Factors associated with underreporting of tuberculosis cases among private healthcare providers in Semarang City

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Abstract

Tuberculosis (TB) continues to be a global public health challenge, with accurate case reporting being crucial for the implementation of effective control measures. In Semarang City, Indonesia, private healthcare providers play a pivotal role, yet the under-reporting of TB cases in this sector compromises the management and containment of the disease. This study investigates the factors influencing the under-reporting of TB cases among private healthcare providers and explores their consequences for public health strategies. The primary aim of this research is to elucidate the relationship between various determinants such as physicians' knowledge of TB notification protocols, their commitment to notification processes, the availability of dedicated staff for notification, incentive mechanisms, and the notification format used, and the phenomenon of TB case under-reporting. Methods: Employing the Spearman correlation coefficient, this study evaluates the associations between the identified factors and the under-reporting of TB cases. The findings indicate significant correlations between under-reporting of TB cases and several variables: the physicians' awareness of notification requirements, their commitment to notification procedures, the existence of incentives, the appointment of designated staff for notification tasks, and the format of the notification system (Sig < 0.05). Discussion: The under-reporting of TB cases hinders accurate disease surveillance and timely intervention, thereby perpetuating transmission and increasing the risk of drug-resistant TB strains. The results underscore the necessity for targeted interventions aimed at enhancing TB reporting practices among private healthcare providers. Enhancing these practices is crucial for strengthening the overall TB control strategy and protecting public health.

Keywords: Tuberculosis; Under-Reporting; Private Healthcare Provider

1. Introduction

Under-reporting is the term used to describe the situation where a significant portion of suspected tuberculosis cases are not formally documented and reported to the National Tuberculosis Program (NTP), as highlighted by the Joint External Monitoring Mission on Tuberculosis in 2018 [1]. Underreporting of tuberculosis cases has far-reaching implications, notably in the realm of public health. One significant impact is the distortion of estimates regarding the actual burden of tuberculosis within a community or population. When a substantial number of cases go unreported, it skews the data used for planning and resource allocation, leading to inaccuracies in understanding the true scale of the tuberculosis epidemic. Moreover, the failure to promptly identify and report tuberculosis cases can result in delays in initiating treatment for affected individuals. This delay not only jeopardizes the health outcomes of those directly affected but also facilitates the ongoing transmission of the disease within the community. As tuberculosis spreads unchecked, there is an increased risk of transmission, which in turn contributes to higher rates of drug-resistant tuberculosis strains. These drug-resistant strains are much harder and more expensive to treat, posing a significant challenge to healthcare systems. Additionally, the mortality rate associated with tuberculosis can be exacerbated by underreporting. Without timely diagnosis and treatment, individuals with tuberculosis are at a heightened risk of experiencing severe complications and even death. Thus,

underreporting not only undermines efforts to control the spread of tuberculosis but also perpetuates a cycle of increased transmission, drug resistance, and mortality associated with the disease. In essence, addressing the issue of underreporting is crucial for effectively combating tuberculosis and mitigating its adverse impacts on public health. By improving reporting mechanisms and ensuring timely diagnosis and treatment, stakeholders can work towards reducing the burden of tuberculosis and preventing the further spread of this infectious disease [2]–[5]. The Indonesia's Inventory Study conducted between 2016 and 2017 revealed that the estimated rate of underreporting stands at 41% (with a 95% confidence interval ranging from 36% to 46%). This underreporting primarily originates from various sources, including public primary health care facilities (15%), hospitals (65%), and a combined category comprising independent general practitioners, clinics, and laboratories (96%) [6].

Underreporting significantly hampers the prevention and control efforts against tuberculosis transmission. It can lead to the broader dissemination of tuberculosis within communities, thereby heightening the risk of resistance emergence and elevating mortality rates associated with tuberculosis. Considering these concerns, it is clear that tackling the underreporting of tuberculosis cases within the private healthcare sector is a pressing matter that demands urgent attention.

2. Materials and Methods
2.1 Research Design
The cross-sectional design was employed to achieve the research objectives. Cross-sectional studies, a type of observational research, were suitable for investigating the underreporting of tuberculosis cases among private healthcare providers. By collecting data at a specific point in time, researchers could assess the prevalence of underreporting and explore associated factors. These studies involve the simultaneous measurement of exposure and outcome variables without requiring follow-up periods. Making them efficient for estimating prevalence rates and identifying associations within a given population. The cross-sectional design allowed researchers to capture a snapshot of the situation, providing valuable insights into the extent of underreporting and potential contributing factors among private healthcare providers.

