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Analysis of Pulmonary Tuberculosis Incidence in The Community in The Talang Pangeran Health Center Area, West Pemulutan District, Ogan Ilir Regency in 2022

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Abstract

Pulmonary tuberculosis is an infectious disease caused by Mycobacterium tuberculosis and is one of the top 10 causes of death worldwide. This study aims to analyze the relationship between the physical condition of the house and the incidence of pulmonary tuberculosis in the working area of the Talang Pangeran Public Health Center, Pemulutan Barat District, Ogan Ilir Regency. This research design uses a case-control approach in determining the sample using a total sampling technique for cases and purposive sampling for controls. The sample number was 96, with 32 cases and 64 control respondents. Based on *bivariate* using chi-square test. The variables that have a relationship with the incidence of pulmonary tuberculosis in the work area of the Talang Pangeran Public Health Center, Pemulutuan Barat District, Ogan Ilir Regency, are temperature *p-Value* = 0.004 (*OR*= 5.073; 95%*CI*= 1.7-14.8), humidity *p-Value* = 0.016 (*OR*= 3.4; 95%*CI*= 1.3-8.7), lighting *p-Value* = 0.048 (*OR*= 4.081; 95%*CI*= 1.1-15), roof *p-Value* = 0.016 (*OR*= 3.182; 95%*CI*= 1.3-7.7). A variable that has no relationship with the incidence of tuberculosis is the type of wall *p-Value* = 0.828. The most dominant variable is house temperature. So that the temperature is normal, it is necessary to carry out home improvement interventions by the criteria for a healthy house. By expanding the size of the house, ventilating the house, and planting trees around the house.

Keywords: Health Centre; Physical condition of the house; Tuberculosis

Introduction

Pulmonary Tuberculosis (TBC) is still a public health problem both in Indonesia and internationally, so it has become one of the sustainable health development goals of the Sustainable Development Goals (SDGs). Pulmonary tuberculosis is an infectious disease caused by Mycobacterium tuberculosis and is one of the top 10 causes of death worldwide. Indonesia is ranked 2nd with the highest pulmonary tuberculosis sufferers worldwide after India. It is estimated that 10 million people will suffer from pulmonary tuberculosis in 2019. Although there is a decrease in new cases of pulmonary tuberculosis, it is not fast enough to achieve the END Pulmonary TB Strategy target in 2020, namely a 20% reduction in pulmonary TB cases between 2015 – 2020. From 2015 – to 2019, the cumulative decrease in pulmonary TB cases was only 9%. Likewise, with deaths from pulmonary tuberculosis, the number of deaths in 2019 was 1.4 million. Globally, deaths due to pulmonary tuberculosis per year decreased but did not reach the target of the END Pulmonary TB Strategy 2020 of 35% between 2015 – 2020. The cumulative number of deaths between 2015 and 2019 was 14%, which is less than half of the target determined (WHO-Global-Tuberculosis-Report, 2020).

Data on the number of suspected pulmonary TB who received standardized services in South Sumatra in 2020 was 61,979, with the highest number in Palembang City (19,569 cases) and the lowest in Pagar Alam City (317 cases). CDR is the number of all cases of Pulmonary Tuberculosis treated and reported among the estimated number of all new cases of Pulmonary Tuberculosis. CDR describes how many cases of Pulmonary Tuberculosis are covered by the program. In 2020, the CDR for tuberculosis in South Sumatra reached 27.8%. This figure has decreased compared to 2019 (65%), still far from the CDR figure recommended by WHO, which is 90%. Case Notification Rate (CNR) is the number of all cases of Pulmonary Tuberculosis treated and reported among 100,000 residents in a particular area. This figure, when collected serially, will describe a trend (trend) of

increasing or decreasing case finding from year to year in a region. In South Sumatra the CNR will reach 111 cases per 100,000 population in 2020 (Profil_Dinkes_Sumsel, 2021).

The data on the number of suspected TB who received services according to standards in Ogan Ilir Regency in 2020 was 2,107, with the CDR of TB in Ogan Ilir Regency reaching 50.8%. This figure has decreased compared to 2019 (62%), still far from the CDR figure recommended by WHO, which is 90%.(Profil_Dinkes_Ogan_Ilir, 2021). Based on the profile of Puskesmas Talang Pangeran 2021, Pulmonary TB cases from 2018 to 2021 have increased. In 2018 there were 20 cases; in 2019, there were 24 cases. In 2020, there were 26 cases, and in 2021 there was an increase of 32 cases of pulmonary tuberculosis.

