THE RELATIONSHIP OF HOME PHYSICAL ENVIRONMENT AND FAMILY HISTORY WITH PULMONARY TUBERCULOSIS IN GUNUNG TABUR

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Article Info

ABSTRACT

The Relationship of Home Physical Environment and Family History with Pulmonary Tuberculosis in Gunung Tabur. *Tuberculosis (TB) is a contagious lung infection that remains a significant public health problem, with a total of 92 cases reported in the Gunung Tabur Health Center working area. Physical environmental conditions of the household and family history are suspected to influence the transmission of this disease. This study employed a quantitative approach with a cross-sectional design. The research sample comprised 48 respondents, selected using a simple random sampling technique from the population of pulmonary TB patients. Data were collected through observation, interviews, and questionnaires, and subsequently analyzed using the Chi-Square test. The analysis revealed a significant relationship between air humidity (p = 0.049) and room temperature (p = 0.038) and the incidence of pulmonary TB. In contrast, no significant relationships were observed for lighting (p = 0.098), residential density (p = 0.078), and family history (p = 0.670). In conclusion, household physical environmental conditions, particularly suboptimal air humidity and room temperature, are associated with the incidence of pulmonary TB in the Gunung Tabur Health Center working area.*

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INTRODUCTION

Tuberculosis (TB) remains a contagious disease and a significant global health problem[1]. According to the World Health Organization (WHO), there were 10 million new TB cases worldwide in 2020, resulting in 1.5 million deaths[2]. Indonesia is classified as a high-burden TB country, with higher incidence observed in densely populated areas and households with substandard physical conditions[3]. Risk factors for pulmonary TB include individual health conditions such as HIV/AIDS and diabetes, as well as environmental and socioeconomic factors[4]. Although numerous studies have examined TB risk factors in general, there is a data gap specific to Berau Regency, particularly in the Gunung Tabur Health Center working area, where the number of TB cases has increased significantly from 2021 to 2023. To date, no comprehensive study has integrated unique household physical conditions in this area with family history as a primary risk factor[5]. This study aims to quantitatively analyze the relationship between household physical environmental conditions (temperature, humidity, lighting, and residential density) and family history with the incidence of pulmonary TB in the Gunung Tabur Health Center working area using the Chi-Square statistical test[8].

MATERIALS AND RESEARCH METHODS

This study employed a quantitative approach with a descriptive-analytic design using a cross-sectional method[9]. The research was conducted in the Gunung Tabur Health Center working area, Berau Regency, from October to November 2024[11]. The study population consisted of all pulmonary TB patients registered at the Gunung Tabur Health Center, totaling 92 cases[12]. The sample comprised 48 respondents, selected using Slovin's formula with simple random sampling[13]. Inclusion criteria included pulmonary TB patients residing in the study area, willing to participate, and able to be interviewed. Exclusion criteria were patients who were unable to communicate or were not at home during data collection. Data were collected through structured questionnaires, interviews, and direct observation of household conditions, including humidity, temperature, lighting, and residential density[14]. Data analysis included univariate analysis to examine frequency distributions and bivariate analysis using the Chi-Square test with a significance level of $\alpha = 0.05$[15].

RESEARCH RESULTS AND DISCUSSION

The study results based on the characteristics of the respondents, including age, gender, education, and occupation, are presented in the following table:

Table 1. Respondent Characteristics by Age of Pulmonary TB Patients in the Gunung Tabur Health Center Working Area

No	Age (Years)	Frequency	Percentage (%)
1	<20	4	8,33
2	21–30	6	12,50
3	31–40	7	14,58
4	41–50	12	25,00
5	51–60	9	18,75
6	61–70	6	12,50
7	>71	4	8,33
	Total	48	100

Source: Processed Data Results

Table 1 shows that among the 48 respondents, the majority of pulmonary TB patients were aged 41–50 years, totaling 12 respondents (25%). In contrast, the lowest percentages were observed in the age groups <20 years and >71 years, with 4 respondents each (8.33%).

