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Contact Investigation Strategies for Detecting Active Tuberculosis Cases at Rappang Primary Health Center Sidenreng Rappang Regency

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ABSTRACT

Introduction: Tuberculosis (TB) remains a complex public health problem in Indonesia. The contact investigation strategy is implemented as an early detection effort to identify active TB cases by tracing individuals who have had close contact with TB patients. This study aims to describe the implementation of the contact investigation strategy in detecting active TB cases at the Rappang Primary Health Center, Sidenreng Rappang Regency. **Method:** This research employed a descriptive qualitative method with data collected through semi-structured interviews, observations, and documentation. The informants consisted of TB program managers, TB supporters, the head of the health center, and TB patients. **Results:** The results showed that in terms of structure, the implementation was constrained by limited screening tools, field logistics, and the number of health workers, causing several activities to be delayed due to the unavailability of medicines or equipment. In terms of process, contact investigation has been carried out consistently, but community participation remains low due to rejection from patients or their families influenced by stigma and a lack of understanding. Although education has been provided, changes in community attitudes have not been significant. In terms of outcomes, this strategy has had a positive impact by increasing active case findings and improving patient acceptance of the services provided. **Conclusion:** In conclusion, the implementation of contact investigation needs to be continuously strengthened through the provision of adequate facilities, increased human resources, and sustained community education to support TB elimination efforts at the primary care level.

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INTRODUCTION

Tuberculosis (TB) remains one of the major public health challenges in Indonesia. Health-related issues are complex, as they not only focus on curative efforts, but also

encompass preventive measures to ensure individuals remain healthy and protected from disease(Said et al. 2023). According to the 2023 WHO Global TB Report, Indonesia ranks second among the countries with the highest tuberculosis burden worldwide, with more than one million new cases reported annually (WHO 2023).

In South Sulawesi Province, including Sidenreng Rappang Regency, the incidence of tuberculosis has remained relatively stable over the past three years, based on regional health office reports. However, a review of TB program documents at the Rappang Primary Health Center indicates that the number of newly detected cases is still not proportional to the estimated number of suspected cases in the service area. This phenomenon indicates a gap between program targets and field achievements, particularly in the implementation of contact investigation strategies. Several confirmed TB patients have not yet undergone optimal tracing of their close contacts. Limited human resources, insufficient diagnostic logistics, and refusal from patients' families are among the factors that slow down the implementation of the activities.

The ineffective implementation of contact investigation in this area may lead to serious consequences if not addressed promptly. Without early detection of close contacts, the risk of transmission at the household and community level will increase, thereby expanding the chain of infection and worsening the TB burden in the region. In addition, delays in contact tracing prolong the diagnostic process, increasing the risk of complications and contributing to higher loss-to-follow-up rates among TB patients. This situation poses a significant barrier to achieving the TB elimination target by 2030 set by the WHO and the Ministry of Health of the Republic of Indonesia.

One of the strategies used in TB control programs is contact investigation, which involves tracing and screening individuals who have had close contact with an active TB patient. The implementation of this strategy at the primary healthcare level plays a crucial role in program success and must be aligned with the needs and conditions of the local community (Da, et al., 2023). This strategy has been proven effective in detecting cases early and reducing the risk of transmission (Fitriani & Sulistiadi, 2023). On the other hand, family involvement is also essential to ensure comfort and support throughout the patient's treatment process (Adri et al., 2020).

Nevertheless, the implementation of contact investigation continues to face several challenges. These include limited facilities and infrastructure, low community participation, and persistent social stigma associated with tuberculosis(Fitriani & Sulistiadi, 2023).

Several previous studies have emphasized the need for TB program evaluations grounded in a comprehensive theoretical frmework. One commonly used approach is the Donabedian model, which evaluates service quality through three components: structure, process, and outcomes. This model enables an evaluation that goes beyond output assessment by examining resource readiness, implementation processes, and the overall program impact (Faradillah et al., 2021).