Risk factors can trigger the incidence of pulmonary tuberculosis, some of which are the environment. Environmental factors affect house lighting, humidity, temperature, roof conditions, walls, floors, and residential density. In addition, factors other than the environment in the form of gender, age, income, knowledge, and attitudes towards the prevention of pulmonary tuberculosis also affect the occurrence of the disease (Azwar, 1995). The study concluded a relationship between occupancy density and positive smear-positive pulmonary tuberculosis incidence. There was a risk factor between lighting and the incidence of positive smear-positive pulmonary tuberculosis (Rohayu, Yusran, & Ibrahim, 2016).

Based on research on the relationship between the physical condition of the house and the incidence of pulmonary tuberculosis, the results obtained for natural lighting are that there is a relationship between natural lighting and pulmonary tuberculosis in the Bailing Public Health Center working area. The results obtained for ventilation are that there is a relationship between ventilation area and pulmonary tuberculosis in the work area of Bailing Health Center with the results of the bivariate analysis which shows that there is a relationship between natural lighting and ventilation area with the incidence of pulmonary tuberculosis in the work area of Bailang Health Center (Monintja, Warouw, & Pinontoan, 2020).

The physical appearance of the house with the incidence of pulmonary tuberculosis in the working area of the Kedungmundu Health Center Semarang City, the results of the study concluded that there was a relationship between humidity, lighting, ventilation area, residential density, type of floor, type of wall, and temperature on the incidence of pulmonary tuberculosis

Based on the data above, the researcher is interested in researching "Analysis of the incidence of pulmonary tuberculosis in the community in the Talang Pangeran Health Center area, Pemulutan Barat District, Ogan Ilir Regency in 2022".

Methode

This type of research is an analytic observational study with a case control. The analysis was carried out from April to June 2022. The research location was in the Talang Pangeran Health Center area, Pemulutan Barat District, Ogan Ilir Regency. The study population included all TB patients. There are 32 lungs in the Talang Pangeran Health Center area in 2021 - 2022. The sample in this study amounted to 96 people, consisting of a case group of 32 people and a control group of 64 people. Case sampling used a total sampling technique, and a control sample was taken by purposive sampling, whose house is close to the case sample. Instrument data is done using Questionnaires and Checklists using a hygrometer, Lux meter, and Calculator. The univariate analysis aimed to describe each variable, including age, gender, occupation, temperature, humidity, type of wall, lighting, and roof of a TB patient's house. Lungs in the Talang Pangeran Public Health Center, Pemulutan Barat District, Ogan Ilir Regency. Bivariate analysis used statistical test X^2 (Chi-square). This Odds Ratio was carried out to analyze the effect of the relationship between temperature, humidity, type of walls, lighting, and roofs of houses on the incidence of TB disease. Multivariate analysis using the Backward Stepwise method to analyze which variables have the most dominant influence on the incidence of tuberculosis

Result

Table 1. Frequency Distribution of Respondent Characteristics

No	Variable	Frequency	Percentage (%)
1	**Tuberculosis Pulmonary**		
	Case	32	33,3
	Control	64	66,7
2	**Year**		
	15-24 yrs	4	4,2
	25-34 yrs	18	18,8
	35-44 yrs	25	26,0
	>45 yrs	49	51,0
3	**Sex**		
	Meal	60	62,5
	Female	36	37,5
4	**Occupation**		
	Weavers/Laborers	12	12,5

Farmer/Plantation	57	59,4
Trader	5	5,2
IRT/Not working	22	22,9

Source: *Primary Data, 2022*

Table 1. The variable of pulmonary tuberculosis (cases) is 32 people (33.3%) compared to respondents without *pulmonary tuberculosis* (control), which is 64 people (66.7%) with a ratio of 1:2. In the age variable, most of the respondents were >45 years old (51%). The smallest respondent was 15-24 years old (4.2%). Then the gender variable, most of the respondents are male (62.5%). The work variable above shows that most respondents are housewives / do not work (22.9%).

