Tuberculosis (TBC) services and facility vignettes associated with new TBC cases found in community health center/sub-center: Analysis of Indonesia Family Life Survey

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Abstract: Indonesia is one of the countries with the highest burden of tuberculosis (TB) in the world. Community health centers and health posts, as primary health facilities, play an important role in the detection and treatment of TB in the community. The purpose of this study was to analyze health services and tuberculosis facilities in community health centers/health posts with new cases of TB in Indonesia. This study used secondary data from the 5th Indonesia Family Life Survey in 2014/2015. This study focused on the level of public health services with new cases of TB as the main outcome. The sample of this study used 955 community health centers/health posts spread throughout Indonesia. Univariate, Chi square and binary logistic regression were used to present the main results of this study. This study revealed that the availability of TB services in health facilities, especially community health centers/health posts and government health offices, is a crucial factor in diagnosing new TB cases. However, spontaneous contact with TB patients and a history of TB did not significantly affect new TB cases. Therefore, increasing access to services, especially in rural areas and sub-health centers, as well as support for diagnostic resources and training of medical personnel are needed to improve early detection and comprehensive control of TB.

Keywords: Tuberculosis (TBC), Health facility, Health services, Puskesmas/pustu, Stigma of TB

INTRODUCTION

An infectious disease caused by Mycobacterium tuberculosis, tuberculosis (TB) most often affects the lungs. When someone with tuberculosis coughs, sneezes, or spits, tuberculosis can spread through the air (Miggiano et al., 2020; Sagavkar & Devkar, 2018). Respiratory disorders, such as coughing and shortness of breath, are caused by TB bacteria that attack the lungs (Organization World Health, 2020). Night sweats and fever are other symptoms commonly experienced by TB sufferers (Allwood et al., 2021; Divala et al., 2022). Treatment for tuberculosis usually requires months of treatment and a strict regimen of taking medication to prevent antibiotic resistance. Mycobacterium tuberculosis bacteria can infect the lining of the brain, kidneys, bones,

joints, lymph nodes, or other parts of the body. This infection is known as extrapulmonary TB (Organization World Health, 2010; Suárez et al., 2019)

As many as 10 million people die from tuberculosis each year. Although TB is preventable and curable, 1.5 million people die from it each year, making it the world's leading infectious disease. In addition, low- and middle-income countries have the highest rates of TB cases (Shang et al., 2024; Williams, 2024). The World Health Organization (WHO) reports that India, India, and the Philippines are the countries that contributed the most to the increase in TB cases worldwide in 2020 and 2021. TB cases in Indonesia are estimated at 969,000 cases (one person every 33 seconds), up 17% from the 824,000 cases found in 2020. The incidence of TB in Indonesia is 354 cases per 100,000 population, meaning that 354 of them suffer from TB (Organization World Health, 2022).

Puskesmas (Community Health Center) and Pustu (sub-health center) as primary health facilities have a crucial role in the detection and handling of tuberculosis (TB) in the community. These two facilities are at the forefront of the TB control program, especially in rural and remote areas (Pradipta et al., 2022). The health center is responsible for conducting initial screening, diagnosis, and providing treatment in accordance with national protocols, as well as providing education to the community about TB prevention and transmission. In addition, the health center also conducts contact tracing to detect new cases in the immediate environment of active TB patients (Essenzi, 2024; Karki et al., 2017). On the other hand, health centers function as an extension of health centers in reaching people in hard-to-reach areas, ensuring that access to health services remains equal, and helping to monitor patient compliance in undergoing treatment (Iswandari et al., 2023). Collaboration between these two facilities is crucial in accelerating TB elimination through a continuous promotive, preventive, curative, and rehabilitative approach. However, the discovery of new TB cases in Indonesia still faces various challenges, especially in terms of early detection and the quality of services provided at the primary care level (Nurliana et al., 2024).

One of the main factors influencing the success of finding new cases of TB in community health centers and health posts is the availability of health facilities and resources (Ruru et al., 2018). The performance of health workers is greatly influenced by the competencies they possess (Indarjo et al., 2022). In some areas, efforts to find active cases have not been optimal due to limited resources, both in terms of infrastructure and the skills of health workers (Handayani & Isworo, 2024).