Although contact investigation has been implemented in various primary health centers, including the Rappang Primary Health Center, studies specifically describing its implementation using the Donabedian framework remain limited. Therefore, this study was conducted to describe the implementation of contact investigation strategies for detecting active tuberculosis cases at the Rappang Primary Health Center, Sidenreng Rappang Regency, based on three key components: structure, process, and outcomes.

LITERATURE REVIEW

Contact Investigation Strategies in Tuberculosis Control

Contact investigation is an essential strategy in tuberculosis (TB) control programs, as it enables early detection of active cases and helps prevent further transmission. The Ministry of Health of the Republic of Indonesia (2021) states that this strategy is carried out by tracing individuals who have had close contact with active TB patients. Meanwhile, the WHO (2023) emphasizes that contact investigation has become a key pillar in global tuberculosis elimination efforts. In Indonesia, this approach has been integrated into the national TB program. However, its implementation still faces various challenges at the primary healthcare level, particularly in densely populated areas (Fitriani & Sulistiadi, 2023).

Community Acceptance Factors Toward the Program

The success of contact investigation is strongly influenced by the extent to which the community accepts and trusts the program. A study by Ula et al. (2021) demonstrated that empathetic communication from healthcare workers can build trust and increase patient participation. Rejection often occurs due to social stigma, fear, and unclear information. Holis et al. (2018) and Rikomah et al. (2023) state that limited public understanding can hinder the effectiveness of program implementation. Therefore, a more humanistic and educational communication approach needs to be optimized in carrying out the program.

The Role of Education and Communication in Strengthening Implementation

Effective health education plays an important role in improving patient compliance with screening and treatment procedures. Furthermore, Widianita (2023) states that intensive training for TB cadres can improve the accuracy of case tracing. In addition, digital-based innovations, such as education delivered through WhatsApp, have been proven to be more effective than conventional leaflets (Latif & Tiala 2022). Consistent education can improve knowledge while also fostering patient commitment to completing treatment (Trishela et al., 2024).

Application of the Donabedian Theory in Program Evaluation

The Donabedian model is considered one of the most relevant approaches for evaluating the quality of TB programs. This model categorizes evaluation into three dimensions: structure, process, and outcomes (Donabedian,1988). Faradillah et al. (2021)) emphasize that the structural, process, and outcome aspects of a program are interrelated in determining service quality. Imperfections in the structure, such as limited facilities or human resources, can affect the implementation of service processes, which in turn directly impacts the achievement of optimal outcomes. Ristianti & Oktamianti (2023) stated that weaknesses in these two components hinder the achievement of the TB program.

So far, most studies have still focused on the overall program effectiveness, without directly linking it to a quality evaluation approach. The study by Da et al. (2023) shows that organizational readiness and the intensity of education play a significant role in the success of case detection. Since few studies have applied the Donabedian approach to evaluate contact investigation strategies, this study aims to fill that gap. The main focus is to assess program implementation at the health center based on three key aspects—structure, process, and outcome—in order to provide a more comprehensive picture of TB service quality in the field.

METHOD

This study used a descriptive qualitative approach, applying Donabedian's service quality theory, which divides service quality into three main components: structure, process, and outcome. This design was chosen to obtain a comprehensive overview of the implementation of tuberculosis contact investigation strategies at the primary healthcare level. The study was conducted at UPT Puskesmas Rappang, Sidenreng Rappang Regency, South Sulawesi, from March to May 2024.

The study population included all parties involved in the implementation of the TB contact investigation program within the working area of UPT Puskesmas Rappang, comprising program-implementing healthcare personnel, patient companions, and active TB patients. From this population, seven individuals were selected as research samples, consisting of three key informants and four additional informants. The key informants included the head of the health center, the TB program manager, and the TB companion, while the additional informants consisted of four TB patients who had undergone the contact investigation process. Informants were selected using purposive sampling, based on the criteria of direct involvement in contact investigation activities, having a minimum of six months' experience in the TB program, and willingness to participate in the study.

