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Evaluation of Tuberculosis Control Program with DOTS Strategy at Pulosari Public Health Center, Pemalang Regency

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A B S T R A C T

Tuberculosis (TB) remains a public health problem in Indonesia, with high incidence and suboptimal treatment success rates. The Directly Observed Treatment Short-course (DOTS) strategy is the main approach to TB control in Indonesia. This study aimed to evaluate the implementation of the TB control program using the DOTS strategy at the Pulosari Public Health Center, Pemalang Regency, focusing on input and process components. A qualitative case study method was used, with data collected through in-depth interviews, observation, and documentation involving program holders, health workers, cadres, TB patients, and Treatment Supervisors (PMO). Results showed sufficient human resources and funding, but a shortage of laboratory analysts and lack of diagnostic tools like GeneXpert. Process implementation followed national guidelines but PMO supervision was suboptimal, especially for patients without companions. Structured monitoring was conducted using the SITB system. Strengthening PMO roles, improving diagnostic facilities, and training health workers are recommended to enhance program effectiveness.

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INTRODUCTION

Tuberculosis (TB) remains one of the deadliest infectious diseases in the world. According to the World Health Organization (WHO), approximately 10.6 million people fell ill with TB and 1.6 million died from the disease globally in 2022. Indonesia ranks second in the world for TB incidence, indicating the magnitude of the national TB burden. Despite the long-standing implementation of the Directly Observed Treatment Short-course (DOTS) strategy since 1995, Indonesia has yet to reach the global TB control targets set in the End TB Strategy.

The DOTS strategy, which comprises five key components—political commitment, case detection through quality-assured bacteriology, standardized treatment under supervision, effective drug supply, and a monitoring and evaluation system—has proven effective globally. However, its success is highly dependent on local implementation, resource availability, and the engagement of communities.

In Pemalang Regency, TB control efforts are decentralized to public health centers (Puskesmas), with Puskesmas Pulosari serving as a frontline facility in TB diagnosis, treatment, and follow-up. Based on health records from 2021–2024, there has been an observable increase in TB case detection in this area. However, the treatment success rate remains below the national target of 90%, with only 38% of cases declared cured or completed in 2024. This low achievement may be attributed to various factors, including limitations in diagnostic capacity, irregular supervision of patients under treatment, and inconsistent involvement of treatment observers (PMO).

Given the importance of achieving TB elimination by 2030, an in-depth evaluation of the DOTS strategy implementation at the local level is necessary. Such evaluation not only identifies strengths and weaknesses of the ongoing program but also provides evidence-based recommendations for improvement. This study aims to evaluate the TB control program at Puskesmas Pulosari by analyzing the input and process components, particularly focusing on human resources, facilities, diagnosis and treatment implementation, monitoring systems, and community engagement.

LITERATURE REVIEW

Tuberculosis as a Public Health Issue

Tuberculosis is an infectious disease caused by *Mycobacterium tuberculosis*, primarily affecting the lungs. It remains a major global health concern, particularly in developing countries. According to WHO (2022), TB is one of the top 10 causes of death worldwide and the leading cause from a single infectious agent. The high burden of TB in Indonesia is driven by various factors including population density, poverty, and limited access to health services (Ministry of Health RI, 2023).

DOTS Strategy (Directly Observed Treatment Short-course)

The DOTS strategy was introduced by WHO as a comprehensive and cost- effective approach to TB control. It consists of five core components: (1) government commitment; (2) case detection through quality-assured bacteriology; (3) standardized treatment with supervision and patient support;

(4) an effective drug supply and management system; and (5) a monitoring and evaluation system (WHO, 2022). Studies show that when implemented effectively, DOTS can significantly reduce TB incidence and mortality (Zhang et al., 2025).

Role of Primary Health Centers in TB Control

In Indonesia, TB services are decentralized to primary health centers (Puskesmas), which are responsible for implementing case detection, diagnosis, treatment, follow-up, and reporting. Puskesmas are crucial in integrating TB services into the broader public health system, including community involvement through health cadres (Pardede et al., 2021). Challenges faced by Puskesmas include limited diagnostic facilities, staff shortages, and low public awareness.

The Importance of PMO (Treatment Observer)

The involvement of a Treatment Observer (Pengawas Minum Obat/PMO) is a critical component of the DOTS strategy. PMOs are responsible for ensuring that patients take their medication regularly and complete their treatment. Research indicates that treatment success rates are higher among patients who have consistent PMO support (Gopalaswamy et al., 2021). However, in rural areas, the lack of trained PMOs and the tendency for patients to self-supervise can hinder treatment outcomes.