In addition, the low level of public awareness regarding TB symptoms and the importance of early examination also contributes to the low rate of detection of new cases (Fuady et al., 2024). The strong social stigma against tuberculosis (TB) sufferers is often a barrier for people to check themselves at health facilities (Datiko et al., 2020). This negative view makes people infected with TB afraid of being discriminated against, shunned by their environment, or considered a source of disease transmission (Chen et al., 2023). As a result, many individuals prefer to hide symptoms or delay treatment, even though they are aware of the health risks (Baskaran et al., 2023). This stigma not only worsens the personal health of sufferers, but also hinders efforts to prevent and control TB more widely in society (Fuady et al., 2023). To address this problem, a comprehensive approach is needed, including more intensive public education and psychosocial support for sufferers so that they feel safe to seek medical care without worrying about negative social reactions (Liboon Aranas et al., 2023).

The Indonesian government has made efforts to increase the discovery of new cases of TB through various national programs such as the Find Treat Until Cured (TOSS) TB Movement. This program aims to encourage early detection and appropriate treatment for TB patients. However, its implementation in the field still needs to be improved, especially in terms of strengthening the network between health centers, health posts, and other health facilities in the region. To assist the government's role, this study aims to analyze tuberculosis (TB) services and facilities related to the discovery of new cases of TB in health centers/health posts throughout Indonesia.

METHOD

This study used secondary data from The Indonesian Family Life Survey (IFLS) which is an on-going longitudinal survey in Indonesia. The sample is representative of about 83% of the Indonesian population and contains over 30,000 individuals living in 13 of the 27 provinces in the country. The fifth wave of the IFLS (IFLS-5) was fielded 2014-15. In terms of ethical clearance, the IFLS surveys and their procedures were properly reviewed and approved by IRBs (Institutional Review Boards) in the United States (at RAND) and in Indonesia at the University of Gadjah Mada (UGM). The fifth wave of the Indonesian Family Life Survey (IFLS5) is a continuation of IFLS, expanding the panel to 2014/2015.

This current study focuses on community health service level with TB new cases findings as the main outcome. The community health services are including government health center

(pusat kesehatan masyarakat/puskesmas) and government health sub-center (pukesmas pembantu/pustu). For each EA (enumeration area) provided by Statistics Indonesia, it was compiled a list of facilities in each health facility stratum from household responses about the names and locations of facilities the respondent knew about. The names and locations provided were added to the sampling frame. The final stratum quota was three government health centers and subcenters per each EA (Strauss et al., 2016). This study used all government center and sub-centers which was 955 units.

There are three questionnaires for each sample that could be answered by head of health center or other representative. This study used the variables from all questionnaires. The outcome of this study is new cases found which retrieved from question: Are there any finding of new patients of positive TB BTA in this puskesmas/pustu in the last 12 months? (yes/no).

The main independent variables are TB service and TB vignettes. TB service was recognized from question: Is there any medical treatment for tuberculosis [TBC]? (yes/no). Moreover, TB vignettes are retrieved from questions: Mr.Widyono came to this facility with a complaint of coughing and a fever. Now I would like to ask you exactly what you would do for this patient.

- What questions do you ask the patient about his cough and fever, and current health? Any contact with others with respiratory problems/TB?
- What questions do you ask the patient about his medical history and behavior? Previous TB case or took TB medicine?
- What laboratory examinations would you conduct? Sputum exam for TB

The possible answers are (mentioned spontaneously/not). The control variables in this study are including region (urban/rural), type of facility (government health center/ sub-center), number of villages coverage (min to mean/mean to max), number of employee, and have laboratory service (yes/no).

This study analyzed the data by univariate, bivariate, and multivariate. The univariate analysis was done with frequency and percentage for categorical variables and mean, standard deviation, minimum, and maximum for continuous variable. The bivariate analysis was done using Chi-square test and t-test to examine the association between each independent variable and outcome. The multivariate analysis using binary logistic regression was done to examine the association between all independent variables and outcome with 95% confidence interval as the cut off. All the analysis was utilized STATA version 17 software.