The research focus was determined based on the three main components of Donabedian's theory: structure, process, and outcome. The structural aspect includes the availability of facilities and infrastructure, logistics, and human resources that support the implementation of contact investigation. The process aspect focuses on the mechanisms of activity implementation, communication strategies employed, and the forms of community involvement in the program. Meanwhile, the outcome aspect assesses the impact of contact investigation implementation on the increase in active TB case detection as well as patient acceptance of the services provided.

Data were collected through semi-structured interviews, field observations, and program document review. The interview guide was developed based on the structure, process, and outcome aspects of Donabedian's theory. Interviews were conducted for 30 to 60 minutes, depending on the informants' availability and the depth of information provided. Each interview session was recorded using a digital audio recorder after obtaining the informants' consent. All recordings were then transcribed verbatim for further analysis. To ensure the content validity of the instruments, the researcher consulted with the academic advisor, an expert in public health, as well as two field practitioners, namely the TB program manager and the TB companion. They provided feedback on the wording and arrangement of the questions to ensure they were appropriate for the field context and easily understood by the informants.

Data analysis was conducted thematically using a deductive approach, with Donabedian's theoretical framework serving as the initial basis for the data coding process. The transcribed data were analyzed through several steps: reading the entire manuscript, identifying key codes based on the structure, process, and outcome aspects, and then developing themes and subthemes according to the field findings. To maintain the credibility of the results, source and method triangulation were conducted, and the findings were re-checked with the key informants.

This study obtained approval from UPT Puskesmas Rappang, and all informants provided informed and voluntary consent through an informed consent form prior to the interviews. Commitment to confidentiality and research ethics was maintained throughout the data collection process.

RESULTS AND DISCUSSION

This study was conducted at the Rappang Primary Health Center, located in Panca Rijang Subdistrict, Sidenreng Rappang Regency, South Sulawesi. This health center serves as a primary care facility actively implementing tuberculosis control programs, including contact investigation activities. The primary health center plays an important role in supporting the achievement of the Indonesia Sehat program by improving the quality of healthcare services (Febrianti et al. 2023). This facility has a broad service coverage area with a dense population, making it a strategic location for tuberculosis elimination efforts. A total of seven informants participated in this study: three key informants (the TB program manager, TB treatment supporter, and the head of the health center) and four TB patients as additional informants. They were selected based on their direct involvement in the contact investigation program, allowing them to provide comprehensive perspectives on its implementation.

Table 1. Summary of Findings Based on the Donabedian Model

Donabedian Component	Theme/Subtheme	Quotation
Structure	Limited logistics and human resources	"We often run out of screening tools, so we have to postpone home visits." (TB Program Officer)
Process	Rejection due to stigma	"The patient said they were not ready and were afraid the family would become the subject of gossip." (TB Treatment Supporter)
Outcome	Positive acceptance of services	"received good treatment. The staff were friendly and easy to talk to." (TB Patient 1)

Thematic analysis based on the Donabedian framework:

1. *Structure*

The results of interviews and observations indicate that the implementation of TB contact investigation is still constrained by structural aspects. In the context of the Donabedian theory, the structural dimension faces challenges primarily related to the availability of screening tools, medications, and field logistics. This finding aligns with the study by Fitriani et al. (2023), which states that inadequate facilities are a major barrier to successful TB detection in primary healthcare settings. Some activities could not be carried out as scheduled because supporting facilities were not always available. This situation resulted in limited and uneven screening coverage among close contacts. One of the program managers stated:

"Sometimes the medicines are unavailable, so we cannot go to the field. Everything is already scheduled, but when we check with the pharmacy, the stock is empty. It feels uncomfortable to visit patients without being able to provide the medication." (Informant 1, TB Program Officer)

Of the seven informants, two mentioned logistical barriers as the main reason for delays in implementing contact investigation. These barriers included limited availability of medications, screening tools, and an uneven logistics distribution system across the health center's service area.