Evaluation Models in Public Health Programs

Program evaluation is essential for measuring the effectiveness, efficiency, and sustainability of public health interventions. The CIPP (Context, Input, Process, Product) model developed by Stufflebeam (2002) is widely used in health program evaluations. This model allows for a comprehensive understanding of both the internal and external factors influencing program implementation and outcomes. In TB control programs, input and process evaluations can reveal weaknesses in infrastructure, planning, and service delivery that directly affect treatment success.

METHODOLOGY

This research employed a qualitative case study approach. Data were collected from February to April 2025 through:

- In-depth interviews with program managers, health workers, cadres, patients, and PMOs;
- Observation of TB program implementation;
- Documentation including program reports and treatment data.

- Informants were selected using purposive sampling. Data analysis followed the interactive model by Miles and Huberman: data reduction, display, and conclusion drawing. Triangulation of sources and methods was used to ensure data validity.

RESEARCH RESULT

This section presents the results of the evaluation of the TB control program at Puskesmas Pulosari, focusing on the components of input and process.

Input Component:

1. Human Resources: The program is supported by general practitioners and nurses trained in TB management. However, the absence of a dedicated laboratory analyst for TB hinders the timeliness and accuracy of diagnosis. The workload of existing staff is high, and TB responsibilities are combined with other duties.

2. Facilities and Infrastructure: The health center has a laboratory equipped with a microscope for sputum testing. However, it lacks advanced diagnostic tools like GeneXpert (TCM), which is essential for detecting drug-resistant TB and confirming diagnosis quickly. Patients requiring GeneXpert testing must be referred to other facilities, which may delay treatment initiation.

3. Medicines and Logistics: Anti-TB drugs are supplied regularly and are generally sufficient. The health center follows the national TB drug supply system, ensuring standardized regimens. However, during periods of transition or delays in central supply, temporary shortages have been reported. Personal protective equipment (PPE) is available for staff handling TB cases.

4. Funding: The program receives budget allocations from the central government and support from the district health office. Funds are used for operational needs such as case detection, home visits, and community outreach. However, budget constraints sometimes affect training programs and transportation for follow-up visits.

Process Component:

1. Planning: Annual TB control planning is conducted in alignment with the District TB Elimination Plan and the National TB Control Strategy. Cross-sectoral coordination involves stakeholders including village leaders and community health workers (kader).

2. Case Detection and Diagnosis: TB suspects are identified through both passive and active case finding. Cadres assist in tracing suspected cases and encouraging them to visit the health center. However, some patients delay seeking care due to stigma or distance to the facility.

3. Treatment and Supervision: DOTS treatment is implemented, but not all patients have PMOs (treatment observers). In many cases, patients become

their own PMOs due to a lack of companions. This compromises adherence. Some PMOs are not well-trained, and their supervision is not well documented.

4. Monitoring and Evaluation: TB reporting is conducted through the SITB system. Staff regularly input patient data and treatment outcomes. Quarterly evaluations are held with district-level officials. However, dropout tracking is not yet effective, particularly for patients who migrate or cannot be contacted.

5. Community Involvement: Cadres play a role in education and case tracing. Nevertheless, their involvement is sometimes limited by a lack of incentives and training. Increased support for cadre capacity building is essential.

These findings highlight strengths in structured planning and resource provision, but also reveal critical gaps in diagnostic support, supervision, and community participation.

DISCUSSION

This study aimed to evaluate the implementation of the Tuberculosis (TB) control program using the DOTS strategy in Pulosari Public Health Center, focusing on both input and process components. The findings indicate that while the basic structure and policy alignment exist, several operational challenges still hinder the program's effectiveness in achieving optimal treatment outcomes.

1. Human Resources and Diagnostic Limitations

Although the health center has trained general practitioners and nurses, the absence of a dedicated laboratory analyst for TB is a significant bottleneck. A similar challenge was reported in studies by Pardede et al. (2021), which emphasized that the availability of trained diagnostic personnel directly influences early detection and prompt initiation of treatment. The absence of GeneXpert (TCM) machines for molecular TB testing also delays diagnosis and referral, especially in suspected drug-resistant TB cases. The reliance on conventional microscopy limits sensitivity and may contribute to underdiagnosis or misclassification.

