriers to sustained implementation. The evidence suggests that scaling up interprofessional strategies requires not only technical solutions but also policy-level support and long-term investment in healthcare workforce development.

4 Discussion

This systematic review synthesizes evidence on interprofessional strategies for improving tuberculosis notification across varied healthcare settings, including hospitals, primary care, and community outreach. TB notification remains a global public health priority, yet underreporting persists due to fragmented workflows, stigma, lack of coordination, and limited awareness among healthcare professionals. The findings of this review indicate that interprofessional collaboration, integrating the roles of physicians, nurses, CHWs, public health officials, and digital health implementers, offers a viable and scalable solution to address these gaps.

4.1 Interprofessional Collaboration Enhances Notification Pathways

Studies reviewed consistently demonstrated that coordinated interprofessional approaches contribute to better detection, notification, and follow-up of TB cases. For instance, Amare et al. (2023) showed that training both healthcare workers and volunteers improved TB case detection significantly. Ramos et al. (2023) further emphasized the importance of clear team structures and defined roles in multidisciplinary teams to reduce reporting delays [9,11].

In many settings, interprofessional collaboration was not just beneficial but essential, particularly where high caseloads, limited human resources, or fragmented administrative systems threatened the continuity of care. By distributing notification responsibilities across cadres, such models reduce dependency on physicians alone and create checks and balances that improve notification accuracy. This aligns with global recommendations on people-centered TB care, where all healthcare workers are active contributors to disease control efforts [1].

Effectiveness of IPC was thus demonstrated by consistent improvements in TB notification outcomes across diverse studies, including enhanced case detection, better adherence to reporting protocols, and reduced reporting delays.

4.2 Persistent Barriers: Institutional, Human, and Social

Despite these gains, systemic and cultural barriers continue to hamper optimal notification. At the institutional level, infrastructure challenges such as weak digital systems [15], unclear accountability mechanisms, and insufficient policy enforcement remain widespread. Digital notification tools are often available but underutilized due to inadequate training and resistance to technological change [13,14].

Human-level barriers include limited knowledge about reporting requirements, high clinical workloads, and competing responsibilities, particularly in resource-constrained or rural settings. Marme et al. (2025) reported that even where policies exist, gaps in leadership and interprofessional communication impair implementation [12]. Moreover, Shrisunder et al. (2025) highlighted that provider-related factors, more than patient-related issues, were responsible for undernotification in many cases [2].

Perhaps most critically, stigma, both anticipated and experienced, remains a cross-cutting barrier. Studies from Kenya and India showed that stigma associated with TB, often tied to HIV, poverty, or social exclusion, deters patients from seeking care and providers from actively reporting cases [8,10]. Interprofessional teams that include CHWs or community educators may be better positioned to address these barriers through culturally sensitive engagement and ongoing community dialogue.

4.3 Digital Health Solutions: Potential and Pitfalls

Digital health innovations, such as electronic surveillance platforms, interactive SMS, and video directly observed therapy (vDOT), have been promoted as tools to strengthen notification. Lee et al. (2023) identified that bidirectional tools, allowing patient-provider interaction, are

more effective than unidirectional alerts in promoting engagement. However, Mumtaz et al. (2023) noted that such systems often require substantial infrastructure, user training, and integration with national TB programs [13,14].

Moreover, even when digital tools are available, the absence of clear workflows or interprofessional coordination can lead to inefficiencies. Without a dedicated focal person or team responsible for managing electronic notifications, cases may still be missed. Thus, digital health must be embedded within an interprofessional framework, not seen as a standalone solution.

4.4 Community Health Workers: Bridging Institutional and Social Gaps

CHWs are often underutilized in TB notification strategies despite their proven potential to support case finding, contact tracing, and stigma reduction. Evidence from Coleman et al. (2024) and Amare et al. (2023) supports the inclusion of CHWs in both community and facility-based efforts. Their proximity to the population allows them to identify presumptive TB cases earlier and guide patients into formal notification pathways [9,17].

Additionally, CHWs can serve as liaisons between hospital systems and public health surveillance agencies, facilitating timely follow-up and ensuring that no cases are lost to follow-up. Their integration into interprofessional teams should therefore be a key component of TB notification policies, especially in high-burden, low-resource settings.

4.5 Implications for Policy and Practice

The synthesis suggests several critical policy directions: 1)Institutionalization of interprofessional teams in TB notification pathways, supported by clear role delineation, collaborative protocols, and leadership structures; 2)Mandatory training programs on TB reporting requirements, digital tools, and stigma reduction embedded within continuing professional development (CPD); 3)Investment in digital infrastructure and support systems to improve interoperability and user compliance; 4)Incentive-based programs, both financial and reputational, to promote provider engagement in notification.

Policies must also address scalability and equity. Models that work in urban hospitals may not be feasible in remote or under-resourced settings. Therefore, adaptive models that integrate community-based workers, mobile technology, and local governance structures should be prioritized.

4.6 Limitations and Future Research

This review is limited by the heterogeneity of the included studies, which varied in design, setting, and outcome measures. Most were observational or qualitative, which may introduce bias. Additionally, no meta-analysis was conducted due to inconsistent reporting metrics. Future research should focus on: 1)Longitudinal studies measuring the impact of interprofessional collaboration on TB control outcomes (e.g., case detection, treatment success, transmission reduction); 2)Implementation research assessing how interprofessional models can be adapted to different health system levels; 3)Economic evaluations to determine the cost-effectiveness of integrated notification strategies.

One of the most significant findings of this study is the positive impact of interdisciplinary teamwork on TB notification. Teaching hospitals serve as training grounds for future healthcare professionals and provide complex, specialized care; thus, an effective notification system requires seamless coordination across different healthcare cadres. Consistent with previous studies, interprofessional collaboration has been shown to improve patient outcomes and adherence to public health protocols. Our findings align with these perspectives, demonstrating

that the involvement of diverse healthcare professionals contributes to enhanced awareness, prompt case identification, and accurate reporting.

Interdisciplinary teams facilitate a broader understanding of TB notification challenges and allow for shared responsibilities in patient management. Physicians, as primary diagnosticians, play a pivotal role in case identification; however, nurses and pharmacists also contribute significantly through patient education, adherence monitoring, and treatment follow-up. Furthermore, public health experts assist in ensuring that notification aligns with national surveillance guidelines. The success of this approach underscores the need for integrated TB notification policies that leverage the strengths of each professional group.

5 Conclusion

The findings of this study highlight the critical role of a interprofessional approach in enhancing tuberculosis notification in teaching hospitals. By integrating interdisciplinary collaboration, structured training programs, and the involvement of community health workers, this approach not only improves case detection but also optimizes adherence to notification protocols. Despite these benefits, challenges such as heavy clinician workloads, stigma, and inconsistent notification policies remain significant barriers to achieving comprehensive TB surveillance.

Addressing these barriers requires a systematic approach that includes sustained institutional commitment, policy reinforcement, and integration of digital health solutions to streamline notification processes. Future research should explore scalable and cost-effective strategies to sustain long-term improvements in TB notification, particularly in high-burden settings. Strengthening interprofessional collaboration and embedding notification practices within routine clinical workflows are essential steps toward achieving global TB control targets.

Acknowledgement

Authors would like to express my deepest gratitude and appreciation to Prof. Dr. Ir Edi Noersasongko, M.Kom; Prof. Dr. Pulung Nurtantio Andono, S.T., M.Kom; Dr. Drs. Abdul Syukur, M.M; DR, dr. Hendriani Selina, Sp. A (K), MARS; DR. Dr. Teuku Mirza Iskandar, Sp.OG, K.Onk which has supported during this review

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