This statement indicates that unstable logistics availability, including TB medications, serves as a significant barrier to the implementation of contact investigation activities. This condition affects not only the technical aspects of service delivery but also community trust in the program follow-up. It highlights the importance of structural

readiness as the foundation for optimal service implementation, as emphasized in the Donabedian model.

Thus, the structural aspect becomes a major challenge in the implementation of contact investigation, particularly related to the availability of logistics and supporting systems in the field. These limitations hinder service consistency and may reduce community trust in the program's effectiveness.

As a practical solution, the primary health center may develop a demand-based logistics planning system integrated with the TB management information system. The local government may also support the allocation of flexible funding for emergency procurement, as well as strengthen cross-sector collaboration to facilitate logistical distribution. Another study by Da et al. (2023) in Tulungagung also showed that partnerships between primary health centers and the community can accelerate logistics distribution and reduce field delays.

2. Process

The implementation of TB contact investigation at the Rappang Primary Health Center is carried out through household contact tracing, TB education, and initial screening of close contacts. These activities are carried out directly by the TB program manager together with field support staff. However, in practice, several challenges were identified, particularly those related to resistance from patients and their families. In the process dimension, although the program has been implemented consistently by healthcare workers, community participation remains low due to stigma, fear, and limited understanding of tuberculosis. This phenomenon is also supported by findings from Latif and Tiala (2022), who reported that repeated education delivered with an empathetic approach has been proven effective in improving patient understanding and acceptance of TB programs.

Interpersonal communication plays a crucial role in determining patient acceptance of the program. One of the main barriers is patient refusal to allow close contacts to be examined, even after persuasive education has been provided. Healthcare workers reported that some patients refused to have their family members screened for various reasons, such as embarrassment, fear, or psychological unpreparedness. One informant expressed this as follows:

"Sometimes patients refuse to have their family members screened, whether because they feel embarrassed, afraid, or are simply not ready, even though the purpose has already been explained." (TB Program Support Staff)

Meanwhile, two informants reported patient or family refusal to undergo close contact screening. This refusal was generally triggered by fear, social stigma, and limited understanding of the purpose of screening.

This situation indicates that the success of the process is highly dependent on patient and family acceptance, as well as the effectiveness of communication delivered by healthcare workers. When individuals lack knowledge about TB, they are unlikely to develop the motivation or willingness to undergo screening (Sulaiman et al. 2021). Despite the educational efforts provided, stigma and negative perceptions toward TB remain a persistent challenge. (Mardhatillah et al. 2021) explain that stigma is shaped by social environmental influences, which create negative judgments toward individuals with TB. Therefore, community-based interventions involving community leaders, health cadres, and former TB patients may serve as a solution to improve public acceptance. Widianita

(2023) found that intensive training for health cadres and empathetic approaches from local community leaders are effective in reducing screening refusal.

Overall, the program implementation process has been carried out; however, community resistance driven by stigma and limited education remains a major barrier. The success of the process largely depends on the quality of interpersonal communication and the social approach applied by the healthcare workers.

3. Outcome

The results of implementing the contact investigation strategy show that the program successfully identified several active TB cases that had previously gone undetected. Although the implementation still faces challenges in the structural and process components, patients have shown a generally positive response to the approach used by healthcare workers in terms of service acceptance. One important aspect that emerged from the interviews was the patients' sense of comfort during the screening process. Friendly attitudes and openness from field health workers encouraged patients to feel accepted and less afraid to undergo examination. One patient stated:

"Yes, I felt very comfortable. When I came for the examination, the staff welcomed me kindly and were very friendly. So I felt safe and not worried at that time." (TB Patient 2)

A similar statement was also expressed by another informant, who felt that the friendly attitude and good communication from the health workers made them feel less anxious, and even appreciated and cared for. This quote illustrates that the quality of interpersonal interactions plays an important role in creating a sense of safety and comfort for patients. Although the facilities are not yet fully adequate, a humanized service can enhance patient satisfaction and encourage their participation. This aligns with Donabedian's theory, in which service outcomes are measured not only by technical outputs but also by patients' perceptions and experiences of the service process they receive. The study by Rikomah et al. (2023) also shows that TB patients are more likely to adhere to treatment when they feel valued and emotionally involved in the service process.

