



Perceived Barriers among Primary Physicians in Tuberculosis Notification: A Cross-Sectional Study

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ABSTRACT:

Introduction: Tuberculosis (TB) remains a significant global health concern, where accurate reporting is crucial for effective control and prevention. However, under-reporting, particularly by primary physicians, poses a challenge to these efforts, contributing to inaccuracies in disease burden estimates and delays in treatment.

Objectives: This study aims to identify and analyze the factors contributing to the under-reporting of tuberculosis (TB) cases among primary physicians in Semarang City, Indonesia. Specifically, the study will investigate the relationships between physicians' knowledge, commitment, the presence of designated staff for notification, incentives for reporting, and the notification format, to determine how these factors influence TB case reporting.

Methods: This cross-sectional study investigates the factors influencing under-reporting of TB cases among primary physicians in Semarang City, Indonesia. The analysis examines factors such as physicians' knowledge, commitment, the presence of designated staff for notification, incentives for reporting, and the format of TB notifications. Spearman's correlation test was used to assess the relationships between these factors and under-reporting.

Results: The study reveals significant correlations between under-reporting and the factors examined. Knowledge, commitment, designated staff, and incentives all showed significant p-values ($\text{sig} < 0.05$). Spearman's correlation coefficients ranged from 0.245 to 0.750, indicating varying degrees of association with under-reporting.

Conclusions: Addressing under-reporting is essential for improving TB control. Enhancing physician awareness, optimizing reporting systems, and providing incentives for accurate notification are crucial steps. These targeted strategies will improve disease surveillance, enable timely interventions, and help prevent TB transmission and drug resistance, thereby improving public health outcomes.

1. Introduction

Under-reporting refers to the failure to formally document and report a substantial number of suspected tuberculosis (TB) cases to the National Tuberculosis Program (NTP), as noted by the Joint External Monitoring Mission on Tuberculosis in 2018 [1]. This

issue of under-reporting has significant repercussions, particularly in the realm of public health. One of the primary consequences is the distortion of estimates regarding the true burden of tuberculosis within a population or community. When a considerable number of cases remain unreported, it leads to inaccurate data



that skews planning and resource allocation, thereby obscuring the actual extent of the tuberculosis epidemic.

Furthermore, the delay in identifying and reporting tuberculosis cases can result in postponed treatment for affected individuals. Such delays not only compromise the health outcomes of those directly impacted but also contribute to the continued spread of the disease within the community. The unchecked transmission of tuberculosis increases the likelihood of developing drug-resistant strains, which are considerably more difficult and costly to treat. This scenario poses a significant challenge to healthcare systems.

Additionally, under-reporting exacerbates the mortality rate associated with tuberculosis. Without timely diagnosis and treatment, individuals with tuberculosis face a higher risk of severe complications and death. Consequently, under-reporting undermines efforts to control the disease, perpetuating a cycle of increased transmission, drug resistance, and mortality.

Addressing under-reporting is, therefore, critical for effective tuberculosis control and for mitigating its negative impacts on public health. By enhancing reporting mechanisms and ensuring prompt diagnosis and treatment, stakeholders can work towards reducing the tuberculosis burden and curbing the disease's spread [2-5].

The Inventory Study conducted in Indonesia between 2016 and 2017 revealed an estimated under-reporting rate of 41%, with a 95% confidence interval of 36% to 46%. This under-reporting primarily stems from various sources: public primary health care facilities (15%), hospitals (65%), and a combined category of primary physicians, clinics, and laboratories (96%) [6]. The impact of under-reporting significantly impedes tuberculosis prevention and control efforts, facilitating broader dissemination of the disease, increasing the risk of resistance emergence, and raising mortality rates.

Given that Indonesia ranks as the second country with the highest burden of pulmonary tuberculosis globally, with West Java, Central Java, and East Java being the provinces with the highest number of TB patients, and Semarang in Central Java having the highest incidence of pulmonary TB, it is crucial to investigate the factors associated with under-reporting among primary physicians in Semarang. Primary physicians often serve

as the first point of contact for many patients, making their role critical in the early detection and reporting of tuberculosis cases [7-8].

2. Objectives

This study aims to identify and analyze the factors contributing to the under-reporting of tuberculosis (TB) cases among primary physicians in Semarang City, Indonesia. Specifically, the study will investigate the relationships between physicians' knowledge, commitment, the presence of designated staff for notification, incentives for reporting, and the notification format, to determine how these factors influence TB case reporting. The goal is to provide insights for improving TB notification systems and enhancing control measures.

3. Methods

3.1. Research Design

This study utilized a cross-sectional design to address its research objectives. Cross-sectional studies are a type of observational research particularly suited for examining the under-reporting of tuberculosis cases among primary physicians. This design allows for the collection of data at a single point in time, enabling the assessment of the prevalence of under-reporting and the exploration of related factors. By measuring both exposure and outcome variables simultaneously, without the need for follow-up, this approach efficiently estimates prevalence rates and identifies associations within the population studied. The cross-sectional design thus provided a snapshot of the situation, offering valuable insights into the extent of under-reporting and its contributing factors among primary physicians.

