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Factors Associated with The Incidence of Pulmonary Tuberculosis in Lebak District, Banten Province, Indonesia

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Abstract
Introduction: Pulmonary tuberculosis (TB) is a chronic disease caused by *Mycobacterium tuberculosis*. The prevalence of pulmonary TB is increasing every year. The previous studies found that knowledge, physical condition of the house, gender and education level are the well-known of factors associated with the TB cases. This study aims to determine the factors associated with the incidence of Pulmonary TB at Puskesmas Maja, Lebak Regency, Banten Province, Indonesia.
Methods: Case control study design was used in this study. Total 20 cases and controls were recruited. Cases are individuals aged over 15 years with pulmonary tuberculosis who were confirmed by sputum examination with acid-fast staining (BTA+) showing the presence of *Mycobacterium tuberculosis*. Controls were individuals with negative sputum examination results. A purposive sampling technique was used to find the defined-case and control groups. A study questionnaire was used to collect the determinant factors and house condition parameter was measured directly. The chi-square test was used to determine the association of each variable related to TB incidence.
Results: The demographic data showed that the majority of TB patients in Puskesmas Maja were male who had an elementary to high school education level and had a low level of knowledge and unhealthy physical conditions of the house. The results of bivariate analysis showed that there was a significant relationship between gender, education level, knowledge, and physical condition of the house with the incidence of pulmonary TB at Puskesmas Maja, Lebak Regency.
Conclusion: This study concludes that all four variables have a significant relationship with the occurrence of Pulmonary TB at Puskesmas Maja, Lebak Regency. The results of this study can be a source of reference for further research and also become the basis for overcoming pulmonary TB in Banten Province in particular and in Indonesia

Keywords: Pulmonary TB, Banten Province, Indonesia

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Introduction

Mycobacterium tuberculosis is an agent of infectious disease causing tuberculosis disease. Tuberculosis mostly affects the lungs (pulmonary TB), but it can also affect other organs. Tuberculosis spreads mostly through the air (coughing, laughing, and sneezing) by producing droplets (Kemenkes RI, 2014). Hygiene has a significant impact on the presence of *Mycobacterium tuberculosis*, which can live for 1-2 hours or up to several days or weeks depending on the presence or absence of

sunlight, ventilation, humidity, walls, floors, and the density of the house occupants.[1]

Environmental health problems are consequences of a variety of factors, including poor environmental conditions, both in terms of quality and quantity, and poor hygiene practices. These factors result in a variety of diseases, including tuberculosis. Pulmonary tuberculosis (TB) is a major global health issue that kills millions of people each year. According to a 2015 WHO estimate, there were 9.6 million cases of pulmonary tuberculosis worldwide in 2014, with Southeast Asia and the Western Pacific region accounting for 58% of cases and Africa accounting for 28%. TB killed 1.5 million individuals worldwide in 2014. Tuberculosis ranks second after Human Immunodeficiency Virus (HIV).[2]

Indonesia is a Southeast Asian country with the world's second highest number of tuberculosis cases.[2] According to a 2015 WHO report, TB cases in India and Indonesia accounted for 23% and 10% of all cases in 2014. Banten Province, along with West Papua, Papua, NTT, Gorontalo, and Bengkulu, has the highest prevalence of infectious diseases. According to the Banten Provincial Health Office, there were about 4,688 cases with a cure rate of (59.7%) in 2014.[3]

Moreover, in 2014, there were 1,483 new tuberculosis patients, and there were 1,369 pulmonary TB patients in 2015 in Lebak regency. Meanwhile, data from Maja Community Health Center reported that there were 34, 92, and 40 patients in 2018, 2019, 2020, respectively. [3]Thus,the incidence rate of pulmonary tuberculosis at the Maja Community Health Center is still relatively high and is among the highest in Lebak Regency. The aim of this research is to determine the factors associated with the occurrence of pulmonary tuberculosis in the working area of the Maja Community Health Center, Lebak Regency, Banten Province.

Methods

Study design

This study used a case control study with a quantitative design. Primary and secondary data were collected. Primary data was collected through interviews using study questionnaires conducted between September 2021 and January 2022.

Eligibility criteria and variables

Cases were all pulmonary tuberculosis age >15 years old who lived in service area of Maja Community Health Center and were recorded in the pulmonary register book in 2020 with *Mycobacterium tuberculosis* BTA (+). Controls were individuals aged >15 years living in the same area, otherwise whose sputum examination showed negative *Mycobacterium tuberculosis*. The independent variables in this study were housing conditions, knowledge, education, gender, and age, while the dependent variable was the pulmonary tuberculosis.

Data collection

All pulmonary TB suspects met the eligibility criteria were deemed as cases and controls. Purposive sampling technique was used in this study, with a sample population determined by matching. The study questionnaire was used to collect the data with interview. The floor and ventilation were measured and observed directly.