In terms of outcomes, the positive responses from patients regarding staff attitudes indicate the importance of an interpersonal approach in program implementation, even though the structural aspects are not yet fully optimal. These positive experiences can encourage active patient involvement and enhance the success of TB case detection in the community.

The success of contact investigation strategies at the global level has also been demonstrated by several recent studies. Velleca et al. (2021) found that, among 110 studies conducted in 42 countries, an average of 2.87% of close contacts tested positive for active TB, and 43.8% tested positive for latent TB. Meanwhile, a field study by Baluku et al. (2022) in Uganda showed that out of 1,350 contacts, 2.1% were detected with active TB, with the effectiveness of tracing being strongly influenced by contact data and the patients' clinical conditions.

This study contributes to the development of TB program evaluation based on Donabedian's theory at the primary healthcare level. The findings can serve as a reference for other health centers in improving their contact investigation strategies. Moreover, this study emphasizes the importance of a holistic approach in TB services, which considers both structural and interpersonal aspects simultaneously. These findings have the potential to inform policies aimed at strengthening contact investigation in high TB burden areas.

Future research could explore the effectiveness of community-based educational interventions to reduce TB stigma and increase the participation of close contacts.

The main limitation of this study lies in its scope, which involved only one health center, as well as the limited time to observe long-term changes resulting from the implemented strategies. Nevertheless, this does not diminish the depth of information that was successfully collected.

Based on the study findings, the researcher assumes that the implementation of contact investigation strategies for active tuberculosis case detection at UPT Puskesmas Rappang is influenced by several factors. From the structural perspective, limitations in facilities, equipment, and healthcare personnel affect the smooth running of the program, although internal support and team coordination help to minimize these obstacles. From the process perspective, patient and family responses are influenced by community understanding of TB and existing stigma; however, effective education and communication successfully increased acceptance among most patients.

The positive findings highlight the importance of interaction and education between healthcare personnel and the community, even though the supporting structure is not yet optimal. Local socio-cultural factors also influence the implementation of this strategy, so sustainable interventions that integrate community education and capacity building for healthcare personnel are believed to strengthen program outcomes in the future. Overall, despite structural and process-related obstacles, contact investigation strategies still have significant potential to improve active TB case detection if supported by adequate facilities, community understanding, and effective coordination.

CONCLUSION

This study concludes that contact investigation strategies at UPT Puskesmas Rappang have had a positive impact on increasing active TB case detection and have received fairly good acceptance from patients. However, program implementation still faces challenges in the structural aspect, such as limited logistics and human resources, as well as in the process aspect, influenced by low community participation due to stigma and limited understanding. Nevertheless, the humanized services provided by staff serve as a major strength in building patient trust and comfort.

The implications of these findings indicate the need to strengthen service structures through a more responsive logistics system, provision of emergency funds, and training for community health cadres. From a policy perspective, the regional health office needs to promote cross-sectoral integration to support the smooth implementation of contact investigations and to develop more sustainable community-based educational interventions. A holistic approach that combines technical and social aspects needs to serve as a foundation in formulating TB elimination strategies at the primary healthcare level.

For future research, it is recommended to focus on strengthening the structural and socio-cultural aspects that influence the implementation of TB contact investigations. Future researchers can explore innovative strategies in interacting with patients and their families, efforts to improve community understanding of TB, and ways to reduce the persistent stigma. In addition, future studies can investigate the factors influencing the success of case detection in greater depth, so that the findings can provide a more comprehensive and applicable scientific contribution in a broader context.

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