Table 2. Variables independent of the incidence of pulmonary tuberculosis

No	Variable	Pulmonary Tuberculosis				p-value	OR	95% CI
		Case		Control				
		n	%	n	%			
Temperature								
1	In qualified	27	84,4	33	51,5	0,004	5,073	(0,7-14,5)
2	Qualified	5	15,6	31	48,4			
Humidity								
1	In qualified	24	75	30	46,9	0,016	3,4	(1,3- 8,7)
2	Qualified	8	25	34	53,1			
Wall								
1	In qualified	20	62,5	29	45,3	0,17	-	-
2	Qualified	12	37,5	35	54,7			
Lighting								
1	In qualified	29	90,6	45	70,3	0,048	4,081	(1,1- 15)
2	Qualified	3	9,4	19	29,7			
Roof of house								
1	In qualified	20	62,5	22	34,4	0,016	3,182	(1,3- 7,7)
2	Qualified	12	37,5	42	65,6			

Source: *Primary Data, 2022*

Table 3. Multivariate analysis of the incidence of pulmonary tuberculosis

No	Variabel	B	Wald	P-value	OR	95% CI
1	Temperature	1.616	3.269	.071	5.034	0.873-29.02
	Humidity	-.475	.318	.573	.622	0.119-3.239
	Lighting	.999	1.842	.175	2.716	0.642-11.49
	Condition Roof	.678	1.883	.170	1.971	0.748-5.194
	Constant	-2.959	7.262	.007	.052	
2	Temperature	1.234	4.506	.034	3.435	1.099-10.73
	Lighting	.898	1.611	.204	2.454	0.614-9.813
	Condition Roof	.648	1.749	.186	1.912	0.732-5.000
	Constant	-2.950	7.340	.007	.052	
3	Temperature	1.354	5.567	.018	3.874	1.258-11.93
	Condition Roof	.759	2.473	.116	2.137	0.829-5.506
	Constant	-2.221	6.312	.012	.109	
4	Temperature	1.624	8.802	.003	5.073	1.735-14.83
	Constant	-1.423	4.038	.044	.241	

Source: *Primary Data, 2022*

Table 2 show the results of a bivariate analysis of the relationship between temperature and the incidence *of pulmonary tuberculosis*, respondents who have a house temperature that does not meet health requirements are more in *pulmonary tuberculosis* (84.4%) than those without *pulmonary tuberculosis*(51.6%). The chi-square results showed a significant relationship between house temperature and the incidence *of pulmonary tuberculosis* (*p-Value:* 0.004). The results of the calculation of the *OR* of respondents whose house temperature does not meet the requirements are at risk of 5,073 times experiencing the incidence *of pulmonary tuberculosis*

compared to the temperature of the house that meets health requirements (95% *CI*: 1,7-14,8).

Table 3 show the results of data analysis using multivariate with *Backward Stepwise Selection* obtained that the variable that has the strongest contribution to predicting the incidence of pulmonary tuberculosis is temperature. This is because the house temperature variable has $p<0.05$ which is the best model 4 (*p-Value* = 0.003; *OR* = 5.073 *CI* = 1.735-14,830).

Regarding the relationship between humidity and the incidence of *pulmonary tuberculosis*, respondents with house humidity that does not meet health requirements are more in *pulmonary tuberculosis* (75%) than those without *pulmonary tuberculosis* (46.9%). The *chi-square* results showed a significant relationship between house humidity and the incidence of pulmonary tuberculosis (*p-Value:* 0.016). The results of the calculation of the *OR* of respondents whose house humidity does not meet the requirements are at risk of 2.818 times experiencing the incidence of *pulmonary tuberculosis* compared to the humidity of the house that meets health requirements (95% *CI*: 1.04-6.8).

Regarding the relationship between the walls of the house with *pulmonary tuberculosis*, respondents who have the type of wall of the place that does not meet the health requirements are more in *pulmonary tuberculosis* (62.5%) than those without pulmonary tuberculosis (45.3%). The chi-square results showed no significant relationship between the type of house wall and the incidence of *pulmonary tuberculosis* (*p-Value*: 0.170).

In the relationship between lighting and *pulmonary tuberculosis*, respondents with home lighting that does not meet health requirements are more in *pulmonary tuberculosis* (90.6%) than those without *pulmonary tuberculosis* (70.3%). The *chi-square* results showed a significant relationship between home lighting and the incidence of pulmonary tuberculosis (p-Value: 0.048). The results of the calculation of the OR of respondents whose house lighting does not meet the requirements are at risk of 4.08 times experiencing the incidence of *pulmonary tuberculosis* compared to house lighting that meets health requirements (95% *CI:* 1.1-15.04).