2.2 Population and Sampling
The research population for this study consisted of doctors employed within the private healthcare service sector, specifically those working in private clinics and/or operating independently. According to data from the Semarang City Health Service, 1351 general practitioners are practicing across hospitals, health centers, clinics, and independent practice settings. Additionally, Semarang City is home to 773 private healthcare facilities, comprising 288 clinics and 485 private doctor's practices. For this study, we conducted random sampling and evaluated whether the selected samples met the predetermined inclusion criteria. Following the random selection process and considering the predetermined inclusion criteria, the total number of samples to be included in the study was determined to be 64.

2.3 Validity and Reliability of The Instrument
The study utilized checklists and questionnaires to gather information on three main areas: 1) background data, 2) demographic characteristics of TB patients, and 3) factors associated with underreporting in private healthcare providers. Eleven items were employed to assess factors related to underreporting in the private health sector, adapted from a study conducted in India and modified to suit the current research context. Consent was obtained for the use of these items, and they demonstrated satisfactory validity and reliability [7].

The reliability assessment revealed a Cronbach's Alpha coefficient of 0.968, indicating excellent reliability of the questionnaire. This suggests consistent measurement of the construct under investigation with minimal variation. Furthermore, all items showed Corrected Item-Total Correlation values exceeding 0.60, indicating strong correlations between individual items and the overall questionnaire score. This confirms the effectiveness of each item in capturing the intended construct, thus enhancing the questionnaire's validity. The high Cronbach's Alpha coefficient and significant correlations between items and the total score validate the reliability and validity of the research questionnaire utilized in the study.

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3. Results and Discussions
3.1 Respondents Characteristics

Characteristic	N	%
Practice facilities		
Independent private practice	36	52
Clinics	14	20
Others (hospital, pharmacy, joint ventures, lab, etc)	19	28
Length of time that the doctor have 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

3.2 Bivariate Analysis
In this study, the Spearman rank correlation test was employed to assess the correlation between doctor's knowledge, commitment regarding notification, presence of designated notification staff, as well as notification system-related factors including the provision of incentives for

notification and the types of notification formats utilized and tuberculosis under-reporting in the private healthcare provider of Semarang City.

Table 2. Bivariate Analysis

Variables	The significance value of the correlation test	RR
Doctor's knowledge regarding notification	Sig 0.000; Sig <0.05	0.750
Doctor commitment to carry out notification	Sig 0.041; Sig <0.05	0.245
Designated staff for notification purposes	Sig 0.000; Sig <0.05	0.679
Incentives for notification purposes	Sig 0.000; Sig <0.05	0.750
Type of notification format	Sig 0.000; Sig <0.05	0.542

The correlation test results indicate that the variables of doctor's knowledge, doctor's commitment, designated staff for notification purposes, incentives, and the type of notification format used have a significant correlation with the underreporting of tuberculosis cases among private healthcare providers in Semarang City.

This corresponds with a study conducted in India in 2021, which highlighted that factors associated with healthcare providers include knowledge, awareness, workload related to notification, stigma, and challenges in obtaining comprehensive data from patients as well as from government sources. Factors concerning the notification system encompass the method and incentives for notification. These findings from the Indian study are consistent with our research outcomes, emphasizing the importance of healthcare provider-related factors such as knowledge and workload, as well as system-related factors like notification methods and incentives, in influencing the accurate reporting of tuberculosis cases. This suggests that similar challenges and factors may be prevalent across different contexts, indicating the relevance and applicability of our findings beyond Semarang City. Such insights are crucial for informing targeted interventions and policy measures to enhance tuberculosis surveillance and control efforts not only in Semarang City but also in other settings facing comparable challenges [8]. A study at China reveals factors contributing to underreporting include inadequately trained and overwhelmed healthcare personnel, insufficient supervision, inadequate accountability mechanisms, and a complex health information management system. These factors underscore the challenges faced within the healthcare system that hinder accurate reporting of tuberculosis cases. Addressing these issues is imperative for improving surveillance and control efforts, ensuring more reliable data collection, and ultimately enhancing tuberculosis management strategies[9]–[11].

4. Conclusions

Underreporting of tuberculosis cases within private healthcare providers poses considerable challenges to public health. This phenomenon distorts the perception of the actual disease burden, leading to inaccuracies in resource allocation and planning. Moreover, it engenders delays in the initiation of treatment, perpetuates disease transmission, and fosters the emergence of drug-resistant strains. In our study, we identified several significant factors associated with underreporting, including healthcare provider knowledge, commitment, designated notification staff, incentives, and the format of notification used.

Effectively addressing these factors is paramount for bolstering surveillance and control efforts, ensuring the reliability of data collection, and refining tuberculosis management strategies. Our findings resonate with similar research conducted in various countries, indicating the wider relevance and applicability of our results beyond the confines of Semarang City. Consequently, confronting the issue of underreporting emerges as a crucial imperative in the collective endeavor to combat tuberculosis and mitigate its detrimental effects on public health. This underscores the urgency for targeted interventions and policy measures aimed at enhancing tuberculosis surveillance and control efforts on a global scale.

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