Table 2. Respondent Characteristics by Gender of Pulmonary TB Patients in the Gunung Tabur Health Center Working Area

No	Gender	Frequency	Percentage (%)
1	Male	37	77,1
2	Female	11	22,9
	Total	48	100

Source: Processed Data Results

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Table 2 shows that among the 48 respondents, the majority of pulmonary TB patients were male, totaling 37 respondents (77.1%)[16], whereas females accounted for 11 respondents (22.9%).

Table 3. Respondent Characteristics by Education Level of Pulmonary TB Patients in the Gunung Tabur Health Center Working Area

No	Last Education Level	Frequency	Percentage (%)
1	No formal education	3	6,3
2	Elementary School (SD)	16	33,3
3	Junior High School (SMP)	11	22,9
4	Senior High School (SMA)	15	31,3
5	Diploma/Higher Education	3	6,3
	Total	48	100

Source: Processed Data Results

Table 3 shows that among the 48 respondents, the majority of pulmonary TB patients had completed elementary school (SD), totaling 16 respondents (33.3%). In contrast, the lowest percentages were observed in respondents with no formal education and those with a diploma/higher education, each accounting for 6.3%.

Table 4. Respondent Characteristics by Occupation of Pulmonary TB Patients in the Gunung Tabur Health Center Working Area

No	Occupation	Frequency	Percentage (%)
1	Civil Servant (PNS)	1	2,1
2	Private Employee	7	14,6
3	Laborer	17	35,4
4	Farmer	3	6,3
5	Housewife	9	18,8
6	Unemployed	11	22,9
	Total	48	100

Source: Processed Data Results

Table 4 shows that among the 48 respondents in this study, the majority were laborers, totaling 17 individuals (35.4%)[17]. In contrast, respondents who were civil servants (PNS) accounted for the lowest percentage, with only 1 individual (2.1%).

Table 5. Relationship Between Humidity Conditions and the Incidence of Pulmonary Tuberculosis in the Gunung Tabur Health Center Working Area

Humidity Condition	Pulmonary TB				Total %	*P-value*
	Patients	Percentage (%)	Recovered	Percentage (%)		
Not Meeting Standard	23	47,9	1	2,1	50,0	0,049
Meeting Standard	18	37,5	6	12,5	50,0	

Source: SPSS Data Analysis Results

Table 5 shows that among the respondents' households, 23 homes (47.9%) in the pulmonary TB patient category had humidity levels that did not meet the standard, while only 1 home (2.1%) in the recovered category was in this condition. Conversely, homes with standard-compliant humidity levels included 18 homes (37.5%) in the pulmonary TB patient category and 6 homes (12.5%) in the recovered category. Household humidity levels are an

environmental factor that can affect the health of residents, particularly regarding infectious diseases such as tuberculosis. High humidity can provide an ideal environment for the growth of bacteria and fungi, including Mycobacterium tuberculosis[18].

Table 6. Relationship Between Room Temperature Conditions and the Incidence of Pulmonary Tuberculosis in the Gunung Tabur Health Center Working Area

Room Temperature Condition	Pulmonary TB				Total % Percentage (%)	*P-value* Recovered
	Patients	Percentage (%)	Recovered	Patients		
Not Meeting Standard	24	50,0	1	2,1	52,1	0,038
Meeting Standard	17	35,4	6	12,5	47,9	

Source: SPSS Data Analysis Results

Table 6 shows that among the respondents' households, 24 homes (50%) in the pulmonary TB patient category had room temperatures that did not meet the standard, while only 1 home (2.1%) in the recovered category was in this condition. Conversely, homes with standard-compliant room temperatures included 17 homes (35.4%) in the pulmonary TB patient category and 6 homes (12.5%) in the recovered category. The immune system can fluctuate, and the risk of infections such as tuberculosis may increase if room temperatures are excessively hot or cold. According to a study by Hidayati, houses with uncomfortable temperatures exhibited higher tuberculosis incidence, with a prevalence rate reaching 220 cases per 100,000 population. Survey data indicated that 50% of homes in this area experienced uncomfortable temperatures, contributing to the high incidence of tuberculosis among residents[19]. Respiratory health, particularly among the elderly and children, can be affected by unstable temperatures[20].