Statistical analysis

A univariate analysis with category and percentage table were showed. The chi square test was used for bivariate analysis to find the significant association, with a significance level *p value* < 0.05.

Results

Total 20 patients with BTA (+) (case) and 20 suspects with BTA (-) (control) were involved in this study (**Table 1**). The majority of male participants who were diagnosed with pulmonary tuberculosis in Community Health Center of Maja Lebak Regency had an education level of elementary to high school (70%). However, more pople with pulmonary TB had poor knowledge on TB compared to the control groups. More subjects diagnosed with pulmonary TB were found living in low-standard healthy houses. The Chi-square test results revealed a significant

relationship between gender, education level, knowledge, and the housing environment and the incidence of Pulmonary TB in Community Health Center of Maja, Lebak Regency (p<0.05).

Table 1. Association between cases and controls with gender, education level, knowledge, and housing environment

	Pulmonary TB		Control		OR (95% CI)	*p* value
	n	%	n	%		
Gender						
Male	14	70	2	10	15.00	0.01
Female	6	30	18	90		
Education level						
Secondary	14	70	2	10	15.00	0.01
Higher Education	6	30	18	90		
Knowledge						
Poor	14	70	2	10	15.00	0.01
Good	6	30	18	90		
Housing environment						
Poor	14	70	6	30	5.44	0.02
Good	6	30	14	70		

Discussion

This study showed a significant relationship between gender, education level, knowledge, and the physical condition of the houses. The findings of this study are consistent with those of Siregar et al., Marleni et al., Samsugito, Sutarto, Susiyanti et al.[4–7] Males are more likely than women to develop pulmonary tuberculosis due to differences in behavior and lifestyle. For example, men smoke more actively and passively than women. However, the findings of this study was different from those of Andayani et al[8] which found that gender was not the only predictor to get infected by TB. If the person lives in a healthy lifestyle, does not smoke, and does not consume alcohol, that person is unlikely to be infected with pulmonary tuberculosis.

In addition to gender, a low level of education is a triggering factor for infection with TB germ. According to this study, the majority of respondents diagnosed with pulmonary tuberculosis have a low level of education, elementary to high school. This study also found that knowledge about pulmonary tuberculosis was not obtained fully about transmission, treatment and prevention measures. The findings of this study are consistent with Absor et al. and Apriliasari et al. It is well known that a person's level of education is directly related to the proportion of knowledge about pulmonary tuberculosis disease. Education is a continuous learning process that can be obtained by learning from one's surroundings. Education is considered adequate when a person or teacher transfers the knowledge from one person to another.[9,10] A person learns a variety of skills and knowledge as a result of the educational process. People with a high level of education will easily absorb various types of information, which will also affect their income level. Education can influence a person's learning process; the higher one's level of education, the easier it is to receive or digest information.[11]

This study found that there was a significant relationship between knowledge and the incidence of pulmonary tuberculosis at the Maja Community Health Center. The findings of this study are consistent with those of Kurniasari et al. and Febriansyah et al.[12,13] Which stated that knowledge is essential, and health workers must provide it to the community through periodic educational activities about Lung TB so that people understand

it. Although some people are only in elementary school or are not in school, if health workers educate the community on a regular basis and use simple language, the community's knowledge of Lung TB will improve.

The majority of respondents live in poor or unhealthy housing conditions, such as a lack of ventilation, lighting, and densed-houses with house occupants. One of the causes of poor housing conditions is economic factors. Because of this condition, there are still cases of pulmonary tuberculosis in the area. The community is unaware of their family members' disease, how it is transmitted, and how to prevent it, resulting in other family members becoming infected with Pulmonary TB infection. The findings of this study are supported by research by Kurniasih and Triyantoro et al. and Rappe et al. who found that healthy physical conditions in the houses can prevent the spread of Lung TB germs among family members.[12,14] The physical condition of an unhealthy house includes such as lack of air ventilation, lack of air circulation, the number of family members, and a dirt floor. These conditions cause the house to become humid, making Lung TB germs thrive. Residents will experience shortness of breath as a result of high residential density.[15]

Conclusion

The results of this study indicate that there are significant relationship between gender, education, knowledge, and housing conditions with the occurrence of pulmonary tuberculosis in the working area of the Maja Community Health Center, Lebak Regency, Banten Province.

Ethics approval

The researcher obtained a research permit from the UPTD Puskesmas Inpatient Maja, Lebak Regency, prior to conducting the study. All respondents provided an informed consent prior to data collection. The researcher ensures the confidentiality of the research findings, as well as information and other issues concerning the respondent.

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Author Contribution

RL prepared the research proposal (including background, research framework, research design, and questionnaire) and made significant contributions to the manuscript. DH conducted data processing, analysis, and interpretation. BRR searched for necessary references and collected field data.

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