RESULTS

Table 1 shows the distribution of general characteristics of respondents related to TB cases. Most respondents (76.34%) were newly discovered TB cases, with TB services available to 76.02% of them. Most respondents had no history of spontaneous contact with TB patients (61.36%), and 72.88% had no previous history of TB. Distribution by location showed that the majority of respondents were in urban areas (71.83%). The most widely available type of health service was government sub-health centers (69.84%), and 62.83% of facilities provided laboratories.

Table 1. The general characteristics of the sample (n = 955)

Variable	Frequency	Percentage
New TB cases found		
No	226	23.66
Yes	729	76.34
TB service provided		
No	229	23.98
Yes	726	76.02
Contact TB spontanoesly		
No	586	61.36
Yes	369	38.64
Previous TB		
No	696	72.88
Yes	259	27.12
Sputum TB		
No	462	48.38
Yes	493	51.62
Health care location		
Urban	686	71.83
Rural	269	28.17
Type of health care		
Government health centre	288	30.16
Government health sub-centre	667	69.84
Number of villages covered		
1 to 6	614	64.29
7 to 98	341	35.71
Number of employee	mean = 32.44	Min/Max= 1/198
Laboratory provided		
No	355	37.17
Yes	600	62.83

Table 2 analyzes the relationship between various variables and new TB cases. Availability of TB services showed a significant correlation with the detection of new TB cases (p<0.001), with 81.13% of those with TB services experiencing new cases. In addition, the location of health facilities in urban areas was also correlated with increased TB cases (p<0.001), and government sub-center health facilities had higher rates of new TB cases than government health centers.

Table 2. The correlation between each independent variable and new TB cases found (n = 955)

Variable	TB cases found		Total	Chi² (p-value)
	No (%)	Yes (%)		
TB service available				38.52***
No	38.86	61.14	229	
Yes	18.87	81.13	726	
Contact TB spontanoesly				4.34*
No	25.94	74.06	586	
Yes	20.05	79.95	369	
Previous TB spontanoesly				0.05
No	23.85	76.15	696	
Yes	23.17	76.83	259	
Sputum TB spontanoesly				4.34*
No	26.62	73.38	462	
Yes	20.89	79.11	493	
Health care location				15.61***
Urban	20.26	79.74	686	
Rural	32.34	67.66	269	
Type of health care				375.73***
Government health centre	64.24	35.76	288	
Government health sub-centre	6.15	93.85	667	
Number of villages covered				75.54***
1 to 6	32.57	67.43	614	
7 to 98	7.62	92.38	341	
Number of employee	COR = 1.08*** (1.07 – 1.09)			
Laboratory provided				258.17***
No	52.39	47.61	355	
Yes	6.67	93.33	600	

Table 3 shows the results of logistic regression analysis for factors associated with the discovery of new TB cases. Availability of TB services showed a significant odds ratio (Adj OR=1.74; p=0.011), indicating an increased likelihood of finding new TB cases in facilities with TB services. The type of health service was also an important factor, with government health centers having the highest odds ratio (Adj OR=11.19; p<0.001). The number of employees in health facilities was also positively correlated with the discovery of new TB cases (p=0.031).

Table 3. Adjusted odd ratio of factors associated with new TB cases found (n = 955)

Variable	Adj Odd Ratio	95% Conf. Interval		*p-value*
		Lower	Upper	
TB service available				
No	*Ref*			
Yes	1.74	1.14	2.67	**0.011***
Contact TB spontanoesly				
No	*Ref*			
Yes	1.28	0.84	1.96	0.246
Previous TB spontanoesly				
No	*Ref*			
Yes	0.83	0.52	1.31	0.416
Sputum TB spontanoesly				
No	*Ref*			
Yes	1.07	0.72	1.60	0.738
Health care location				
Urban	*Ref*			
Rural	0.82	0.54	1.26	0.373
Type of health care				
Government health centre	11.19	5.07	24.71	**0.000****
Government health sub-centre	*Ref*			
Number of villages covered				
1 to 6	*Ref*			
7 to 98	0.98	0.54	1.78	0.953
Number of employees	1.02	1.00	1.04	**0.031***
Laboratory provided				
No	*Ref*			
Yes	1.17	0.55	2.47	0.687

*p-value <0.05, p-value <0.01, ***p-value<0.001, Pseudo R2 = 0.3616, Log likelihood = -333.5918

DISCUSSION

The study reveals that TB services available in health facilities are crucial for addressing new cases, with 81% of facilities providing them addressing more cases than those without. Access to TB services is essential for diagnosis, treatment, and information provision. The study also highlights the importance of type of health care and infection in determining new cases. The number of employees in a facility also impacts the detection of new TB cases, with laboratories showing a higher detection rate (93.33%).