3.2. Population and Sampling

The study focused on primary physicians, including those practicing in private clinics and those operating independently. Data from the Semarang City Health Service indicated that there are 1,351 general practitioners working in various settings, including hospitals, health centers, clinics, and independent practices. Semarang City is also home to 773 private healthcare facilities, which include 288 clinics and 485 independent practices. Participants were selected through random sampling to ensure they met the



predetermined inclusion criteria. Following this process, a total of 64 samples were identified and included in the study.

3.3. Validity and Reliability of the Study Instrument

To gather data, the study employed checklists and questionnaires focusing on three main areas: 1)background information, 2)demographic characteristics of tuberculosis patients, and 3)factors associated with under-reporting among primary physicians. Eleven items, adapted from a study conducted in India and modified for the current research context, were used to assess factors related to under-reporting. Permission was obtained for the use of these items, which demonstrated satisfactory validity and reliability [9].

The reliability assessment of the questionnaire showed a Cronbach's Alpha coefficient of 0.968, indicating excellent reliability. This high coefficient suggests that the questionnaire consistently measured the intended construct with minimal variation. Additionally, all items had Corrected Item-Total Correlation values above 0.60, demonstrating strong correlations between individual items and the overall questionnaire score. These findings confirm that each item effectively captured the intended construct, enhancing the questionnaire's validity. The high Cronbach's Alpha coefficient and significant item correlations validate the reliability and validity of the research instrument used in this study..

4. Results and Discussion

4.1 Respondents characteristics

Table 1. Respondents Characteristic

Characteristic	N	%
Length of time that the doctor has been practicing		
Less than 5 years	16	23.20
5-10 years	13	18.80
11 years and more	40	58.00
Number of TB patients treated in last 6 months		

0-5 patients	53	76.80
6-10 patients	9	13.00
More than 10 patients	5	10.10
Type of regimen prescribed		
Regimen A (daily)	35	50.70
Regimen B (thrice weekly)	34	49.30
Refer patient to government's healthcare facilities		
Yes	58	84
No	11	16
Notification experience		
Yes	23	33.30
No	46	66.70

4.2 Bivariate Analysis

In this study, the Spearman rank correlation test was used to evaluate the relationship between several variables and tuberculosis under-reporting among primary physicians in Semarang City. Specifically, the analysis examined correlations between doctors' knowledge, their commitment to notification, the presence of designated notification staff, and various factors related to the notification system, including the provision of incentives for notification and the types of notification formats used.

Table 2. Bivariate Analysis

Variables	The significance value of the correlation test	Rsquared
Doctor's knowledge regarding notification	Sig 0.000; <0.05	Sig 0.750
Doctor commitment to carry out notification	Sig 0.041; <0.05	Sig 0.245
Designated staff for notification	Sig 0.000; <0.05	Sig 0.679



purposes	
Incentives for notification purposes	Sig 0.000; Sig 0.750 <0.05
Type of notification format	Sig 0.000; Sig 0.542 <0.05

The results of the correlation test reveal that variables such as doctors' knowledge, commitment to notification, the presence of designated staff for notification, incentives, and the types of notification formats used all significantly correlate with the under-reporting of tuberculosis cases among primary physicians in Semarang City.

These findings align with a 2021 study conducted in India, which identified several factors impacting healthcare providers, including their knowledge, awareness, notification workload, stigma, and difficulties in obtaining comprehensive data from both patients and government sources. System-related factors such as notification methods and incentives were also found to be significant. The Indian study's results are consistent with our research, highlighting the importance of both healthcare provider-related factors (e.g., knowledge and workload) and system-related factors (e.g., notification methods and incentives) in ensuring accurate tuberculosis reporting. This suggests that the challenges and factors influencing tuberculosis reporting may be similar across various contexts, underscoring the broader relevance of our findings for improving tuberculosis surveillance and control efforts beyond Semarang City [10,14-27].

A study conducted in China further highlights additional factors contributing to under-reporting, including inadequately trained and overwhelmed healthcare personnel, insufficient supervision, weak accountability mechanisms, and a complex health information management system. These challenges illustrate the systemic issues that hinder accurate tuberculosis reporting. Addressing these problems is essential for enhancing surveillance and control efforts, ensuring more reliable data collection, and ultimately improving tuberculosis management strategies [11-13, 16-20].

5. Conclusion

The under-reporting of tuberculosis cases among primary physicians presents significant challenges to public health. This issue skews the understanding of the true burden of the disease, leading to misguided resource allocation and planning. Additionally, it causes delays in initiating treatment, perpetuates disease transmission, and contributes to the rise of drug-resistant strains. Our study identified key factors contributing to under-reporting, including the knowledge and commitment of healthcare providers, the presence of designated notification staff, incentives, and the formats used for reporting.

Addressing these factors is crucial for improving surveillance and control efforts, ensuring accurate data collection, and enhancing tuberculosis management strategies. The consistency of our findings with research conducted in other countries highlights the broader relevance and applicability of our results beyond Semarang City. Therefore, tackling the issue of under-reporting is a vital component of the global fight against tuberculosis and its adverse effects on public health. This underscores the need for targeted interventions and policy measures to strengthen tuberculosis surveillance and control efforts worldwide.

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