Regarding the relationship between the roof of the house and pulmonary tuberculosis, respondents with roof conditions that do not meet health requirements are more in *pulmonary tuberculosis* (62.5%) than those without *pulmonary tuberculosis* (34.4%). The results of the chi-square showed that there was a significant relationship between the condition of the roof of the house and the incidence of *pulmonary tuberculosis* (*p-Value*: 0.016). The results of the calculation of the OR of respondents whose roof conditions do not meet the requirements are at risk of 3,182 times experiencing the incidence of tuberculosis lungs compared with the state of the roof of the house that meets health requirements (95% *CI:* 1.3-7.7).

Discussion

Based on the bivariate analysis using the *chi-square* test to determine the relationship between the temperature variable and the incidence of tuberculosis, the *p-Value* = 0.004 <0.05. it means that there is a relationship between temperature and tuberculosis incidence in the working area of the Talang Pangeran Public Health Center, Pemulutan Barat Regency. According to the Decree of the Minister of Health of the Republic of Indonesia Number 1077/Menkes/Per/V/2011 (Kemenkes, 2011) concerning Guidelines for Air Sanitation in the room, it is stated that the room temperature that meets the requirements ranges from 18°C - 30°C. So it can cause hypothermia, while the temperature is too high can cause dehydration up to heat stroke. Abnormal temperatures can also cause a medium for the growth of microorganisms.

The incidence of tuberculosis. These bacteria can live in environments with high humidity to ensure their survival. In addition, these bacteria are resistant to low temperatures and can survive for a long time at a temperature of 4°C to -70°C. Phlegm will die at a temperature of 30°-37°C within ± one week (Rieder, Cauthen, Comstock, & Snider Jr, 1989). Dewi's research supported this study, resulting in a *p-Value*= 0.02 < 0.05, indicating a relationship between house temperature and the incidence of tuberculosis (Dewi, Suhartono, & Adi, 2015). This is supported by research conducted by (Wulandari, Nurjazuli, & Adi, 2015), showing the results of the temperature variable getting a value (*p-Value*= 0.001 < 0.05). This means that there is a relationship between room temperature and the incidence of *pulmonary tuberculosis*. With *OR* = 7.50, this indicates that respondents with room temperature who do not meet the requirements have a seven times greater risk of suffering from *pulmonary tuberculosis*.

Based on the researcher's assumption, why does temperature affect the incidence of tuberculosis in the working area of the Talang Pangeran Health Center. Many house windows are not opened, only a small part is opened, and only 2 or 3 windows are opened. According to the researcher's observations, this is also due to many houses (pulmonary TB cases) not being opened. And have ventilation holes so that the airflow in the home does not run well, thus triggering an increase in temperature, one of the factors causing tuberculosis.

Based on bivariate analysis, there is a relationship between humidity and the incidence of tuberculosis in the working area of the Talang Pangeran Public Health Center, Pemulutan Barat Regency. According to the Decree of the Minister of Health of the Republic of Indonesia No. 829/Menkes/SK/VII/1999 concerning housing health requirements, the air humidity that meets the requirements is 40%-70%. Air humidity that does not meet the needs can cause the growth of microorganisms that cause disturbances to human health. Smooth airflow can reduce indoor humidity. High humidity is a suitable medium for disease-causing pathogenic bacteria (Macfoedz, 2008). Based on the study's results (Wulandari et al., 2015). there is a relationship between humidity and the incidence of tuberculosis, with a risk value of 4.7 times.= *p-Value* 0.018 < 0.05, *OR* = 4.705. The researcher assumes that the humidity of the house affects the incidence of tuberculosis. Humid houses are caused by rarely opening windows, lack of airflow in the house, and minimal lighting, so humidity is the cause of tuberculosis.