Health services are crucial in reducing cases and treatment outcomes for TB patients. This is especially important in countries with high healthcare costs and high mortality rates. Effective health services involve patients understanding the disease and having access to facilities for diagnostic and treatment services. A study in Nigeria found that improved health services are a key to effective TB diagnosis and treatment (Bethrand, 2023). In Cambodia, the integration of public-private programs has been identified as a crucial aspect for addressing undiagnosed issues and utilizing technological solutions for local health promotion. (Teo et al., 2023).

A study in Tanzania found that diabetes management facilities have a high TB service, and integrating it into the existing health service network can reduce TB symptoms, especially between patients and comorbid conditions (Shayo & Shayo, 2019). Integration of this is also crucial in Ukraine's healthcare system, ensuring the provision of essential services for effective TB treatment (Gils et al., 2020). The challenge, which differs to health facilities and economic constraints, is the ability of individuals to seek care, but in low-resource settings (Ereso et al., 2020). This is compounded by spatial disparities in service availability, which can create significant gaps in care for underserved populations (Odume et al., 2023).

The influence of spontaneous and history of tuberculosis (TB) on identifying new TB cases is a crucial research topic in the context of active TB diagnosis and treatment strategies. Uganda's study identifies social factors contributing to TB cases, emphasizing the need to manage spontaneous and structured TB treatment (Castellanos et al., 2020). The study conducted in Peru found that active case detection not only identifies new cases but also increases the risk of TB between cases, affecting the effectiveness of contact counseling (Saunders et al., 2019). Early identification of contacts, especially those with a history of TB, can create a ripple effect in community awareness and subsequent case detection, and health interventions in Nigeria are health. Study in Kampala, Uganda, reveals that individuals may be more susceptible to TB cases due to their social environment, potentially leading to a higher incidence of new infections (Quach et al., 2022). This emphasizes the importance of understanding the social context surrounding the TB outbreak, especially in the context of the potentially severe spontaneous outbreak.

The detection of new tuberculosis (TB) cases varies significantly based on the location and type of health facilities. Urban facilities have a higher detection rate than rural ones, possibly due to better health infrastructure and availability of medical personnel. Government health centers have a higher odds ratio of detecting new cases, suggesting that strengthening rural and sub-health centers could improve TB detection in remote areas. Studies reveal that in urban areas like Lima,

Peru, most TB patients don't receive a diagnosis on their first visit, highlighting a significant knowledge gap among health professionals (Bonadonna et al., 2018). This gap can be attributed to a variety of factors, including the availability of diagnostic resources and training of health care providers in urban health facilities.

A study in Kaduna State, Nigeria, revealed inconsistent implementation of TB diagnosis and treatment guidelines in primary health care centers, leading to delays in diagnosis and treatment (Suleiman et al., 2021). In Ethiopia, a study found that TB diagnoses are primarily made in hospitals, indicating a referral pattern that may delay timely treatment initiation, highlighting the need for improved training and resources in Public Health Care (Asres et al., 2019). Similarly, systematic reviews show that incarcerated populations often experience higher rates of TB due to limited access to health services, underscoring the need for targeted screening and treatment programs in these high-risk settings (Cords et al., 2021).

CONCLUSION

In sum, the study reveals that TB service quality in health facilities, particularly in police and government health departments, is a key factor in diagnosing new TB cases. Quality staff and laboratory facilities are also crucial for enhancing diagnosis. Despite spontaneous contact with TB patients and TB patients, quality service is the main factor. Therefore, improving service quality, particularly in health departments and health care facilities, and improving diagnostic resources and medical training are recommended. The study also suggests that public education on TB detection and treatment should be implemented to promote effective diagnosis and treatment.

Conflict of Interest

All of authors declare that they have no conflict of interest.

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