Table 7. Relationship Between Residential Density Conditions and the Incidence of Pulmonary Tuberculosis in the Gunung Tabur Health Center Working Area

Residential Density Condition	Pulmonary TB				Total % Percentage (%)	*P-value* Recovered
	Patients	Percentage (%)	Recovered	Patients		
Not Meeting Standard	12	25,0	0	0	25,0	0,078
Meeting Standard	29	60,4	7	14,6	75,0	

Source: SPSS Data Analysis Results

Table 7 shows that 12 homes (25.0%) in the pulmonary TB patient category had residential density conditions that did not meet the standard, while none in the recovered category fell into this condition. Conversely, homes with standard-compliant residential density included 29 homes (60.4%) in the pulmonary TB patient category and 7 homes (14.6%) in the recovered category. In the Gunung Tabur Health Center working area, residential density was not significantly associated with the incidence of pulmonary tuberculosis, as indicated by the statistical test result (p = 0.078 > 0.05).

Table 8. Relationship Between Lighting Conditions and the Incidence of Pulmonary Tuberculosis in the Gunung Tabur Health Center Working Area

Lighting Condition	Pulmonary TB				Total % Percentage (%)	*P-value* Recovered
	Patients	Percentage (%)	Recovered	Patients		
Not Meeting Standard	31	64,6	3	6,3	70,8%	0,098
Meeting Standard	10	20,8	7	8,3	29,2%	

Source: SPSS Data Analysis Results

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Table 8 shows that in respondents' households, 31 homes (64.6%) in the pulmonary TB patient category had inadequate lighting, compared to 3 homes (6.3%) in the recovered category. Conversely, homes with adequate lighting included 10 homes (20.8%) in the pulmonary TB patient category and 7 homes (29.2%) in the recovered category. Therefore, no significant relationship was found between lighting conditions and the prevalence of pulmonary tuberculosis in the Gunung Tabur Health Center working area, as indicated by the statistical test result (p = 0.098 > 0.05)[20].

Table 9. Relationship Between Family History and the Incidence of Pulmonary Tuberculosis in the Gunung Tabur Health Center Working Area

Family History	Pulmonary TB				Total %		*P-value* Patients
	Patients	Percentage (%)	Recovered	Patients	Percenta ge (%)	Recover ed	
Yes	7	14,6	1	2,1	8	16,7%	0,670
No	34	70,8	6	12,5	40	83,3%	

Source: SPSS Data Analysis Results

Table 9 shows that among respondents with a family history of pulmonary TB, 7 individuals (14.6%) were in the patient category, and 1 individual (2.1%) was in the recovered category. Among respondents without a family history, 34 individuals (70.8%) were in the patient category, and 6 individuals (12.5%) were in the recovered category. Therefore, no significant relationship was observed between family history and the incidence of pulmonary tuberculosis in the Gunung Tabur Health Center working area. Interviews indicated that respondents often interacted with family members suffering from pulmonary TB at a distance of less than 1 meter[21].

CONCLUSIONS AND RECOMMENDATIONS
This study concludes that the incidence of pulmonary tuberculosis in the Gunung Tabur Health Center working area is significantly influenced by the household physical microclimate, particularly air humidity (p = 0.049) and room temperature (p = 0.038). A synthesis of the results indicates that homes with substandard physical conditions (not meeting the standard, TMS) create an environment conducive to the persistence of Mycobacterium tuberculosis, with 47.9% of patients residing in homes with inadequate humidity and 50% of patients living in environments with suboptimal room temperature. In contrast, lighting (p = 0.098), residential density (p = 0.078), and family history (p = 0.670) were not statistically significantly associated with the incidence of pulmonary TB in this study (p > 0.05). This underscores that the primary risk factors in this area are related to the household's physical environment rather than genetic factors or primary social contacts[25]. For future research, it is recommended to further investigate occupant behavioral factors (such as smoking habits inside the house or duration of time spent indoors) and ventilation conditions more specifically, as these may interact with temperature and humidity[22].

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