Based on the bivariate analysis using the c*hi-square* test to determine the relationship between the wall type variable and the incidence of tuberculosis, the *p-Value* = 0.170 > 0.05. It means that there is no relationship between the type of wall and the incidence of tuberculosis in the working area of the Talang Pangeran Public Health Center, Pemulutan Barat Regency. This research is supported by research conducted by Imaduddin (2019), who says that there is no relationship between the type of wall and the incidence of tuberculosis, resulting in *p-Value*= 1,000 > 0.05 (Imaduddin, Setiani, & Suhartono, 2019). According to researchers, the house's walls are related to the population's temperature, climate, and geographical conditions. The existence of a tropical environment so that when it rains, it will evaporate and dry quickly so that the type of wall does not affect the incidence of *tuberculosis pulmonary*.

Based on the bivariate analysis it is using the *chi-square* test to determine the relationship between the home lighting variable and the incidence of tuberculosis, the *p-Value*= 0.048 <0.05, which means that there is a relationship between house lighting and the incidence of tuberculosis in the work area of the Talang Pangeran Public Health Center, Pemulutan Barat Regency. Lighting or lighting is needed in a room. This lighting is very much required so that the house is not damp and the walls are not mouldy due to bacteria or germs entering the house. Because disease-causing bacteria like dark places to breed. The more sunlight that enters, the better. According to (Kemenkes, 2011) states that the lighting requirements in the house are at least 60 lux. Sunlight has a role as a gemercid (killer of germs or bacteria). To get lighting, especially natural light, every room must have light or ventilation holes that allow the light to enter directly or indirectly. This study is supported by the results of research (Budi, Ardillah, Sari, & Septiawati, 2018), who found that the *p-Value* = 0.01< 0.05, *PR* = 1.57, which means there is a relationship between lighting and the incidence of TBC and has a risk 1.57 times. This study is also in line with research (Wulandari et al., 2015) which states that there is a relationship between lighting and the incidence of tuberculosis—obtained *p-Value*= 0.006 <0.05 with an *OR* value of 8.125 and has a risk of 8.1 times. The assumption of the researcher when measuring the lighting of the respondent's house. Many houses have minimal or insufficient lighting. This condition is influenced by the lack of glass tiles or the lack of ventilation in the place.

The bivariate analysis uses the chi-square to determine the relationship between the variable condition of the roof of the house on the incidence of tuberculosis, the *p-Value*= 0.016 <0.05. It means that there is a relationship between the condition of the roof of the house and the incidence of pulmonary tuberculosis in the working area of the Talang Pangeran Public Health Center, Pemulutan Barat Regency. This study was supported by (Budi et al., 2018), who said that there was a relationship between the condition of the roof of the house and the incidence of pulmonary tuberculosis, resulting in the *p-Value* of 0.02 <0.05 *PR* value of 3.57 (2.38-5.34). Researcher assumptions Many houses have minimal or insufficient lighting. This condition is influenced by the lack of glass tiles or the lack of ventilation in the house. This is because the condition of the roof of the respondent's house has met the requirements. This study is also in line with research (Budi, 2018), showing the results of the survey p-value= 0.000 <0.05, which means there is a relationship between the type of wall and the incidence of *pulmonary tuberculosis*. However, not everyone can repair or install a roof that has a roof. Qualified economic factors influence this. Because building the roof of the house requires a lot of money too. So, economic factors can affect the house's condition that does not meet the requirements. Therefore, there are still many people who have roofs that meet health requirements.

In the next stage, the data were analyzed together with multivariate analysis to determine the relationship between the physical environment of the house and the incidence of *pulmonary tuberculosis*. Bivariate analysis of each variable with a significant number with a value (*p-Value*) <0.05 is temperature, humidity, lighting, and the house's roof. Multivariate analysis can be done if the bivariate analysis results show a *p-Value* <0.25. The method used is Backward Stepwise (Conditional) at a significance level of 95% using the

SPSS application. The results of multivariate analysis of the most dominant variable that causes the incidence of *pulmonary tuberculosis* are temperature.

Conclusion

The study results showed a relationship between the temperature and humidity of the house with the incidence of *pulmonary tuberculosis*, and there was no relationship between the type of wall and the incidence of *tuberculosis* in the Talang Pangeran Health Center area. The most dominant variable causing the incidence of tuberculosis is the temperature of the house and doing greenery around the house so that the house where we live is filled with cool air and a temperature that meets health requirements.

Author Contribution and Competing Interest

It is hoped that it will improve the house's condition by the criteria for a healthy home. By expanding the size of the house and adding ventilation, the house. Because the addition of size and ventilation can affect the intensity of temperature, humidity, and lighting in the home.

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