2. Role of PMO and Treatment Supervision

The DOTS strategy emphasizes the importance of patient supervision through the appointment of a Treatment Observer (PMO). However, this study found that many patients in Pulosari are unsupervised, or act as their own PMO, especially among migrant workers or patients without family support. Previous research has shown that inadequate supervision is associated with lower adherence and increased risk of treatment default (Gopalaswamy et al., 2021). The lack of structured training and incentives for PMOs further weakens their performance and motivation.

1. Monitoring System and Reporting Challenges

Monitoring and evaluation are conducted through the SITB system and regular reporting to district-level TB officers. While SITB facilitates data management, it is not yet integrated with real-time field follow-up, which makes it difficult to respond quickly to dropouts or non-adherence cases. This supports findings by Zhang et al. (2025), who suggested that digital systems need to be complemented with responsive field action mechanisms.

2. Community Engagement and Cross-Sectoral Collaboration

The involvement of health cadres in TB education and case finding is one of the program's strengths. However, their effectiveness is often constrained by limited resources and training. Cross-sectoral collaboration, although included in the planning documents, is not consistently implemented. Strengthening partnerships with village governments, religious leaders, and schools can increase awareness and reduce stigma, as supported by WHO guidelines and local experience (Ministry of Health RI, 2023).

3. Policy Implications and Need for Program Strengthening

From a policy perspective, the study highlights the need for resource investment in diagnostic infrastructure and human resource development. It also underscores the importance of structured supervision and community-based support systems in achieving the DOTS targets. The low treatment success rate in 2024 (38%) reflects the urgent need to re-evaluate current approaches and reinforce both operational and behavioral components of the program.

CONCLUSIONS AND RECOMMENDATIONS

Based on the evaluation of the Tuberculosis control program using the DOTS strategy at the Pulosari Public Health Center, it can be concluded that the implementation has generally followed national guidelines; however, several operational weaknesses still hinder the program’s effectiveness. From the input aspect, the availability of general health personnel and TB medications is sufficient, but there is a shortage of specialized laboratory analysts and the absence of rapid diagnostic tools such as GeneXpert. These limitations affect early detection and the accuracy of diagnosis, particularly for drug-resistant TB cases.

In terms of process, planning and case detection are routinely carried out, and the SITB system supports data reporting and monitoring. However, in practice, there is inconsistency in patient supervision due to the limited availability or inactivity of Treatment Supervisors (PMO), especially among patients who live alone or are migrant workers. Although cadres and community involvement exist, their roles are still limited due to a lack of training and ongoing support.

To address these challenges, it is recommended that the health center strengthen diagnostic capacity through the procurement of GeneXpert or the establishment of effective referral mechanisms. Improving the performance of PMOs by providing structured training and incentives is also crucial to increase treatment adherence. Additionally, monitoring and evaluation systems need to be enhanced to allow real-time field responses, particularly in managing dropouts. Human resource development should be prioritized by assigning or training dedicated TB laboratory staff. Finally, community empowerment must be increased by enhancing the capacity of health cadres and encouraging more active cross-sectoral collaboration with local stakeholders.

These steps are expected to improve the quality and success of TB control efforts in rural areas and contribute to Indonesia's broader goal of TB elimination by 2030.

ADVANCED RESEARCH

This study has provided an in-depth evaluation of the DOTS-based TB control program at a primary health care level. However, there are still several areas that warrant further investigation to deepen understanding and strengthen TB elimination strategies.

Future research should explore the behavioral and sociocultural aspects that influence patient adherence to TB treatment, especially among populations without direct supervision or PMO support. In-depth qualitative studies on patient motivation, stigma, and the influence of family dynamics could provide valuable insights for designing more patient-centered interventions.

Moreover, quantitative research is needed to assess the effectiveness of current PMO models in rural and urban settings, comparing treatment success rates between supervised and unsupervised patients. Studies that evaluate the cost- effectiveness of investing in diagnostic technologies, such as GeneXpert, at the sub-district level would also be beneficial to inform health policy and resource allocation.

Additionally, implementation research that tests innovative models of community engagement—such as digital reminders, peer-support systems, or collaboration with religious and local leaders—could offer practical solutions for increasing treatment adherence and case detection in high-burden areas.

By building upon the findings of this study, future research can contribute to the development of more responsive, inclusive, and sustainable TB control programs at the grassroots level, in line with national and global TB elimination targets.

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